AD_____

Award Number: W81XWH-06-1-0334

TITLE: Barriers to Breast Cancer Screeni ng Among Latinas in the U.S.-Mexico Border Region

PRINCIPAL INVESTIGATOR: Jose A. Pagan

CONTRACTING ORGANIZATION: University of Texas-Pan American
Edinburg, Texas 78539

REPORT DATE: May 2009

TYPE OF REPORT: Annual

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT: Approved for Public Release;
Distribution Unlimited

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
01-05-2009	Annual	1 MAY 2008 - 30 APR 2009

4. TITLE AND SUBTITLE

Barriers to Breast Cancer Screening Among Latinas in the U.S.-Mexico Border Region

5a. CONTRACT NUMBER

5b. GRANT NUMBER
W81XWH-06-1-0334

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Jose A. Pagan

E-Mail: jpagan@utpa.edu

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

University of Texas-Pan American
Edinburg, Texas 78539

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release; Distribution Unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT The purpose of this project is to establish a research and training collaborative partnership between the Institute for Population Health Policy (IPHP) at the University of Texas-Pan American (UTPA) and the Leonard Davis Institute of Health Economics (LDI) at the University of Pennsylvania (Penn). Our objectives and scope are: to develop a competitive and successful breast cancer research program that focuses in cancer control and population sciences at UTPA; to develop and complete a research project on barriers to breast cancer screening among Latinas in the U.S.-Mexico border region; to develop the research infrastructure that will enable UTPA investigators to submit competitive breast cancer research proposals. The key accomplishments during the third year of the project are: the completion of survey data collection on mammography screening practices; participation in the 2008 Era of Hope meeting; and securing federal grants in cancer and in health disparities research, which will further develop health services research at UTPA.

15. SUBJECT TERMS
Breast cancer screening; Latinas

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			USAMRMC
U	U	U	UU	27	**19b. TELEPHONE NUMBER** *(include area code)*

Table of Contents

	Page
Introduction……..	**4**
Body……..	**4**
Key Research Accomplishments……..	**5**
Reportable Outcomes……	**5**
Conclusion……	**5**
References……..	**5**
Appendices……	**5**

INTRODUCTION

The subject/purpose of this project is to establish a research and training collaborative partnership between the Institute for Population Health Policy (IPHP) at the University of Texas-Pan American—a Minority Institution—and the Leonard Davis Institute of Health Economics (LDI) at the University of Pennsylvania (Penn). The UTPA-Penn breast cancer research/training partnership focuses on understanding and ameliorating disparities in breast cancer screening among Latinas in the U.S.-Mexico border region. Our objectives and scope are (1) to develop a competitive and successful breast cancer research program that focuses in cancer control and population sciences at UTPA; (2) to develop and complete a research project on barriers to breast cancer screening among Latinas in the U.S.-Mexico border region; (3) to develop the research infrastructure that will enable UTPA investigators to submit competitive breast cancer research proposals.

BODY

The Statement of Work for the project includes the following three tasks:

(1) Develop a competitive and successful breast cancer research program that focuses in cancer control and population sciences at UTPA (Years 1 and 2)
(2) Develop and complete a research project on barriers to breast cancer screening among Latinas in the U.S.-Mexico border region (Years 3 and 4)
(3) Develop the research infrastructure that will enable UTPA investigators to submit competitive breast cancer research proposals (Year 4)

We have been able to accomplish our set goals and objectives during the third year of the project. Our task for the first two years of the project involved the development of a competitive and successful breast cancer research program that focuses in cancer control and population sciences at UTPA. During Year 2 we were able to complete our survey instrument on breast cancer screening and on 23 July 2007 we received approval to conduct our study from the Institutional Review Board at UTPA. The protocol was reviewed by the USAMRMC's Office of Research Protections (Human Research Protection Office) and found to comply with applicable Federal, DOD, U.S. Army, and USAMRMC human subjects protection requirements (approved 24 July 2007; HRPO Log Number A-13729). We began data collection efforts during Year 2 and completed data collection in Year 3. A total of 738 interviews were conducted by ten trained interviewers between January and June 2008. Study participants were selected from the Border Epidemiologic Study on Aging (BESA), a longitudinal survey of Latino/a adults in South Texas.

