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In A Survey, Marked Inconsistency In How Oncologists Judged Value Of High-Cost Cancer Drugs In Relation To Gains In Survival

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Abstract

Amid calls for physicians to become better stewards of the nation's health care resources, it is important to gain insight into how physicians think about the cost-effectiveness of new treatments. Expensive new cancer treatments that can extend life raise questions about whether physicians are prepared to make "value for money" tradeoffs when treating patients. We asked oncologists in the United States and Canada how much benefit, in additional months of life expectancy, a new drug would need to provide to justify its cost and warrant its use in an individual patient. The majority of oncologists agreed that a new cancer treatment that might add a year to a patient's life would be worthwhile if the cost was less than \$100,000. But when given a hypothetical case of an individual patient to review, the oncologists also endorsed a hypothetical drug whose cost might be as high as \$250,000 per life-year gained. The results show that oncologists are not consistent in deciding how many months an expensive new therapy should extend a person's life before the cost of

therapy is justified. Moreover, the benefit that oncologists demand from new treatments in terms of length of survival does not necessarily increase according to the price of the treatment. The findings suggest that policy makers should find ways to improve how physicians are educated on the use of cost-effectiveness information and to influence physician decision making through clinical guidelines that incorporate cost-effectiveness information.

In the past decade, new cancer treatments have emerged that offer the hope of increased survival for patients with previously untreatable diseases. Patients with lung, colon, gynecologic, and other cancers have benefited modestly from these new therapies.^{1–4}

But many of these promising new therapies come at staggering financial costs.⁵ Drugs like bevacizumab (Avastin)—designed to impede the growth of blood vessels and tumors—can cost more than \$100,000 per patient.^{6–8} With pressure from insurers, employers, and governments to control health care costs, experts have begun to ask whether even developed nations can afford to offer these treatments to all patients who might benefit from them.⁹

Medical oncologists in the United States and Canada are on the front line of this controversy.¹⁰ Their decisions to recommend treatments with modest clinical benefit to their patients are complicated by the cost of these new therapies. The financial burden of even a 10 percent copayment on a \$100,000 treatment is beyond the means of many people.¹¹

In addition, even when patients are not burdened by the cost of therapy, oncologists may wonder whether society, more generally, can afford these treatments.¹² The use of new technology is, by some estimates, the greatest contributor to health care inflation,¹³ and rising health care costs place burdens on employers, insurance enrollees, and governments.¹⁴

But are physicians prepared to make “value for money” trade-offs at the bedside?¹⁵ This question is a crucial one for health policy experts because physicians’ decisions still play a large role in driving up health care costs.¹⁶ Ultimately, the proliferation of expensive medical technologies has resulted from the accumulated decisions of individual physicians caring for individual patients. Health care policies often succeed or fail depending on how they influence physicians’ behaviors. Thus, it is important to gain more insight into how physicians think about the cost-effectiveness of new technologies.

In this article we report the results of a survey of oncologists in the United States and Canada that we conducted to gauge how much benefit oncologists believe new treatments need to provide so as to justify their costs. To determine the stability of the oncologists’ attitudes about what constitutes a cost-effective treatment, we randomized oncologists to receive different versions of our survey, in which we varied the price of the new treatment.

Study Data And Methods

We surveyed oncologists in the United States and Canada, presenting them with a hypothetical new chemotherapy drug and asking them how much benefit, in months of life expectancy gain, this drug would need to provide to warrant its use. We randomly varied the scenario across respondents, as described below, to assess the stability of oncologists’ attitudes.

SURVEY METHODS

In the United States, we surveyed a random sample of members of the American Society of Clinical Oncology, the largest clinical oncology organization in the country. More than two-thirds of the oncologists in the United States are members of this society (Allen S. Lichter, American Society of Clinical Oncology, personal communication). We mailed surveys to

1,389 randomly selected society members. Twenty-four surveys were returned to us by the post office as undeliverable, leaving our study denominator at 1,365. We randomized society members to receive either a \$50 incentive on the first mailing and none on the second, or a \$20 incentive on both mailings. All responses were anonymous. Our overall response rate of 59 percent did not vary as a function of the financial incentive ($p > 0.10$).

