

COST-BENEFIT METHODOLOGY IN MEDICAL CARE: COMMENTS ON
THREE PAPERS PREPARED FOR THE ANNUAL MEETING
OF THE ROBERT WOOD JOHNSON CLINICAL SCHOLARS

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The application of cost-benefit methodology to medical care services has come a long way from its first tottering steps in the late 1950s and early 1960s (see, for example, Fein 1958; Weisbrod 1961; Klarman 1965). In the early studies, benefits were measured by the change in a discounted stream of earnings caused by a medical care intervention. Beginning with Schelling's seminal paper in 1968, economists began to realize that earnings as a measure of benefits was seriously defective (see also Taylor 1969). Subsequently, there has been widespread agreement that the proper measure of benefit is given by the utility a well-informed consumer receives from the intervention; empirically, this can be represented by the amount the consumer would be willing to pay for the intervention (or the amount the consumer would accept to forego it; if the willingness-to-pay and willingness-to-forego differ, a specialist should be consulted). Unfortunately, there has been no large-scale attempt to implement a willingness-to-pay measure, and existing studies (for example, Acton 1973) remain under a cloud of suspicion that consumers did not understand the questions and so did not give valid responses (Raiffa, Schwartz, and Weinstein 1976). Decision-theoretic approaches to diagnosis and treatment are in the same spirit as the willingness-to-pay approach in that they attempt to ascertain the patient's preferences for certain outcomes (Schwartz, et al., 1975; Pauker 1976). Decision analysis is especially useful when uncertainty is an important part of the problem. This prologue is relevant to the papers on computed tomography (CT) (Larson, et al., 1977), and X-ray for lower back pain (Rockey, et al., 1977); discussion of the paper concerning the cost of rheumatoid arthritis (Meenan, et al., 1977) I shall defer for the moment.

I am delighted to see the awareness of costs that these papers evidence; I can still vividly recall discussing some years ago a decision tree for laboratory testing that a physician had drawn up; the tree omitted any reference to cost. When I pointed out that cost really belonged in the tree, the physician became indignant, arguing that only risk and value of information were relevant in medical decisions. Times have certainly changed!

Unfortunately, the pendulum may have swung too far. To understand the reason why, it is important to be clear about why one is interested in cost. Ultimately, one wants to make the most of society's scarce resources. CT and X-rays use resources that could have been used to produce other goods and services (or to reduce "bads" such as pollution). Such resource use shows up in an accounting framework as cost. Hence, the question comes: Is this the best use that can be made of these resources, the best that can be done for this cost? Such a question cannot be answered unless we can value outcomes or measure benefits.

In the measurement of benefits, I am afraid that the physician authors are showing signs of a syndrome noted by Oscar Wilde to afflict economists, who were said to know the cost of everything and the value of nothing. In the case of the paper concerning CT, the authors find that measures such as length of hospital stay and speed of work-up do not differ before and after the introduction of CT, and they therefore judge CT solely on whether it raises or lowers diagnostic costs. For two of the three diagnoses that they examine (suspected brain tumor and suspected hydrocephalus), CT lowered cost; for the third (suspected cerebrovascular disease), it raised it. Are we to conclude that CT should not be used in patients with suspected cerebrovascular disease? The authors think so: "However, for patients with suspected cerebrovascular disease, by far the most common inpatient neurological diagnosis, our studies suggest that CT does not have a beneficial impact on patient care and that 'need' projections should not include patients with this common diagnosis."

Are the authors right? Perhaps so, but there are signs of Wilde's Syndrome here. The authors note that there was a significant decrease in lumbar punctures in these patients, from around 25 percent to 10 to 15 percent. Would an informed consumer be indifferent between receiving CT and a lumbar puncture? I doubt it, since one can get a prolonged headache from the lumbar puncture and occasionally paralysis or meningitis might even occur. The proper question to ask is: Are informed consumers willing to pay the additional cost of CT for the convenience

of not undergoing a lumbar puncture?*

If the answer is yes, then CT should be used to diagnose suspected cerebrovascular disease. Moreover, some patients may and some may not; Pauker finds that patients differ in their preferences for possible outcomes of coronary artery surgery (Pauker 1976). Thus, in many cases, it may not be possible to make general statements.

An issue of benefit valuation also occurs in the study of X-rays for lower back problems. In this case, the authors look at measures of mean days lost and symptom status in a group of patients that received a spine X-ray and a group that did not. While these measures showed no difference, about 15 percent of the group that did not receive an X-ray was either unsatisfied or saw another physician; less than half that figure was unsatisfied or saw another physician in the group that received an X-ray. The authors state: "From our data and a review of the literature, we conclude that back X-ray examinations have negligible diagnostic value in otherwise healthy patients under 50 years of age with nontraumatic backache....We recognize that any clinical strategy which reduces the use of the back X-ray examination may require concomitant patient education to maintain patient satisfaction."