During Year 3 we have spent a substantial amount of time in data management, coding, computer programming, and statistical modeling/analysis. The mean age of study participants is 63 (with a standard deviation = 13). Seventy percent of participants had less than a high school education, 16 percent had a high school diploma or GED, and 14 percent had more than a high school education. Fifty-seven percent of respondents were married and the 42 percent had an annual household income of $10,000 or less. Twenty-six percent of survey participants did not have any form of health insurance coverage. Ninety-six percent of participants had heard of mammography and 44 percent began to get breast cancer screening between the ages of 40 and 50. Eighty-one percent had a mammogram done within the past one or two years and 77% know where to go for mammography screening. Only 17 percent knew when a self-breast exam should be performed with respect to menses. Our next step is to assess knowledge, attitudes and beliefs, and behaviors related to mammography and self-breast exams. We will also assess the factors that influence the decision to have a mammogram and the role of health care system distrust on mammography screening rates. We will also look at differences in these variables and outcomes across different socioeconomic and demographic groups, with a particular emphasis on the role of functional health literacy. Our preliminary analysis suggests that health literacy levels in our South Texas Latina sample are very low and that there are substantial differences in knowledge, attitudes, and behaviors about mammography and breast cancer screening between women classified as having adequate versus inadequate functional health literacy levels (which is based on respondents' answers to the Short Test of Functional Health Literacy in Adults (STOFHLA)). The UTPA and Penn investigators will work very closely over the next year to analyze the data and interpret the results. We are confident that we will be able to write several policy relevant, high quality manuscripts from this data collection effort. Our main Penn collaborators (Drs. Asch, Armstrong and Guerra) have provided expert guidance and advice throughout this research project and we would not have been able to get this work done without their mentoring.

Our tasks also involve the development of research infrastructure at UTPA that will enable investigators to submit competitive research proposals. We have continued our work on the projects funded though an R24 grant from the Agency for Healthcare Research and Quality (AHRQ). This AHRQ research infrastructure grant funds several pilot projects in health services research (community uninsurance and health care access, the use of health care services in the U.S.-Mexico border region, severe weather and health care use by low-income and uninsured vulnerable populations, and the cost-effectiveness and net-benefits of school-based health promotion programs). The AHRQ health services research initiative is also actively promoting the development of research projects by junior faculty and graduate students focusing on the U.S. Latino population. These projects are consistent with the goals and objectives of not only AHRQ and the UTPA health services research initiative but also with the goals and objectives of this HBCU/MI Partnership Training Award.

Two papers related to cancer were published during Year 3:

Chao, Li-Wei, José A. Pagán and Beth J. Soldo. (2008). "End-of-Life Medical Treatment Choices: Do Survival Chances and Out-of-Pocket Costs Matter?" *Medical Decision Making*, 28(4), 511-523.

Guerra, Carmen E., Phyllis A. Gimotty, Judy A. Shea, José A. Pagán, J. Sanford Schwartz and Katrina Armstrong. (2008). "Effect of Guidelines on Primary Care Physician Use of PSA Screening: Results from the Community Tracking Study Physician Survey," *Medical Decision Making*, 28(5), 681-689.

These two papers were revised, completed and accepted for publication during Year 2 and DOD support is gratefully acknowledged and noted. They are also examples of the close collaborative research partnership between UTPA and Penn.

KEY RESEARCH ACCOMPLISHMENTS

- Completion of data collection for a mammography screening survey of Latinas in the US/Mexico border region.
- Data management, computer coding, and preliminary statistical modeling/analysis of mammography screening survey has been accomplished.
- Receipt of a four-year (~$1 million) research grant from the National Cancer Institute. This project began September 2008 and it funds faculty and student cancer research, with a particular focus on genetic testing for breast cancer risk. This grant would not have been possible without the support of this HBCU/MI Partnership Training Award.
- Publication of two manuscripts on cancer research with collaborators from Penn.

REPORTABLE OUTCOMES

Manuscripts

Chao, Li-Wei, José A. Pagán and Beth J. Soldo. (2008). "End-of-Life Medical Treatment Choices: Do Survival Chances and Out-of-Pocket Costs Matter?" *Medical Decision Making*, 28(4), 511-523.

Guerra, Carmen E., Phyllis A. Gimotty, Judy A. Shea, José A. Pagán, J. Sanford Schwartz and Katrina Armstrong. (2008). "Effect of Guidelines on Primary Care Physician Use of PSA Screening: Results from the Community Tracking Study Physician Survey," *Medical Decision Making*, 28(5), 681-689.

CONCLUSION

The development of a research and training collaborative partnership between the Institute for Population Health Policy (IPHP) at the University of Texas-Pan American and the Leonard Davis Institute of Health Economics (LDI) at the University of Pennsylvania (Penn) has been very successful during the third year of this project. The partnership has allowed UTPA researchers to improve their research skills, particularly in the areas of survey instrument development, design of research protocols, data collection, and manuscript and research proposal writing. The outcomes from this collaboration includes several joint manuscripts, two funded federal grant proposals, and the collection of data on mammography screening practices among Latinas in US/Mexico border communities that will allow this collaboration to further develop over the next few years. We believe that we are successfully developing a breast cancer research program and that we are getting closer to developing the research infrastructure which will enable UTPA investigators to submit competitive breast cancer research proposals.