In Canada, we distributed the survey to all 238 medical oncologists outside of Quebec Province using the following sources: the membership list of the Canadian Association of Medical Oncologists, the Canadian Medical Directory, and the directory of Fellows of the Royal Canadian College of Physicians and Surgeons. We excluded oncologists in Quebec Province because our survey was written in English. Participants received an e-mail link to a web-based version of the survey as well as a hard-copy version by mail. E-mail reminders were sent to enhance the response rate.

GENERAL ATTITUDES TOWARD VALUE FOR MONEY

In a portion of the questionnaire assessing oncologists' general attitudes toward the cost of cancer care, we asked them: "What do you think is a reasonable definition of good value for money or cost-effectiveness per life-year gained?" Response categories were \$0–\$50,000, \$50,001–\$100,000, \$100,001–\$150,000, \$150,001–\$200,000, and more than \$200,000.

A HYPOTHETICAL CLINICAL SCENARIO

Our clinical scenario was adapted from the work of Eric Nadler and coauthors.¹⁷ The scenario involved a patient with metastatic cancer who was expected to survive for twelve months with standard chemotherapy at a cost of \$25,000. The survey asked oncologists: "What minimum improvement in median survival (in months) over standard treatment's median survival would cause you to prescribe the new medication instead of standard treatment? (Assume that patients bear no out-of-pocket costs for the medication.)" Thus, our scenario essentially asked oncologists to consider a societal perspective on treatment cost.

Across oncologists, we randomly varied the cost of the hypothetical new drug, indicating that it cost either \$75,000 or \$150,000. In other words, we asked some oncologists to consider a \$75,000 drug, and others a \$150,000 drug. This experimental randomization enabled us to test whether the implicit cost-effectiveness ratio endorsed by physicians in this scenario was stable or, instead, whether respondents were relatively insensitive to the financial cost of the new drug.

The \$75,000 drug cost \$50,000 more than the standard treatment. A physician who indicated that the new drug must extend a patient's life by at least three months to justify its use therefore implicitly endorsed a cost-effectiveness ratio of \$200,000 per year of life, because \$50,000 for three months equates to \$200,000 per year. In contrast, the \$150,000 drug cost \$125,000 more than the standard treatment. An oncologist using the same cost-effectiveness ratio for this drug would require that it extend a patient's life by 7.5 months: \$125,000 for 7.5 months equates to \$200,000 per year.

Later in the survey, we presented oncologists with a second scenario, focused on treatments that improve quality of life but do not extend length of life. We did not experimentally vary the price of the treatments in the second scenario. Because the focus of our current analysis is price sensitivity, we do not report the responses on the quality of life scenario here.

DATA ANALYSIS

All data were entered by two separate research assistants. Discrepancies in data entry were resolved by referring to the original questionnaire. Because of the interests of one of our

fundings, the California HealthCare Foundation, we oversampled oncologists practicing in California. To adjust for this sampling strategy, we used poststratification weights in all analyses.

The primary outcome measure in this study was the cost-effectiveness ratio implied by physicians' responses. See the online Appendix for details of our calculation.¹⁸

To test the influence of our experimental factor (drug price) on physicians' cost-effectiveness judgments, we conducted linear regression analyses. The dependent variable was the implicit cost-effectiveness ratio. The independent variable was drug price. We adjusted for respondents' age, sex, and percentage of time spent in clinical practice.

The implicit cost-effectiveness ratios were skewed. Therefore, we ran analyses again, with the natural log of the cost-effectiveness ratio as the dependent variable. All of our results were robust.

