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POLICY ANALYSIS

Choice Defines Value: Using Discrete-Choice Experiments to Understand and Inform Health Care Decisions

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Introduction

Almost every activity in health care or health care systems involves the evaluation of alternatives based on multiple criteria. At the regulatory level, policy makers evaluate alternatives to define general principles that shape national and local policies for the provision of health care. At the clinical level, physicians and manufacturers of drugs evaluate alternatives within the broad criteria defined by policy makers to treat patients and improve their health. Finally, patients evaluate the specific treatment alternatives laid out before them in an effort to improve their overall level of well-being.

Across and within the stakeholder levels described above, the evaluation of health care alternatives can lead to different choices even when the same evidence is considered. These differences can be the result of differences in the factors emphasized by each group of stakeholders or of the relative importance that the factors considered might have to each group. There is increased interest in uncovering and understanding differences in choice as a way to explain issues in health care provision, such as sub-therapeutic levels of treatment for chronic conditions or treatment non-compliance, and to improve allocative efficiency in health care systems (e.g., subsidies for healthy behaviors). There are challenges, however, that make the process of exploring these multiple criteria difficult.

First, health care decisions likely are influenced by a variety of factors including, but not limited to, health outcomes. Second, with few exceptions, the market transactions that conventionally serve as a source of information to understand the decisions of different stakeholders are seldom openly observed in health care. Even when these transactions are observed, they occur in highly regulated contexts and may poorly reflect the value of the alternatives.

Eliciting stated preferences over health and health care alternatives is increasingly regarded as a viable option to determine what factors are important in health care decisions. This is because stated preferences can be elicited over a variety of controlled scenarios relatively easily and inexpensively while providing the information necessary to determine the relative value of factors affecting health care decisions. In this article, the authors briefly describe how stated preferences can be elicited using several types of discrete-choice experiments (DCEs), and discuss how stated preferences can be used to understand health care decisions and to determine the importance of the multiple factors that implicitly drive these decisions.

Stated Preference and Discrete-Choice Experiments

Economists interpret people's choices among finite sets of alternatives as actions that reflect underlying preferences for attributes associated with the alternatives considered. It is assumed that choices are, on average, the optimal responses to the decisions people face. As an optimal response, a choice then indicates that no other alternative will make the decision-maker better off. For that reason, preferences—although not directly observed— are inferred by systematically observing people's choices among alternatives. In the absence of choice data from real-world situations, economists commonly rely on stated choices to infer the relative value of outcomes. Stated preferences refer to the preferences that can be inferred from stated choices as opposed to real-world decisions.

Among the options available to elicit stated preferences, DCEs are increasingly conducted to inform the evaluation of health care alternatives. Discrete-choice experiments rely on the analysis of stated choices for alternatives or alternative attributes under experimental conditions to uncover the value of the factors that drive choice. Discrete-choice experiments are based on the hedonic principle that people derive benefits from the combination of attributes in an alternative, and, therefore, choices between alternatives are a reflection of the implicit values assigned to each attribute. In addition, because DCEs can consider a variety of factors with flexible relationships between them, they make it easy to consider the influence of these factors within broader economic concepts, like market demand.

In practice, DCEs ask respondents to choose among attributes that define alternatives. These choices can be made between bundles of multiple attributes similar to the way some real-world alternatives might be considered, or among specific attributes within alternatives. Systematic changes in the attributes that respondents are asked to consider provide the experimental stimuli that create the choice experiment. Discrete-choice experiment results produce what are commonly known as utility or preference weights. These weights convey the relative value of outcomes to a sample of respondents. The ratios of these weights reveal the rate at which outcomes can be substituted for each other, making it possible to compare factors measured in different units. As an example, DCE results could be used to help determine how much risk patients are willing to accept to achieve greater longevity by taking the ratio of a preference weight for changes in a particular risk over the preference weight for changes in years of survival. If, for example, the ratio is equal to two, patients are willing to accept two units of the risk for every unit of greater longevity (additional years of survival).

Using DCEs, health care alternatives can be characterized by the health outcomes they produce as well as the multiple clinical, social and economic considerations that are believed to influence health care decisions. With this characterization of health care decisions in DCEs, it is possible to uncover the implicit importance of the factors involved in these decisions and estimate the relative value of the health care alternatives.

Versions of Discrete-Choice Experiments

Several question formats within DCEs are used to elicit stated preferences over health and health care alternatives. Each format presents respondents with tasks that make different assumptions about the complexity of the decision process of interest. Nevertheless, the analysis of all the different tasks is based on the same utility-theoretic principles.

- **Partial ProfilePaired Comparison:** Partial profile paired comparisons are arguably the simplest choice tasks that can be considered in DCEs. In these comparisons, respondents are asked "which do you prefer" given a partial set of attributes for each of two alternatives. The pairs presented to respondents are varied systematically until choices are recorded for every attribute relative to every other attribute of interest. Across respondents, the probability that an attribute is preferred over another in paired comparisons is considered an indication of the relative value of that attribute.

