smallness of the trade in manufactures already being recorded by such countries.

It can be seen from the comments above that this volume has as its major attraction the ability to influence readers into assuming a for or against position. It is very well balanced in that both sides of the argument are well presented and it should be listed as essential reading for the international economics and industrial policy sections of the discipline.

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Costs and Benefits of the Heart Transplant Programmes at Harefield and Papworth Hospitals *by Martin Buxton, Roy Acheson, Noreen Caine, Stuart Gibson and Bernie O'Brien.*
(Department of Health and Social Security, Research Report No. 12, HMSO, London, 1985) pp. viii + 171, ISBN 0-11-321033-7

This is a technical monograph. As the title indicates, it is concerned with an evaluation of two independently established heart transplant programmes in the UK, at Harefield and Papworth hospitals, which are funded on an *ad hoc* basis by the Department of Health and Social Security. It is quite exemplary in terms of the nature of the evaluation undertaken and in terms of the clarity with which the study's methodologies and findings are presented. The researchers recognise the probability of a diverse readership, and cater for the general reader through the use of non-technical summaries at the end of each chapter. Though these summaries necessarily incline towards rather balder statements, there is no tendency toward overstatement. For the more informed reader the main body of the chapters deals with the many caveats and cautions that the researchers unreservedly offer. Discussion of the study's methodologies and findings is amply supported by diagrams and tables.

The monograph is divided into four sections: Section I provides background about the size and nature of the two heart transplant programmes; presents data on the characteristics of patients (referred to the centres, assessed for suitability as transplant candidates, and transplanted, and of the donor population); and summarises broader parameters of resource use in the two hospitals, including their levels of activity, lengths of stay and bed use. Broad comparisons of this ilk are central to the remit "to show the position with respect to both centres individually and in terms of a more generalised statement drawing on data from both", and allow the researchers to reflect on the external validity of their findings.

Section II deals with the costing methodologies and conventions used to develop average unit costs, and presents an analysis of programme-related costs by treatment stage and by six-month post-transplant period, and of the extra NHS costs and other public sector costs incurred outside the two centres by patients assessed for transplantation and transplanted.

Section III presents information on patient outcomes in terms of their survival and quality of life. Section IV draws together the several elements of the evaluation and provides a preliminary basis for policy making. To give an

indication of potential demand, this section discusses the epidemiology of heart transplantation, and the costs and benefits of heart transplantation *vis á vis* alternative uses of the resources committed to such programmes.

The evaluation has a number of strengths. One is its scope. It embraces the gamut of outcomes (survival, quality of life, and cost-effectiveness) that should be of concern to clinicians and policy makers. This is unusual, and obviously advantageous. More commonly, each outcome is addressed separately, most often by researchers from different disciplines. All too often the upshot is an admixture of invalid assumptions and technical excellence, depending on areas of ignorance and expertise. The present evaluation reflects economies of scale in data collection but more importantly, it illustrates beautifully that the whole should and can be greater than the sum of the parts.

Another strength is that the evaluation was done prospectively. Hence, the researchers were able to choose a study design to maximise the internal and external validity of results, and to capitalise on sentinel effects and fine-tune data collection. With retrospective studies, one is constrained by the quantity and quality of the data already collected. Also, at a policy level, there is the problem that technologies not contemporaneously introduced and evaluated are not readily retrieved once diffused throughout the health care system. A particular advantage of the prospective nature of this study was the opportunity to observe trends in resource utilisation and patient survival as the transplant programmes evolved, and as technology changed.

Other strengths relate to the way in which the study deals with patient and programme outcomes. The assessment of patient survival is made tricky by the lack of an 'authentic' control group to address the fundamental question of the extent to which transplantation increases survival over conventional medical and surgical therapy. The problems here are that a randomised controlled trial of heart transplantation is widely regarded as unethcal, and that sub-groups of patients who might provide suitable comparison (patients rejected on purely psychosocial grounds or because they are outside the age limits for acceptance into the programmes) were too small in number. By default, the main group against which comparisons can be made is patients accepted for transplantation but not transplanted (waiting or died waiting). The problem with this group is the possibility of selection bias — that patients who die may be more sick than patients who are transplanted, and patients still waiting at any point in time may have a relatively better prognosis than those at the top fof the waiting list for what is, after all, a last ditch operation. The role played by selection bias could have been tackled statistically because the researchers also collected measures of health status from patients accepted into the transplant programme. It is not clear why they overlooked this possibility in their survival analyses. As it is, they are able to show that, making the most valid comparison possible in the circumstances, transplantation significantly extends life. Across the two programmes survival probabilities are 0.73 at six months, 0.69 at one year, 0.61 at two years, and 0.52 at three years.

The analyses of the costs of the transplant programmes at the two centres have a number of features that are worthy of comment. First, the researchers eschew short-run marginal costs in favour of 'average unit costs' for particular resources or services used in the programme. They argue, quite rightly, that an all-inclusive average cost concept is more appropriate in the context of planning decisions regarding a highly-specialised patient service that is, in the final analysis, experimental. Of course, this means that the costs identified do not

represent the additional funding required to underwrite the setting up of a heart transplant programme. Another qualification, again legitimate, is that the evaluation concentrates on operating costs rather than capital costs. Most capital resources used are available to hospital patients in general, or all cardiac surgery patients. Importantly, the study also considers 'net' costs to the NHS and costs elsewhere in the public sector. This is critical because the resource requirements and costs of heart transplantation are not restricted to the recipient operation and immediate post-transplantation care. Rather there is need to take full account of the costs of assessment for all patients regardless of whether or not they are accepted and transplanted, and of the extra costs of monitoring the clinical status of patients accepted into the progtramme but.not yet transplanted. Equally important are the costs associated with the procurement of donor organs. Because such costs are often borne elsewhere in the health care system, they are often overlooked.

Technically, the evaluation is not a cost-utility analysis, though the researchers do take the extra step of measuring quality of life. That quality of life is a conceptually thorny question probably does not mean we should give up and not attempt to measure it. The researchers are not nay-sayers and prudently adopt two approaches to measuring quality of life. Specifically, they use the Nottingham Health Profile (NHP) to provide quantitative measures of health status and changes therein, and semi-structured interviews with patients to gain an appreciation of the impact of transplantation on their health states and lives. the NHP is a fairly widely used formal instrument that focuses on six areas of social functioning: pain; energy; physical mobility; sleep; social isolation; and emotional reactions. It is one of a small number of well-validated general (as opposed to disease-specific) health status measures. More work can and should be done on the convergent validity of quality of life measures, but for now it can be said that both approaches affirm that patients' health improved after transplantation.

The final strength of the study is its measured evaluation of comparative costs and benefits and in this regard, the provision of a benchmark against which heart transplantation can be calibrated. From a policy perspective, a key question in evaluating health programmes is their relative cost-effectiveness. The 'answer' supplied is often a league table of costs per QALY (quality-adjusted life-year) with meagre regard for the propriety of the comparisons made. To their credit, the researchers anticipate this potentiality and provide their own estimates of costs for transplant versus CABG (coronary artery bypass graft) patients. The point is not that the two operations are substitutes — for they are not — but rather that those who seek to make comparisons may do so using data that reflect substantive rather than spurious cost differences due to methodology.

In summary, this monograph is very good indeed, though it is bound to be appreciated more by those with expertise in the area of the economic evaluation of health. Still, its diffusion should be urged for other reasons, including the hope that it will come to the attention of the policy makers who can and should commission similar studies in Australia.

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