LIMITATIONS

Our study has a few limitations. First, it was limited to US and Canadian oncologists and does not necessarily reflect the views of oncologists in other countries, who typically practice in very different health systems. Nevertheless, the health systems in the United States and Canada, although geographically close, are quite different. The similarity in attitudes in the two countries suggests that our findings are potentially of widespread interest.

Second, a response rate of 59 percent means that our results might be biased, although it is similar to that reported in the majority of physician surveys.¹⁹ However, nonresponse bias has no bearing on our main experimental finding: that cost-effectiveness ratios were significantly influenced by the cost of the hypothetical new drug. On a related point, our US sample—members of the American Society of Clinical Oncology—was not a representative sample of US oncologists. Nonetheless, the sample included the majority of the country's medical oncologists.

Third, our survey relied on responses to a hypothetical clinical scenario. It therefore may not reflect how oncologists behave in practice. However, research has shown that responses to clinical scenarios closely mirror actual practice.²⁰ In addition, by posing a hypothetical scenario, we were able to control other factors relevant to such decisions, such as patients' out-of-pocket costs and the cost of the new treatments.

Fourth, our scenario did not describe the quality of life of the hypothetical cancer patient in enough detail for respondents to be able to calculate the quality-adjusted life-years created by treatment. To account for this, in our cost-effectiveness threshold analyses, we made the generous assumption that patients experienced the maximal quality of life. This means that the cost-effectiveness thresholds presented here are best-case scenarios.

Study Results

The online Appendix¹⁸ shows basic demographic information for our respondents. None of these demographic characteristics varied significantly across the two versions of the questionnaire ($p > 0.10$). We received responses from 788 US oncologists and 158 Canadian oncologists, for an overall response rate of 59 percent. For US oncologists, the response rate was 57 percent; for Canadian oncologists, it was 65 percent.

When we asked oncologists to explicitly indicate what constitutes "good value for money," Canadian oncologists, on average, endorsed higher cost-effectiveness thresholds than their

US colleagues ($p = 0.04$) (Exhibit 1). However, only 30 percent of US oncologists and 35 percent of Canadian oncologists endorsed cost-effectiveness ratios of higher than \$100,000 per life-year.

Responses to the clinical scenario revealed very different attitudes toward the cost-effectiveness of oncology treatments. Exhibit 2 shows the increase in median life expectancy that oncologists indicated would warrant the use of a new drug, according to whether the drug cost \$75,000 or \$150,000. Responses to the clinical scenario did not significantly differ between US and Canadian oncologists ($p > 0.10$; data not shown). However, the cost of the drug was significantly associated with the number of additional months that oncologists felt patients needed to live to justify use of the drug. For the \$75,000 drug, oncologists required a mean of 6.0 additional months of life, versus 7.8 months for the \$150,000 drug ($p < 0.001$).

Oncologists demanded longer survival from the \$150,000 drug, but their demands did not rise in proportion to the drug's incremental cost. Consequently, the cost-effectiveness ratios implied by their responses to the clinical scenarios differed significantly, depending on the cost of the drug (Exhibit 3).

For example, of the oncologists presented with the lower-cost drug, the median respondent endorsed a cost-effectiveness ratio of \$100,000 per year of life gained. That ratio equates to a median increase in life expectancy of six months because the drug cost \$50,000 more than standard therapy. The twenty-fifth percentile of those oncologists also endorsed a cost-effectiveness ratio of \$100,000 per year of life. However, the seventy-fifth percentile endorsed a cost-effectiveness ratio of \$200,000 per year of life—stating that the drug would need to extend life by four months.

In contrast, of the oncologists presented with the more expensive drug, the median respondent endorsed a cost-effectiveness ratio of \$250,000 per year of life gained. These oncologists did not adjust their life expectancy demands in proportion to the increased price of the treatment. Indeed, this \$250,000 ratio equates, once again, to a median life expectancy of six months because the drug cost \$125,000 more than standard therapy.