REFERENCES

NA

APPENDICES

Appendix A

Reprints of:

Chao, Li-Wei, José A. Pagán and Beth J. Soldo. (2008). "End-of-Life Medical Treatment Choices: Do Survival Chances and Out-of-Pocket Costs Matter?" *Medical Decision Making*, 28(4), 511-523.

Guerra, Carmen E., Phyllis A. Gimotty, Judy A. Shea, José A. Pagán, J. Sanford Schwartz and Katrina Armstrong. (2008). "Effect of Guidelines on Primary Care Physician Use of PSA Screening: Results from the Community Tracking Study Physician Survey," *Medical Decision Making*, 28(5), 681-689.

End-of-Life Medical Treatment Choices: Do Survival Chances and Out-of-Pocket Costs Matter?

Li-Wei Chao, MD, PhD, José A. Pagán, PhD, Beth J. Soldo, PhD

Background. *Out-of-pocket medical expenditures incurred prior to the death of a spouse could deplete savings and impoverish the surviving spouse. Little is known about the public's opinion as to whether spouses should forego such end-of-life (EOL) medical care to prevent asset depletion.* ***Objectives***. *To analyze how elderly and near elderly adults assess hypothetical EOL medical treatment choices under different survival probabilities and out-of-pocket treatment costs.* ***Methods***. *Survey data on a total of 1143 adults, with 589 from the Asset and Health Dynamics Among the Oldest Old (AHEAD) and 554 from the Health and Retirement Study (HRS), were used to study EOL cancer treatment recommendations for a hypothetical anonymous married woman in her 80s.* ***Results***. *Respondents were more likely to recommend treatment when it was financed by Medicare than by the patient's own savings and when it had 60% rather than 20% survival probability. Black and male respondents were more likely to recommend treatment regardless of survival probability or payment source. Treatment uptake was related to the order of presentation of treatment options, consistent with starting point bias and framing effects.* ***Conclusions***. *Elderly and near elderly adults would recommend that the hypothetical married woman should forego costly EOL treatment when the costs of the treatment would deplete savings. When treatment costs are covered by Medicare, respondents would make the recommendation to opt for care even if the probability of survival is low, which is consistent with moral hazard. The sequence of presentation of treatment options seems to affect patient treatment choice.* ***Key words:*** *end-of-life care; Medicare; heuristics and biases; oncology; willingness to pay.* ***(Med Decis Making 2008;28:511–523)***

Over the past 4 decades, the poverty rate of the US elderly population has fallen by more than 60%, and the most recent data (2005) show that only about 1 of every 10 people aged 65 and older (3.6 million) earned less than the poverty level.[1] Yet, the poverty rate of elderly widows is 3 times higher than that of elderly married women.[2] Recent studies provide convincing evidence that out-of-pocket health care expenditures incurred prior to the death of a spouse are partially responsible for the impoverishment of the surviving spouse.[3,4] As much as one fourth of the increase in elderly poverty after widowhood has been attributed to end-of-life (EOL) out-of-pocket health care expenditures.[2] This added financial burden may also be related to major depression and poorer health outcomes for elderly spousal caregivers.[5–7]

Although out-of-pocket medical expenditures prior to the death of a spouse can drive the surviving spouse into poverty, it is unclear from the literature whether people would and should forego expensive late-life medical care to prevent asset depletion. For example, an altruistic spouse may choose to forego expensive EOL medical care to protect assets to shield the widowed spouse from impoverishment or from a decline in living standards after widowhood.

There is also limited research on how individuals respond to changes in prognosis of life-threatening health conditions under different

Received 1 August 2006 from the Population Aging Research Center of the Population Studies Center (LWC, BJS) and Leonard Davis Institute of Health Economics (LWC, JAP), University of Pennsylvania, Philadelphia, Pennsylvania, and Department of Economics and Finance, College of Business Administration, University of Texas–Pan American, Edinburg, Texas (JAP). Financial support for the study was provided by the National Institutes of Health, National Institute on Aging (P30AG12836, B. J. Soldo, principal investigator). LWC was supported by a career award from the National Institutes of Health Fogarty International Center (K01TW06658). JAP was supported by the Department of Defense Breast Cancer Research Program (W81XWH-06–1-0334). Revision accepted for publication 1 October 2007.

