

This section looks back to some ground-breaking contributions to public health, reproducing them in their original form and adding a commentary on their significance from a modern-day perspective. The original paper is reproduced by permission of the *British Medical Journal*.

Setting health priorities: the development of cost-effectiveness league tables

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Alan Williams's web site describes him as a "pseudo-retired professor of economics still active in promoting more explicit priority-setting based on cost-effectiveness approaches to both health maximisation and the reduction of health inequalities". He is widely acknowledged as the most influential of British health economists and indeed the father of the sub-discipline in the United Kingdom, as evidenced by respondents to a survey of British health economists who, when asked about the paper deemed most influential on both the discipline and policy, answered "anything written by Alan Williams" (1) and specifically his 1985 paper reproduced here.

At first sight it may appear odd that economists should choose as "most influential" a paper about coronary artery bypass grafting (CABG), and moreover one published in a medical journal. We believe that the following features account for the seminal nature of the paper: the collection of methodological aspects that were innovative at that time; the close relationship between analysis and policy; the frank acknowledgement of the limitations in data quality; and the vision of a future research agenda. However, the active involvement of its author in proselytising and arguing for his overall vision that "an explicit approach based on cost-effectiveness reasoning is on stronger moral ground than any other approach" has also been a key reason for the paper's success in stimulating the research and policy directions of many others (including economists).

Williams's paper introduced four specific methodological ideas to the context of decision-making in the UK National Health Service (NHS): application of the quality-adjusted life year (QALY) as a measure of effectiveness of interventions; calculation of ratios of cost per QALY gained from interventions; presentation of the first 'league table' comparing the relative cost-effectiveness of different interventions; and recognition that sub-groups of patients may have differential cost-effectiveness ratios. Parts of these ideas had been developed and applied in earlier publications in the USA (2, 3) but never in the UK. The approach of combining quantity and quality of life across different health interventions in the league table was particularly influential in moving cost-effectiveness analysis away from only piecemeal decision-making to broader sectoral planning (4).

In terms of policy implications, the paper concluded that CABG compared extremely favourably with heart transplants and treatment of end-stage renal failure, favourably with valve replacement for aortic stenosis and implantation of pacemakers for heart block, and less favourably with hip replacements. The more severe a case of angina, the more cost-effective it was to treat with CABG, and only the most severe cases were judged to be "a fairly strong claimant" on any extra resources. These were controversial conclusions aimed at stimulating further debate. The paper was published at an important point: a consensus conference had recommended a large increase in CABG operations; the UK Department of Health and Social Security had just significantly extended the heart transplant programme; and a detailed report on the costs and benefits of the heart transplantation programme had been completed (5). The paper was the first to compare directly the efficiency of very different types of health care interventions and, by so doing, to challenge UK government policy. However, it was also important for the future acceptance of the approach that several key people involved in these debates had been part of the

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process that produced the paper and that they have been influential in the funding, implementation and development of Williams's broader vision.

Williams disarmed his critics by his open and frank acknowledgement that the data used were extremely weak — “the data on which these judgements are based are crude and in need of refinement” — and he published the details of the evidence. Thus it is possible to see the values given and to understand the problems behind the numbers. Williams was also circumspect about how satisfactory his assumptions were. Subsequent methodological developments and empirical applications have not paid as much heed as they should have to the value of transparency (6) and this is one area where his successors should have taken greater note.

The admissions about weaknesses in the empirical data help concentrate attention on the methodology, which remains the core of the paper. They also enabled Williams to set out his vision for a future research agenda encompassing both methodological and data concerns. He argued for further research “focused much more on measurement of the quality of life and cost (both public and private)” of interventions. It is fascinating to read through the different steps of Williams's approach and reflect on how many of them have been developed, critiqued and used over time. For example:

- Measuring the quality of life benefits from health interventions is often now a specific requirement for evaluating the effectiveness of medical interventions.
- Several alternative methods for valuing health states have been developed and tested. General population surveys of health state values exist in Finland, Germany, Japan, the Netherlands, Spain, UK and USA, and are being used to evaluate changes in health measured by the EuroQol questionnaire. This has facilitated a move towards using the general public to evaluate health states, rather than experts.
- Alternative approaches to QALYs have been developed that explore different ways of combining quality and quantity of life, and examine what types of benefits should be maximized (e.g. including considerations of non-health benefits

and process utility). There is also greater attention being paid to the equity implications of QALYs and their alternatives.

- League tables of cost-effectiveness have been developed to cover a much wider variety of interventions and have been used explicitly to influence regional, national and international priorities for resource allocation.

Williams himself has taken a keen interest in these developments, always with an eye to ensuring that analyses answer policy-relevant questions. For example, he has been a persistent opponent of burden of disease analyses (7–9). However, no doubt he would approve, in principle, of WHO's development of a list of the cost-effectiveness of over 100 health interventions across many regions of the world, for policy-advice purposes.

The pattern of close connections between methods, analysis and policy choices, as well as between academic and government economists, has been maintained and extended since the paper. Indeed, in many respects, cost-effectiveness analysis is now institutionalized, in the form of regulatory requirements especially for drugs, and through commissioning agencies such as the UK National Institute for Clinical Excellence. One area that remains neglected is the exploration of factors driving variations in cost-effectiveness ratios. This has a critical part to play in questioning and understanding the generalizability of results and models of cost-effectiveness. As demand for cost-effectiveness analysis of health interventions rises around the world, we believe this will be a burgeoning area of research over the next decade — and Williams pointed to it in the mid-1980s.

While all this subsequent development of cost-effectiveness analysis as a tool for priority setting cannot be attributed to the influence of this paper alone (and there were leaders in other countries, such as George Torrance in Canada and Milton Weinstein in the USA), nonetheless this paper clearly influenced theory, policy, teaching, research, and practice and foreshadows many very important later developments. ■

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