- **Best-Worst Scaling:** In best-worst scaling (BWS) questions, respondents are asked to partially rank a set of alternatives described by a handful of attributes. Specifically, respondents choose the alternatives they most and least prefer. The combination of attributes in each set is varied systematically until enough information is obtained to determine the value of all attributes. Information from the partial rankings can then be expanded into a series of pairwise responses and analyzed to quantify the relative value of each attribute across respondents. This task is more complicated than paired comparisons, but its expansion enables BWS to capture more preference information in each question than paired comparisons.

- Full profile: Designed to provide information about individuals' willingness to accept tradeoffs among attributes of multi-attribute alternatives, full-profile questions ask respondents to choose their preferred alternative based on a comprehensive list of attributes. These alternatives are treated as bundles of attributes that are varied systematically across questions. Differences in the attributes across alternatives force respondents to forego some desirable outcomes for others as they choose one alternative over another. By collecting information on the tradeoffs that respondents are willing to accept, it is possible to estimate the relative importance of each treatment attribute. Unlike partial profile paired comparisons, full-profile comparisons allow respondents to simplify the choice by systematically ignoring attributes. In some circumstances, full profile choices can allow the estimation of a wealth of interaction effects between attributes. That is, changes in the preference for alternatives can be conditioned on combinations of attributes, which do not occur in partial profile comparisons and BWS. Full-profile questions are often harder to answer, however, and may require excluding alternatives described by implausible combinations of attributes as these can be rejected by respondents as nonsensical.

Stakeholders

For regulators, DCEs could provide a systematic and rigorous approach to quantify the relative value that patients assign to benefits and risks of medical interventions. These relative values can be used to determine what benefit-risk tradeoffs are acceptable to patients. By calculating the ratio of the preference weights of benefits and risks it is possible to quantify the risk levels that would offset the benefits of treatments. This type of information could also help regulatory agencies consider patients' perspectives in the evaluation of current and future treatment options.

The European Medicines Agency (EMA) established in its Roadmap to 2015 [EMA 2012] that the current risk management plan for medicines should eventually be converted into a benefit/risk management plan. The EMA also advocates transparency of benefit-risk assessments at the regulatory level through the use of quantitative methods and closer attention to patients' values. In the United States, the Food and Drug Administration (FDA), through the FDA Amendments Act of 2007 (H.R. 3580 [Public Law 110-85] §904), is required to collaborate with public and private entities to provide advanced analyses of drug safety that can be used to improve the quality of benefit-risk decisions. More recently, FDA's Center for Devices and Radiological Health and Center for Biologics Evaluation and Research issued guidance on benefit-risk assessments that also considers patients' perspectives on treatment-related benefits and risks. In addition, the recent reauthorization of the Prescription Drug User Fee Act (Pub. L. No. 112-144, 126 Stat. 993 [2012] in the US) includes the development and testing of a benefit-risk framework for use in regulatory decision making in its goals. Moreover, this reauthorization specifically indicates that patient perspectives should be considered in regulatory discussions on drug development.

Discrete-choice experiments could also provide regulators the necessary information to develop a rigorous approach to negotiate pricing based on the incremental cost-benefit ratio of health technologies. In Germany, the Institute for Quality and Efficiency in Healthcare, also known by its German acronym IQWiG, is mandated by the German Social Insurance Code (SGB V) to develop methods and criteria for cost-benefit assessments by international standards of evidence-based medicine and health economics (§ 35b SGB V). By analyzing the marginal benefits associated with alternative interventions, the decision-making body is expected to be able to determine a price premium for interventions. One of the central methodological and practical problems in the systematic evaluation of health technologies is the identification and weighting of endpoints apt to document relevant patient benefits. IQWiG recently completed two pilot studies using analytical hierarchy process (AHP) and DCE in order to determine the relative weight (relative importance) of patient-relevant endpoints.

Results from DCEs also can help physicians identify optimal therapeutic levels of treatments for chronic conditions. A common tool in oncology is Quality Time without Symptoms or Toxicity (Q-TWiST), which is the number of days of added survival less the symptomatic days. Instead of weighing these days equally, DCE evidence can provide a weighing scheme that corresponds more closely to patients' preferences for such cancer-related outcomes. Insights on patients' preferences can shed light on their tolerance of treatment-related side effects, which, in turn, may identify the factors that influence treatment non-compliance. For manufacturers of drugs, DCE results can be used to help determine the appropriate path for the development of compounds.

Conclusion

Discrete-choice experiments represent a practical way to understand preferences for health care alternatives where real-world choices are difficult (if not impossible) to observe. Discrete-choice experiments can also be used to define the appropriate criteria in health care decisions by eliciting the value patients place on the different attributes that drive decisions in health care.

With recent efforts to improve the allocative efficiency of health care systems, understanding stakeholders' preferences is quickly becoming an important part of good health care decision making. Although limitations in the use of information related to health care decisions (i.e., privacy concerns, poorly defined outcomes, and highly regulated markets) are unlikely to change in the near future, stated preferences are already providing information about stakeholders' current decisions. Looking forward, this information can be used to inform stakeholders at the clinical and regulatory levels about clinical factors that might be important to patients in future treatments.