Address correspondence to Li-Wei Chao, MD, PhD, Population Studies Center, University of Pennsylvania, 3718 Locust Walk, Room 239, Philadelphia, PA 19104–6298; e-mail: chao69@wharton.upenn.edu.

DOI: 10.1177/0272989X07312713

health care financing mechanisms and on their views as to whether policy choices for various treatment options should depend on prognosis and financing. For example, when would a terminally ill person agree to forego medical treatment that prolongs survival, and how is this decision modified under different survival probabilities and diverse cost scenarios? Would the same terminally ill person opt for treatment despite a low probability of success just because health insurance coverage results in low out-of-pocket cost?

The purpose of this study is to analyze the various EOL medical treatment choices that elderly and near elderly adults would recommend for a hypothetical elderly woman with cancer, when the treatment choices have varying probabilities of success and substantially different financial implications. To the extent that the recommendations are for a hypothetical person, the choices reflect the respondents' policy choices rather than choices for themselves.

METHODS

Data Source and Study Population

We used survey data from the Asset and Health Dynamics Among the Oldest Old Study (AHEAD) and the Health and Retirement Study (HRS)—which include identical experimental modules with various vignettes on EOL medical treatment—to study the AHEAD and HRS respondents' expressed recommendations for various hypothetical treatments for cancer. Prior to 1998, the AHEAD and HRS were separate but related surveys. The AHEAD included persons born in 1923 or before, and interviews were conducted in 1993 and 1995. The HRS included persons born from 1931 to 1941, and interviews were conducted in 1992, 1994, and 1996. The 2 surveys were merged starting in 1998 and are now known simply as the HRS, with interviews every 2 years since 1998. The vignettes used in our study came from the 1995 AHEAD and the 1996 HRS.

The original HRS included noninstitutionalized adults born from 1931 to 1941, who were selected from a nationally representative sample of US households that included oversamples of blacks, Hispanics, and Florida residents, using a multistage area probability sample design. The HRS was designed to follow age-eligible individuals and their spouses as they transition from active worker into retirement. Data collection through in-home, face-to-face interviews began in 1992 with a panel of 12,654 participants, with subsequent telephone reinterviews every 2 years thereafter.[8] The AHEAD study was designed as a supplementary sample to the HRS to examine health, family, and economic variables in the postretirement period and at the end of life. The first wave of AHEAD began in 1993 with a sample of 8222 participants, who were selected from the same nationally representative sample of US households as the original HRS but by selecting participants who were born in 1923 or before. Blacks, Hispanics, and Florida residents were also oversampled in the AHEAD study.[9] HRS and AHEAD both contain detailed information on demographics, health status, housing, family structure, employment, work history, disability, retirement plans, net worth, income, and health and life insurance. More detailed information on the design of the AHEAD and HRS surveys can be found on the data's Web site.[10]

Wave 2 of AHEAD (1995) and wave 3 of the HRS (1996) included a set of experimental questions that were asked to 605 and 556 randomly selected respondents of each study, respectively. Respondents listened to a vignette that asked them to consider the treatment choice for a hypothetical married woman in her eighties of unspecified race or ethnicity with a life-threatening form of cancer. Respondents were told that this woman would die within a few months if she did not undergo a treatment plan that could delay the spread of cancer. The treatment would make her dependent on personal care help during the treatment period. The treatment's probability of success was either low or high (20% or 60%), and the out-of-pocket treatment costs were also either low (with Medicare covering the costs) or high (with near depletion of household savings because Medicare would not cover the costs). All 4 combinations of success probabilities (low v. high) and out-of-pocket costs (low v. high) were presented in 4 different vignettes to the respondents. (The vignettes are reproduced at the bottom of Table 2; the vignettes and questions were identical in both the HRS and AHEAD studies.) Each respondent was randomly assigned to 1 of 4 groups. Every group received the same 4 vignettes, except the sequence with which the vignettes were presented was randomized by groups. Randomization of the vignette sequence was done because ordering effects could affect responses due to, for example, starting point bias or framing.[11]

Statistical Analysis

We employed nonparametric statistical tests in our bivariate comparisons. We used the within-group

Wilcoxon signed rank test to test for whether the respondent's opinion changed—on whether the hypothetical married woman should accept or reject the various treatment options—when different survival probabilities and financing mechanisms were presented in the 4 vignettes. To test for whether the distribution of the respondent's choices to the same vignette differed between groups of respondents (who were presented with different sequences of the vignettes), we used the Kruskal-Wallis test to compare between groups.[12]