Discussion

When asked what cost per year of life represents “good value for money,” the majority of oncologists endorsed cost-effectiveness ratios of less than \$100,000 per life year. Yet, when presented with a hypothetical patient with metastatic cancer and the chance to prescribe an expensive new drug, both US and Canadian oncologists implicitly endorsed much higher cost-effectiveness ratios, often several hundred thousand dollars per life-year gained. In addition, responses to the clinical scenario revealed that oncologists were relatively insensitive to the cost of drugs, failing to adjust their expectations of a drug's benefits in proportion to its price.

In theory, cost-effectiveness information is supposed to guide decision makers by letting them compare the value of a given intervention to an implicit cost-effectiveness threshold.²¹ However, the results of this study show that oncologists do not have consistent opinions about how many months an expensive new therapy should extend a person's life before the cost of therapy is justified. In fact, their responses suggest that oncologists are relatively insensitive to the costs of such drugs when making these decisions.

Such results are not entirely surprising, nor should they be viewed as a criticism of oncologists. Most physicians receive very little training in how to factor cost-effectiveness information into their decision making, and many indicate that they are uncomfortable using

cost-effectiveness information.²² And most physicians are often unaware of the costs of the medications they prescribe.^{15,23,24} In fact, most physicians are taught that they should disregard this information when treating individual patients and should leave such judgments up to policy makers.²⁵

IMPLICATIONS

The relative price insensitivity exhibited by the oncologists in our study has important implications for the pricing of new oncology therapies. Pharmaceutical companies price drugs based in large measure on what the market will bear.²⁶ The market price depends in part on the willingness of third-party payers to reimburse treatment. But it also depends on oncologists' decisions about whether or not a therapy yields enough benefit to justify its cost. The extremely high price of many new treatments may, in part, reflect a phenomenon uncovered in this study—that the benefit oncologists demand from new treatments does not necessarily increase according to the price of the treatment.

Cost-effectiveness experts usually endorse thresholds of between \$50,000 and \$100,000 per quality-adjusted life-year (QALY).¹⁹ The concept of a QALY is designed to capture both the length and degree of treatment benefit, so that a life extension of one year in perfect health yields a benefit of one QALY. Extending a patient's life for a year, but at less than perfect health, would yield less than one QALY. Indeed, the United Kingdom's National Institute for Health and Clinical Excellence has adopted this threshold as a key input in deciding whether to recommend payment for a new treatment.²⁷ Oncologists' responses to our clinical scenario raise questions about the appropriateness of this \$50,000–\$100,000 threshold because most of the cost-effectiveness ratios implied by their responses far exceed it.

However, oncologists' apparent rejection of the threshold needs to be considered with caution. First, the implicit cost-effectiveness thresholds used by our respondents varied widely across physicians, reflecting a lack of consensus about these issues. Our observation of a large difference in oncologists' implicit cost-effectiveness thresholds based on the cost of the drug further reflected this lack of consensus.

Second, when questioned directly about what constitutes a reasonable threshold, more than two-thirds of our respondents indicated that treatments costing more than \$100,000 per QALY were not good value for money, an attitude that directly contradicted their answers to the clinical scenario. In other words, they endorsed the \$50,000–\$100,000 threshold in the abstract but abandoned it when indicating how they would treat an individual patient.

IMPORTANT ASPECTS OF PHYSICIANS' ATTITUDES

Our study takes advantage of an experimental design to determine the stability of oncologists' attitudes. Oncologists' explicit views of what constitutes value for money correlated with the implicit cost-effectiveness ratios suggested by their responses to the clinical scenario.²⁸ This set of results could be interpreted as evidence of a potentially stable underlying value. But our experimental design highlights a much more important aspect of physicians' attitudes about the cost-effectiveness of oncology treatment: These attitudes are neither well developed nor consistent.

