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Invited Commentary

Calculating Utility Gain by Different Methods for the Treatment of Cataract or Neovascular Age-Related Macular Degeneration
What Are the Consequences?

Marissa J. Carter, PhD, MA

Cataract surgery and drug treatment for neovascular age-related macular degeneration (NVAMD) are among the most common evidence-based ophthalmic procedures and yield substantial benefit to patients. For vulnerable populations who are elderly or disabled and minority populations who have struggled to obtain access to appropriate care most of their lives, loss of sight is devastating, so providing timely treatment ought to be straightforward. However, cataracts and NVAMD mostly occur late in life, which means that these conditions compete with other concurrent serious comorbidities, and benefits are spread across far fewer years than for younger patients. As a result, quantifying treatment benefits becomes more complicated.

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Utility theory has long been used as a means of determining the quality of life based on a scale of 0 to 1 in which 0 represents the health state of death and 1 is perfect health[1]; for example, in 1 large US study, the utility of diabetes estimated using the EuroQol-5 Dimension instrument was 0.8.[2] When cost is combined with utility, it is possible to evaluate any treatment for a given condition by calculating the cost of the treatment in relation to the change in utility value. Although the concept of cost-utility is widely accepted as a tool by health decision-makers to determine whether society should provide any given treatment, actual values are highly affected by the expected utility gain.

Patients can sometimes be considered experts of their own health conditions,[3] which is perhaps one reason why the time trade-off (TTO) approach to estimating utility has gained so much traction. Another reason is that the method is less cognitively demanding than the standard gamble. However, societal and community- or population-based estimates of utility values are still frequently recommended by health agencies and international organizations for a variety of reasons.[4] Given that health state values acquired from the patient are usually higher than hypothetical health state values obtained from other sources, how much of a difference does this make in cost utility analysis of treatment for cataracts or NVAMD?

In this issue of *JAMA Ophthalmology,* Brown et al[5] set out to answer this question by calculating cost-utility values for treatment of cataracts and NVAMD (phacoemulsification and intravitreal injections of ranibizumab for 11 years, respectively) using settings in the US, 2018 costs, and utility values estimated using the TTO approach from patients with the conditions, patients without the conditions (ie, the general public), and medical students without exposure to ophthalmology. The issue of systemic nonophthalmic comorbidity, a condition in which other serious concurrent comorbidities affect the overall patient utility value, was addressed by using the maximum limit approach in which the systemic comorbidity utility was set as an upper limit for the potential vision utility gain associated with the ophthalmic interventions.

As expected, utility values were considerably different between the ophthalmic and nonophthalmic cohorts, translating to a decreased cataract surgery cost-effectiveness of 71.3% compared with the reference case. In the maximum limit approach, cost-effectiveness dropped even more (92.5%), with the worst-case scenario (nonophthalmic patient vision utilities and a mean nonpatient systemic comorbidity utility analogue of 0.903 to limit the vision utility gain) showing a 206.8% cost-effectiveness decrease vs the reference case. Cost-effectiveness losses for NVAMD treatment were much less compared with cataract surgery but considerable nonetheless. Although cost-utility ratios for cataract surgery remained below the often-used incremental cost-effectiveness ratio threshold of $100 000 per QALY, all the cases in which the maximum limit approach was used for NVAMD treatment exceeded the threshold. Although health economists have argued that the $100 000 benchmark was arbitrary when it was published more than 2 decades ago, and its value is likely obsolete owing to inflation, it is still widely used in decision-making, as is its cousin of $50 000 (or £30 000) per QALY in the UK.[6]

Few patients should be denied vascular endothelial growth factor inhibitor drug treatment for NVAMD on medical grounds when the risks and benefits have been carefully weighed. The cost-utility of ranibizumab based on patient-obtained utility values is excellent, and the situation will likely be even better when longer-term studies of aflibercept have been published. The case is even stronger for cataract surgery. Al-

though health economics plays an essential role in deciding what interventions should be covered in national health care programs, decisions should also be transparent. That means understanding the methods by which utility values are obtained and how they affect the resultant cost-utility values. Although this study is a theoretical exercise—it would be hard to estimate in real-life practice how many patients would be affected by using different methods to determine utility values when benchmarks are used—the authors are to be commended for performing their study when most research is focused purely on cost-utility values rather than the provenance of the utility values themselves.

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