We also analyzed the determinants of the respondent's propensity to recommend for or against the treatment options by using *ordered* logistic regressions. The dependent variables are the *thresholds* of survival probability or of financing options, or changes in these thresholds that the treatment would have to reach before the respondents would agree to recommend that the woman in the vignette accept treatment. These thresholds or cutoff values in the ordered logistic regressions come from the probabilities and financing options specified in the vignettes; they are noted at the bottom of Table 5 and described in detail in the results section for that table. The explanatory variables included the respondent's age, education, and net household wealth as continuous variables, as well as marital status, gender, race or ethnicity, health status, health status of the spouse if married, past experience with cancer, and religion as dummy variables. Because the HRS and the AHEAD subsamples come from different cohorts that may have differing viewpoints (in addition to age), we included a dummy indicator for the AHEAD cohort. We also included dummy variables for the randomized sequence groups to examine whether the order in which the 4 vignettes were presented was related to the respondents' opinions.

RESULTS

From the original 1161 respondents who were randomized into the cancer treatment experimental module, we excluded 18 who had missing values for our core set of explanatory variables, leaving us with 1143 observations (with 554 from HRS and 589 from AHEAD). No respondent was excluded based on answers to the cancer treatment experimental module because everyone assigned to the module gave some form of response to these questions. Descriptive statistics of the sample are shown in Table 1. There were no significant differences in demographic and socioeconomic characteristics across the 4 randomized sequence groups (evaluated using chi-square tests not shown in the table).

Table 1 Descriptive Statistics of the Sample

Variable	Mean or Percentage
Male, %	38.50
Non-Hispanic white/other, %	85.30
Non-Hispanic black, %	12.07
Hispanic, %	2.62
Married, %	68.15
Respondent in poor/fair health, %	23.27
Spouse in poor/fair health, % among those married	23.62
Respondent has/had cancer, %	12.51
Protestant religion, %	68.85
Catholic religion, %	22.13
AHEAD cohort, %	51.53
Age, years	68.25
Education, years	12.26
Household wealth, US$ 100,000	2.99
Sample size	1143

AHEAD, Asset and Health Dynamics Among the Oldest Old Study.

To simplify our discussion below, the verbatim transcripts of the 4 vignettes are reproduced at the bottom of Table 2. Although most respondents gave answers of yes or no to the vignettes, some respondents answered "don't know" or "depends" or "refused to answer" some of the vignettes. About 9% of respondents gave these other-than-yes-or-no answers for vignette S60, and such answers were slightly less prevalent for the other vignettes, with 6.9%, 7.4%, and 6.5% for vignettes M20, M60, and S20, respectively. For the subsequent analyses, we decided to collapse these other answers with the "no" answer while keeping "yes" as a separate category for 3 reasons: 1) because our main research question ("whether people should forego care to prevent impoverishment") required the combined information from multiple vignettes, modeling these other answers as separate choices would quickly explode the number of parameters in a multinomial logit, making interpretation of results exceedingly complex; 2) although there are no tests available[13] for whether categories could be combined in an *ordered* logistic regression model (a model that we use to capture the natural order of survival probabilities or of financing options in the combined vignettes), we ran multinomial logits using each vignette individually, and the likelihood ratio tests[14] of whether these other answers could be combined with either yes or no answers rejected the null for

Table 2 Percentage Agreeing to Hypothetical Cancer Treatment, Grouped by Vignette Sequence

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				Group by Sequence of Vignettes				*P* Value
Treatment Vignettes	Financing Mechanism	Survival Probability	Full Sample	Group 1	Group 2	Group 3	Group 4	Difference across Groups
M20	Medicare	20%	37.10	44.98 [1]	33.94 [2]	39.79 [3]	29.51 [4]	0.001
M60	Medicare	60%	58.01	62.63 [2]	54.87 [1]	60.90 [4]	53.47 [3]	0.070
S20	Savings	20%	26.51	32.18 [3]	25.62 [4]	27.68 [1]	20.49 [2]	0.015
S60	Savings	60%	42.17	47.06 [4]	41.16 [3]	47.06 [2]	33.33 [1]	0.002
Percentage of sample			100	25.28	24.23	25.28	25.20	

Descriptions of Vignettes

M20: "Now I'd like to describe a specific situation and get your opinion about it. Here is the situation: A married woman in her 80s is told by her doctor that she has a life-threatening form of cancer. The doctor tells her that without any treatment she is likely to die within the next few months. He describes a 4-month treatment plan aimed at delaying the spread of the cancer. The treatment itself would make her fairly uncomfortable, and she would have to rely on others for personal care during the treatment. The treatment costs are fairly high but Medicare will pay most of the costs. The doctor tells her that, with the treatment, she stands a 20% chance of living 2 or 3 good years after completing the treatment. Do you think she should agree to the treatment?"