In their earlier article,¹⁷ Nadler and coauthors surveyed oncologists in the Boston area, presenting them with a scenario similar to the one in our study. Nadler and coauthors asked oncologists how much longer a patient would need to survive to warrant the prescription of an expensive new medication. That article has been widely cited as evidence of how oncologists think about the cost-effectiveness of their treatments.

The current study expands on the earlier study by including a randomized experiment, in which we varied the price of the hypothetical drug in the scenario. Such experimental survey designs, widely used in behavioral economics, enable researchers to test the stability and consistency of people's values and attitudes.²⁹ In the current study, the experimental design reveals that oncologists' attitudes may not be stable enough to guide policy decisions.

LESSONS FOR POLICY MAKERS

Our study has several implications for policy makers looking for ways to control health care spending. First, it suggests that making physicians aware of the costs of the treatments they prescribe, a policy recommended by some experts,^{30,31} may not on its own have much effect on physicians' decision making. Educating physicians about how to use cost-effectiveness information may improve their decision making, but other studies show that such an approach would also face obstacles—such as physicians' unwillingness to apply the same cost-effectiveness thresholds to established treatments as they do to new ones.³²

A better approach might be to more strongly influence physicians' decision making through clinical guidelines that incorporate cost-effectiveness information.³³ Such guidelines would both signal to physicians whether specific interventions were appropriate and give them the flexibility to deviate from the guidelines in special circumstances. If such guidelines failed to produce the desired effect, policy makers might need to resort to stronger interventions. For example, they might take the approach of the UK National Institute for Health and Clinical Excellence, using cost-effectiveness information to inform coverage decisions for new treatments. Policy makers may need to take more of a leadership role in determining affordability, instead of leaving these decisions to individual physicians.

Conclusion

Industrialized societies face many difficult decisions about when to pay for expensive new health interventions to extend patient life. Physicians are likely to play a prominent role in making these decisions. But they need help. Oncologists responding to our survey demonstrated that they held inconsistent views on how much benefit expensive new drugs should provide to be considered worthwhile. The physicians' decisions about new treatments may not be appropriately sensitive to the cost and value of such therapies.

We need to improve the way physicians are trained and supported to incorporate economic consequences of their clinical decisions into their decision-making process, or develop other ways to ensure that medical treatments bring good value for their cost.

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Biographies

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In this month's *Health Affairs*, Peter Ubel and coauthors report on a survey of physicians' attitudes about the value of expensive new cancer treatments that may extend life for a period of time. They find that physicians aren't consistent in their opinions about how many months an expensive new therapy should extend a person's life before the cost of therapy is justified—especially when asked to contemplate a hypothetical scenario involving an individual patient. The authors identify a need to improve how physicians are educated on the use of cost-effectiveness information and to influence their decision making through clinical guidelines that incorporate such information.

Ubel is the John O. Blackburn Professor of Business, Public Policy, and Medicine at Duke University and a Robert Wood Johnson Foundation health policy investigator. His research explores topics in medical decision making using the tools of behavioral economics and decision psychology. He recently completed a book on the psychology of shared decision making, and he is conducting a series of studies exploring the psychological barriers to controlling health care costs.

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Exhibit 1.
Treatment Cost Per Life-Year Gained That Represents ‘Good Value For Money’ To
Oncologists In The United States And Canada
SOURCE Authors’ analysis.

Exhibit 2.

Increase In Life Expectancy, In Months, That Warrants Use Of New Drug To Oncologists,
By Cost Of Hypothetical New Drug

SOURCE Authors' analysis.

Exhibit 3.

Cost-Effectiveness Ratios Implied By Oncologists' Responses To The Clinical Scenario

SOURCE Authors' analysis. **NOTES** For the \$150,000 drug, the median is the middle line, with arrows pointing up to the 75th percentile and down to the 25th. For the \$75,000 drug, both the 25th and 50th percentiles were \$100,000 per life-year.