Measuring Value From the Patient’s Perspective

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With growing calls for scaling back medical spending in the United States, cardiac treatments in general, and revascularization procedures in particular, are receiving scrutiny. The American Heart Association estimates that in 2009, $93 billion in direct cost of care was attributed to ischemic heart disease in the United States.1 Much of this expense was due to an estimated 7 million cardiac procedures performed in the United States in 2006. These procedures include >1.3 million percutaneous coronary interventions (PCIs), and when coupled with a typical hospital charge of $45 000, it is clear that spending on PCI is a significant financial burden for the US healthcare system.

One of the drawbacks of PCI as a method of revascularization is the need for repeat procedures due to restenosis. This process is gradual and rarely life threatening, but often leads to symptoms of worsening angina, reduced quality of life, and significant expense for evaluation and treatment. The development of drug-eluting stents (DES) has been a major advance in the quest to reduce the restenosis rate, and they are now used in >70% of PCI procedures despite their higher initial cost of $1600 to $3200 compared with a bare-metal stent procedure.2 This rush to use a new technology, though not uncommon in United States, has led many to wonder whether this gain in quality of life is worth the added expense. A recently publicized case of overutilization of stenting has highlighted the skepticism that these procedures are appropriately used.3

To determine value of eliminating restenosis (eg, with DES), we have several options. One is a traditional cost-effectiveness analysis where effectiveness is measured in years of life gained. Because we have no evidence that reducing restenosis will improve survival, this method will not capture the value of technologies that reduce restenosis. A second method is a cost-utility analysis where one adjusts survival for quality of life. A recent review of 8 studies of DES found that all reported significant improvements in quality of life over bare-metal stenting.2 A few of these studies attempted to measure the gain in quality of life measured on a utility scale (0 to 1.0, where 1 is perfect health), which can be multiplied by years alive with angina to obtain quality-adjusted life-years (QALYs). These studies estimated that using a DES increased QALYs by 0.06 to 0.08 compared to bare-metal stenting. One attraction of a cost-utility analysis is that no value judgment is placed on the gain in QALYs. This value judgment is left to the policymakers who determine availability of medical treatments. However, many of the estimates that go into such an analysis are difficult to validate, such as the utility gain with less angina and the utility loss when having to undergo repeat procedures.

Some studies have ignored the patient’s view of his or her length and quality of life and have used revascularizations avoided as an intermediate outcome. The attraction of using this metric is that it is relatively easy to measure, although studies have reported a wide range ($1800 to $36 900) in cost of DES to prevent 1 revascularization.2 However, the use of an intermediate outcome such as avoidance of a procedure has significant limitations. It does not provide insight into how reducing angina and avoidance of procedures are valued by the patient, and it does not allow comparisons with other technologies needed for coverage decisions.

An alternative method is to perform a cost-benefit analysis where both benefit and cost are converted to cost units. If the benefit is greater than the cost, then the intervention has value. The difficulty with cost-benefit analysis is that those performing the analysis need to determine the dollar value of a life or improvement in quality of life. There are several ways one could estimate the dollar value of an extra year of life. For many nonmedical technologies, the improvement in economic productivity is the benefit (human capital method). However, many would argue that there are other reasons for keeping people alive and healthy unrelated to their economic productivity.

Perhaps the most straightforward method of determining value is to ask the patient: the willingness to pay approach. Guertin et al4 used this approach in their comparison of drug-eluting and bare-metal coronary stenting, which appears in this issue of Circulation: Cardiovascular Quality and Outcomes. The investigators estimated how much patients would be willing to pay to eliminate the risk of restenosis. Patients about to undergo cardiac catheterization and possible PCI were described scenarios where the baseline rate of restenosis was either 10% or 20%. By randomly offering a range of prices (bids) for a hypothetical treatment that would reduce the restenosis rate to 0, the authors were able to determine a median willingness to pay of $2802. This value was slightly higher than estimates from a clinical trial population from 2004 that demonstrated a willingness to pay of $273 for a reduction in restenosis from 30% to 20%, and $1162 for a complete elimination of restenosis.5

Important concerns with surveys are whether the respondent understood the question and gave a sincere response. Although it is often impossible to prove that patients would

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actually pay what they stated, there are signs of validity demonstrated by the investigators. Patients with higher income were willing to spend more money than those with lower income. In addition, when patients were offered a follow-up scenario where the out-of-pocket cost was higher by $500 the number willing to pay dropped, suggesting that the patients were considering their own economic situation when answering the questions.

Perhaps a more important question is whether the patients believed that restenosis was non-life threatening. Initially, 90% of patients expected PCI to improve their life span, which is consistent with a prior study of 153 patients with coronary disease of whom 75% thought that without PCI, they would probably have a myocardial infarction (MI) within 5 years, and 88% believed that PCI would reduce the risk for MI. This patient belief in MI-reduction (and associated life-prolonging) effects of PCI contrasted with a more evidence-based physician view of the benefits of PCI (although 25% of cardiologists also believed that elective PCI would reduce mortality). There is such a strong logic to the thought that blockages cause MI and drug-eluting stents reduce future blockages that it will be hard to dissuade patients from believing that they will live longer with less restenosis. Thus, it is likely that patients had a residual belief that preventing restenosis also would prevent MI and death, and this may have increased their willingness to pay for it.

Given that the Guertin et al4 study was done in Canada, we should ask whether Canadians are different. The authors note that Canadians’ healthcare costs are already covered by taxes and that they might be willing to pay more out of pocket than US patients who already have significant out-of-pocket health expenses. However, it is not clear whether Canadian patients would actually be willing to spend their stated amounts given that they know that their system provides universal coverage. Despite the few limitations noted, Guertin and colleagues estimate that a patient’s willingness to pay $2,800 to avoid restenosis is reasonable and indicates that eliminating restenosis with similarly priced interventions will have value for patients with coronary disease. As we maximize use of life-prolonging therapies, more of our work as clinicians will be to optimize quality of life and health status. However, we have little information to guide policymakers regarding how much to spend as a society to reduce angina, improve edema, eliminate palpitations, or avoid unnecessary testing and procedures. Placing a value on these symptoms through high-quality willingness-to-pay studies, such as the Guertin et al investigation, will be an important step.

Disclosures

None.

References


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