M60: "What if the doctor had, instead, told her that with the treatment, she stood a 60% chance of living 2 or 3 good years? Do you think she should agree to the treatment then?"

S20: "Now let's say the situation is a bit different. The same woman faces the same decision whether to agree to the same 4-month treatment for her cancer, but this time instead of Medicare paying most of the costs, she and her husband will have to pay most of the costs. They could afford to do so but it would take almost all of their savings. The doctor tells her that, with the treatment, she stands a 20% chance of living 2 or 3 good years after completing the treatment. Do you think she should agree to the treatment?"

S60: "What if the doctor had, instead, told her that with the treatment, she stood a 60% chance of living 2 or 3 good years? Do you think she should agree to the treatment then?"

Number in brackets denotes the sequence of vignettes for each group; *P* value by Kruskal-Wallis test.

combining with "yes" in 4 out of 4 vignettes (*P* values from < 0.0001 to 0.03) and failed to reject the null for combining with "no" for vignettes S60 and M60 (although S20 and M20 were rejected at *P* values less than 0.05); and 3) regardless of whether we combined these other answers with no or with yes answers, our main results and conclusions do not change.

The top panel of Table 2 summarizes the decisions made by the respondents in the 4 different groups. Each group had a different sequence of how the treatment vignettes were presented, with the 4 possible combinations of financing source (Medicare v. savings) and treatment success (20% v. 60%) making up the 4 groups. Column 1 presents the codes we used for each of the 4 possible vignettes to indicate the financing mechanism (column 2) and the survival probability (column 3). In column 1, "M" denotes Medicare financed, "S" denotes savings financed, "20" denotes 20% treatment success, and "60" denotes 60% treatment success.

Column 4 presents the acceptance rates for the 4 treatment vignettes as recommended by the full sample. The rankings of the percentages of respondents in favor of treatment for the 4 vignettes were consistent with a priori expectations. The percentage of respondents who would recommend accepting S20, the vignette when the treatment had to be financed out of the patient's own savings and had only a 20% survival chance, was far lower than the percentage who would favor M60, the vignette where the treatment was financed by Medicare and the survival chance was 60%, with the acceptance rates for the other 2 vignettes falling between the 2 extremes.

Columns 5 to 8 in Table 2 report the percentage of respondents who agreed that the married woman in the vignette should undergo cancer treatment,

Table 3 Number (and Percentage) of Respondents, by Latent "Reservation" Survival Probability

Minimum Survival Probability Threshold Required before Recommending Accepting Treatment						
Conditional on Financing by Medicare			Conditional on Financing by Patient's Own Savings			
			Less Than 20% Survival (S20 = 1; S60 = 1)	20% to 60% Survival (S20 = 0; S60 = 1)	More Than 60% Survival (S20 = 0; S60 = 0)	Total by Row
(0)			(1)	(2)	(3)	(4)
(1)	Less than 20% survival	(M20 = 1; M60 = 1)	303 (26.5%)[a]	62 (5.4%)[b]	59 (5.2%)[c]	424 (37.1%)
(2)	20% to 60% survival	(M20 = 0; M60 = 1)	0	117 (10.2%)[d]	122 (10.7%)[e]	239 (20.9%)
(3)	More than 60% survival	(M20 = 0; M60 = 0)	0	0	480 (42.0%)[f]	480 (42.0%)
Total by column			303 (26.5%)	179 (15.7%)	661 (57.8%)	1143 (100%)

Superscripts denote the respondents' accept/reject decisions for the 4 vignettes, with 1 = accept and 0 = reject as follows:
a. M20 = 1, M60 = 1, S20 = 1, S60 = 1.
b. M20 = 1, M60 = 1, S20 = 0, S60 = 1.
c. M20 = 1, M60 = 1, S20 = 0, S60 = 0.
d. M20 = 0, M60 = 1, S20 = 0, S60 = 1.
e. M20 = 0, M60 = 1, S20 = 0, S60 = 0.
f. M20 = 0, M60 = 0, S20 = 0, S60 = 0.

tabulated by vignette and by group. The ordering in which the vignettes were presented to the respondents is indicated by the number inside the brackets in Table 2. For instance, group 2 received the vignettes in the sequence of M60, M20, S60, and S20, and group 3 received S20, S60, M20, and M60. As a very rough approximation, group 2 respondents received vignettes in a descending order of potential value, and group 3 received vignettes in an ascending order of potential value.

The acceptance rate for the various vignettes differed across the groups, reaching statistical significance for 3 out of the 4 vignettes (column 9). Because the respondents were randomized into the 4 groups, this significant difference across groups suggests that the recommendation to accept or reject the hypothetical treatment was related to the sequence with which the vignettes were presented.