Again, the authors may be right, but again their data are not fully persuasive. First, the cost of the "concomitant patient education" needs to be considered, as well as the cost of any residual dissatisfaction or additional visits. But there is a more important issue. It may be the case that a spine X-ray could rule out or confirm certain quite infrequent problems for which intervention could make a difference if the problem were caught early. If the problem were sufficiently infrequent, it needn't show up in the sample of patients the authors examined. Physicians I have consulted have suggested that cancers, especially multiple myeloma, and bacterial osteo-

* A similar point can be made about the other two diagnoses studied; for them the frequency of pneumoencephalograms declined after CT, and I doubt that an informed consumer would be indifferent between CT and a pneumoencephalogram either. In these cases, however, CT also lowered cost.

myelitis could be missed if an X-ray were not taken, as could an abscess. They have also raised the issue of whether one can sufficiently trust the history to rule out trauma with certainty. The point here is simple: If I have a 1 in 1000 chance of having a life-threatening problem, I might be willing to pay \$32 to find out. (This would be in the range of values suggested by Weinstein and Stason [1976] for the value of a statistical life.) Note that there is also reassurance value in a (true) negative finding. From decision-theoretic principles, we know that X-ray is less likely to be preferred the lower is the probability that the X-ray could detect an important problem. Hence, the authors' conclusion that X-ray is of negligible diagnostic value in patients under 50 without trauma may be correct, and that group may be the optimal subset not to X-ray. But no analysis is presented to distinguish this particular group.

There is also an important point connected with the measurement of cost that both papers raise. One really wants to know what opportunities society forewent to use resources in a given way, the opportunity cost. There are two important implications for these problems: (1) Charges for ancillary services carry a notoriously high markup. As a result, use of charges will overstate the opportunity costs. (2) The appropriate cost figure is marginal cost; that is, what did the additional X-rays or additional CT cost? That is what society foregoes to deliver the service. But the charge may relate to average cost rather than marginal cost. For example, if the CT scanner were in place and being used for suspected brain tumor and suspected hydrocephalus, but were not fully utilized, the marginal cost of running an extra scan would be much less than the average cost. The charge would then further overstate the opportunity cost. For both these reasons, the studies appear to have overstated the relevant cost of the diagnostic services they consider.

In sum, it is important to be broad in one's definition of benefits; anything that is of potential value to the informed consumer is fair game. If possible, one should set up a mechanism to obtain measures of benefit from consumers themselves, and should allow for the possibility that different patients would prefer to be treated differently. If benefits include ascertaining the likelihood of low

probability events, sufficiently large samples need to be used to make this possible. Measures of cost should reflect the marginal cost of the good or service, and should also reflect the true resource cost, rather than "charges."

The third study differs markedly from the other two in that it focuses upon the costs imposed on certain individuals by rheumatoid arthritis. It notes quite correctly that costs include not only medical costs, but also reduced opportunities in the use of one's time. The authors should, but do not, distinguish between a loss in earnings caused by a reduction in hours and a loss caused by a reduction in the wage rate. To the degree that the loss in earnings comes as a reduction in hours, one gains time that one may use in other ways, and loss of earnings overstates the true loss. To the degree that the loss is in the wage rate, there is no compensation. One suspects that much of the earnings loss the authors show was in the wage rate, so that the authors' estimated costs may not be far off the mark.

Assuming this to be the case, the authors demonstrate that those with rheumatoid arthritis bear large costs, and raise the issue of whether nonmedical costs should be insured in addition to medical costs. The answer to this issue must consider a host of questions that are beyond the scope of this comment. These questions include: (1) To what degree are public and private disability insurance programs performing badly? (2) If public disability insurance is to be expanded, should it be financed by premiums (as group health insurance is), by payroll taxes, by general revenues, or by taxes related to the product generating the disability (for example, a tax on coal to finance a black-lung benefit)? (3) How should disability benefits relate to previous earnings in such a program? (4) What is the definition of a disability? Is it defined solely by a medical diagnosis such as rheumatoid arthritis? Must functional limitation be shown? If so, who decides what limitation is sufficient and by what criteria? (5) How do we apply public disability insurance to housewives? Do we pick an arbitrary value for the housewife's services? Or, do we let the household buy different values of insurance, just as it now can buy differing amounts of life insurance for the housewife? (6) How do we apply public disability insurance to members of

the household other than those employed and housewives? If an elderly parent becomes disabled and comes to live with the child, this may mean one member of the household must stop working. Can that be an insurable risk? I do not propose to answer these questions, but only to suggest some of the complexities in this area.

From my vantage point, cost-benefit analysis and decision theory have many useful applications in medicine. Indeed, physicians should know rudimentary decision theory because of its relevance to decision-making in patient care, although they cannot be expected to acquire the detailed knowledge of these tools that an economist possesses. I detect increasing collaboration between economists and physicians in applying these tools to medicine. Such collaboration augers well for future progress.

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