EDITORIAL

Do Cost-effectiveness Analyses Cause You Dyspepsia?

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In this issue of the *Journal*, Ebell and colleagues[1] evaluate the cost-effectiveness of several diagnostic and therapeutic approaches to dyspepsia. They use decision analysis, a modeling technique that is found with increasing frequency in the family medicine literature. The article is a good example of cost-effectiveness analysis, staying true to most of the principles outlined in the recent Health and Human Services (HHS) report.[2]

So, we have a good study about an important topic. Are we done? Do we have the answer? Hardly.

As clinicians, we recognize that our tools, be they diagnostic tests or therapeutic approaches, have both strengths and limitations. The same should apply to the tools used by researchers when they present the results of their work. A complete review of all the issues involving decision analysis is beyond the scope of this editorial. There are excellent reviews available for those interested in learning a little more[3] or a lot more[2,4,5] on the topic. Instead, this editorial briefly highlights two issues that directly relate to how we should use the results from this particular analysis.

First, as a background: decision analysis is a powerful tool to aid in decision making. Often complex problems, such as the evaluation of a dyspeptic patient, can be broken down into their component parts, simplifying our evaluation of the issues. Over the past decade, great strides have been made in the science of decision analysis and cost-effectiveness analysis. These advances were in part developed and codified in the recent HHS report.[2] But these advances do not mean that all problems have been solved. Several key issues limit our ability to immediately apply the findings of Ebell and colleagues.

Who is the patient?

A decision analysis is a very flexible tool. In essence, it can be used to help any individual make a decision. The problem is that one can consider two types of questions. An important question is, "How should I manage a patient with dyspepsia?" A second question is, "What is the best approach for Mrs Smith, the patient I have sitting in front of me right now?" At first blush, many (including the popular press) cannot see the important difference between these two questions. After all, it is argued, what is best for Mrs Smith should be best for "the masses," and vice versa. As clinicians we recognize the fallacy of this thinking. Every person is different, and we try to individualize our approach to patients taking these differences into account: avoid penicillin in those who are allergic, consider an alpha blocker in a patient with hypertension and benign prostatic hyperplasia, avoid beta blockers in a hypertensive diabetic patient with asthma. We know that everybody is different, but decision analysis treats everybody the same. This means that if you were able to put Mrs Smith's risks and preferences into the analysis, the results might help Mrs Smith make up her mind about which approach she favors. If Mrs Smith does not have average risks and preferences and you use average risks and preferences in the analysis, you may not be able to help Mrs Smith make up her mind. On the other hand, you should now have excellent insight into how a clinical policy might look.

The cost-utility study of the evaluation of the patient with dyspepsia is written for general use; it is not meant to be the solution for every patient. The analysis uses average costs and average quality-of-life values. Mrs Smith may not look anything like this average patient. To their credit, the authors do not assume that their results should be applied to all patients. But even for general policy work, the article by Ebell and colleagues leaves us somewhat up in the air. This is not their fault; as mentioned, the science has advanced, but the evolution still is not complete.

Take the perspective of the analysis. It makes the most sense for us to evaluate all elements of the analysis from the same perspective. For example, if this were meant to be an HMO policy, we would like to evaluate all outcomes from the HMO's perspective. If Medicaid were doing the analysis, the out-

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comes would be evaluated from Medicaid's perspective. This is sometimes difficult. In the article, the authors claim that costs are evaluated from the "payer perspective," yet drug costs were estimated by pharmacy charges, and other costs were estimated by Medicare reimbursement. The two different "cost" definitions, neither pure, confuse the perspective of the analysis. This common problem limits the usefulness of many decision analyses. On the other hand, the benefits of the analysis far outweigh this limitation, especially after viewing the results of sensitivity analysis as discussed in the next section.

DEALING WITH THE UNKNOWN

Any decision analyst recognizes that the results of the analyst's work depend on the assumptions used in the analysis. These assumptions take the form of variables because we do not know their true value. The two types of variation can be illustrated in an example of an antibiotic that is used to treat an inpatient who has pneumonia. First, we may not know the true value of the variable. For example, there may be 15 published trials that report the effectiveness of an antibiotic. The treatment success rate may vary between 75% and 95%. What is the true value in your patient population? Clearly, you do not know and may never know. While you are reasonably certain that it is somewhere between 75% and 95%, it may be higher or lower.

The second type of variation is one that is based on true variation within the population. For example, while we may learn that the average cost of treatment is $7000, we also know that there is tremendous variation in this cost. Some patients respond quite quickly and are out of the hospital with a $3000 bill. Those who develop complications may have a bill in excess of $20,000. In the first case we assume that there is a single value for the effectiveness of the treatment; we just do not know what it is. In the second case we know there is not a single value for the cost of treatment, and we assume an average value.

We can deal with these unknowns in several ways, generically referred to as a "sensitivity analysis," where we vary the values of the assumptions in the analysis and observe the effect of this variation on the results. For example, we might assume that since clinical trials tell us that the effectiveness of the antibiotic is between 75% and 95%, the "true" effectiveness is 85%. We would start with 85% in the analysis, but also use 75% and 95% in different analyses and compare the results. The final calculated values may be different, but if the conclusions we draw do not vary, we know the value of this variable, ie, the effectiveness of the antibiotic, is not a critical unknown. Conversely, if the variation changes our conclusions, more work is needed to learn the true effectiveness of the antibiotic.

The problem is that in any analysis there may be a large number of variables, and the standard approach is often insufficient. The article by Ebell and co-workers, for example, contains over 40 variables, but the investigators chose to perform a sensitivity analysis on only a few. Even at that, they chose to vary only one or two variables at a time. This is standard practice in decision analysis, but it does not help us know how to deal with the diversity we see in our offices. As mentioned, we need to further develop the decision analysis science.

"Evaluation of the Dyspeptic Patient: a Cost-Utility Study" is an excellent example of how decision analysis can be used to give clinicians important insights into complex issues. This does not mean, however, that the findings in this article are applicable to everyone or that further research to better estimate important variables is not needed. Ebell and colleagues should be commended for their excellent work and thanked for the tool they have given us. Just as we need to use a new antibiotic carefully and in the appropriate setting, it is important for us to use their work in an appropriate manner.

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See article on page 545