The 4 vignettes varied on 2 dimensions: financing and survival probability. Because the respondents were given discrete choices (yes or no) to the treatment in the vignettes, we do not observe the true underlying latent variables that form the decision basis for the respondents. Instead, we observe the various cutoff points that actually could serve as bounds (or thresholds) for the latent variables. The cutoff points for financing are near depletion of the patient's savings v. low financial cost, and for survival, 20% and 60%. Under the 2 vignettes when Medicare covers the treatment costs, the financing variable is fixed (low financial cost), but the survival probability variable is varied. Therefore, *conditional on Medicare paying for the treatment*, the respondents' recommendations under the 2 survival probabilities essentially reflect the respondents' latent "reservation" survival probability or, equivalently, the minimum survival probability the respondents feel that the treatment must provide the patient in order for the respondents to recommend that the patient accept the treatment. When the respondents recommend accepting treatment at 20% survival probability, the respondents' reservation survival probability is less than or equal to 20%; when the respondents reject treatment at 20% but accept when survival is 60%, the respondents' reservation survival probability is between 20% and 60%. These are depicted in Table 3. Column 0 tabulates the possible decisions when survival probability changes from 20% to 60% but *conditional on financing by Medicare*. Conditional on Medicare paying for the costs, respondents could recommend to 1) accept treatment with 20% or 60% survival probability (coded M20 = 1; M60 = 1), 2) reject the treatment with 20% but accept the treatment with 60% survival (coded M20 = 0; M60 = 1), or 3) reject treatment even with a 60% survival (coded M20 = 0; M60 = 0). The first kind of respondents has a latent reservation survival probability for the patient (*conditional on* Medicare coverage) that is less than 20% because they would

recommend that the patient accept treatment with a 20% survival. The second kind of respondents has a latent reservation survival probability for the patient between 20% and 60%. The third kind of respondents has a latent reservation survival probability for the patient that is higher than 60% because they would recommend that the patient reject the treatment even when it offered 60% survival for the patient.

Similarly, columns 1, 2, and 3 in Table 3 present the possible acceptance/rejection recommendations under varying survival probability but *conditional on financing by the patient's own savings*. Conditional on having the patient pay for the treatment out of her household savings, respondents could recommend to 1) accept treatment when it has a 20% survival probability (coded S20 = 1; S60 = 1), 2) reject if the treatment has 20% survival but accept if it has 60% survival (coded S20 = 0; S60 = 1), or 3) reject even when the treatment has 60% survival (coded S20 = 0; S60 = 0).

The cells in Table 3 present the number and percentage of respondents who gave the various treatment recommendations under different survival probabilities—and conditional on the treatment being financed either by Medicare or by the patient's own savings. The superscript letters in the cells denote the respondents' choices to the 4 vignettes, as explained in the note at the bottom of the table. When Medicare covers the treatment costs, a total of 424 respondents have a less than 20% reservation survival probability for the patient (shown in row 1 or cells a, b, and d of Table 3). They would recommend that the patient accept the treatment when survival is 20%. However, when treatment has to be financed by the patient's own savings, these same respondents' reservation survival probability for the patient shifts higher, so that some respondents require the treatment to have a higher survival probability before they would recommend that the patient in the vignette accept the treatment. Thus, when the patient had to pay for the treatment, 303 respondents (cell a) still had a reservation survival probability for the patient of less than 20%, 62 respondents (cell b) required a higher reservation survival probability of between 20% and 60%, and 59 respondents (cell d) had a reservation survival probability greater than 60%. Similarly, when Medicare covers the costs, a total of 239 respondents had a reservation survival probability between 20% and 60% (in row 2 or cells c and e of Table 3). However, when the treatment costs had to be covered by the patient's own savings, 122 out of the original 239 respondents would recommend rejecting treatment with a 60% survival, suggesting that their reservation survival probability for the patient was higher than 60%. Therefore, when financing changed from Medicare to the patient's own savings, respondents in cells a, c, and f would continue to recommend the same treatment, but respondents in cells b, d, and e would recommend rejecting the same treatment because such treatment no longer met their higher reservation survival probability for the patient. Thus, a total of 243 or 21% of the respondents rejected the same treatment when financing changed from Medicare to savings depletion.

Table 4 presents the minimum level of patient wealth that the respondent feels the patient must retain to recommend that the patient accept the treatment, *conditional on survival probability*. In column 0, *conditional on 60% survival*, the respondents could recommend to 1) accept treatment when it is financed by the patient's own savings, 2) reject treatment when savings financed but accept if Medicare financed, or 3) reject treatment even when Medicare financed. The first type of respondents has a very low reservation wealth for the patient because they would rather see that the patient deplete savings and opt for the treatment at 60% survival than to have the patient maintain her current wealth but receive no treatment. The second type has a reservation wealth level for the patient that is between asset depletion and the patient's current wealth. The third type has a reservation wealth level for the patient that is more than the patient's current wealth; these respondents feel that the patient must be *paid* before the respondents would recommend that the patient accept treatment with a 60% survival probability. The cells in Table 4 tabulate the number and percentages of respondents who fall into each of the 3 latent reservation wealth levels, but conditioning on 20% or 60% survival.

To find out the covariates that are related to the latent reservation survival or wealth levels, we performed a series of ordered logistic regressions using the survival or wealth latent variable as the dependent variable and various sociodemographic and health variables as explanatory variables. The results are shown in Table 5.

The dependent variables for columns 2 through 5 are the reservation thresholds. In columns 2 and 3, for instance, the dependent variables are the reservation survival probability thresholds, with cutoffs at 20% and 60%, conditional on, respectively, Medicare financing and patient savings financing. The dependent variables in columns 4 and 5 consist of

Table 4 Number (and Percentage) of Respondents, by Latent "Reservation" Wealth Level

Minimum Wealth (or Financing) Threshold Required before Recommending Accepting Treatment					
Conditional on 60% Survival		Conditional on 20% Survival			
		< Savings Depletion (S20 = 1; M20 = 1)	Savings Depletion to Current Wealth (S20 = 0; M20 = 1)	> Current Wealth (S20 = 0; M20 = 0)	Total by Row
(0)		(1)	(2)	(3)	(4)
(1) < Savings depletion	(S60 = 1; M60 = 1)	303 (26.5%)[a]	62 (5.4%)[b]	117 (10.2%)[c]	482 (42.2%)
(2) Savings depletion to current wealth	(S60 = 0; M60 = 1)	0	59 (5.2%)[d]	122 (10.7%)[e]	181 (15.8%)
(3) > Current wealth	(S60 = 0; M60 = 0)	0	0	480 (42.0%)[f]	480 (42.0%)
Total by column		303 (26.5%)	121 (10.6%)	719 (62.9%)	1143 (100%)

Superscripts denote the respondents' accept/reject decisions for the 4 vignettes, with 1 = accept and 0 = reject as follows:
a. M20 = 1, M60 = 1, S20 = 1, S60 = 1.
b. M20 = 1, M60 = 1, S20 = 0, S60 = 1.
c. M20 = 0, M60 = 1, S20 = 0, S60 = 1.
d. M20 = 1, M60 = 1, S20 = 0, S60 = 0.
e. M20 = 0, M60 = 1, S20 = 0, S60 = 0.
f. M20 = 0, M60 = 0, S20 = 0, S60 = 0.

the reservation wealth thresholds, with cutoffs at patient savings depletion and the patient's current wealth, conditional on, respectively, 60% and 20% survival. For all the reservation thresholds, male and black respondents stood out as having a much lower odds of having a high reservation threshold for the patient, suggesting that they had low reservation levels for both the survival and wealth variables. In other words, they are more likely to recommend that the patient accept treatment, regardless of survival probability or financing source. Under Medicare financing (column 2), married respondents (whose spouses were not in poor health) were more likely than those not married to recommend that the patient accept treatment, although such a differential effect was not significant when the treatment entailed depletion of the patient's savings (column 3). The respondent's health or prior history of cancer did not seem to matter in the treatment recommendations; however, married respondents with spouses in poor health were far more likely to recommend accepting treatment than those who were married but whose spouses were not in poor health.[15] Respondent's age, household wealth, education, and religion did not seem to matter. The AHEAD dummy variable was also insignificant, including in separate regressions without the age variable (not reported in the table).

The respondent's sequence group was also included as dummy variables to control for the effect from vignette ordering, with group 2 as the reference. Group 2 was the one where the vignettes were presented in a sequence suggestive of decreasing potential value (M60, M20, S60, S20). Conditional on financing, group 2's vignette sequence suggested a loss in survival (going from 60% to 20%, under each financing scheme). Conditional on financing, groups 1 and 3 both had a sequence of vignettes that were increasing in survival. Under Medicare financing (column 2), group 1 and group 3 had lower reservation survival probability than group 2 at $P < 0.01$ and $P < 0.10$, respectively, indicating that the respondents who experienced a sequential loss in survival (group 2) needed a higher survival probability to "compensate" for the loss *more than* the respondents who experienced a sequential gain in survival (groups 1 and 3). Conditional on savings-financed care (column 3), group 1 continued to have a lower reservation survival probability threshold than group 2. Under savings financing (column 3), group 4 had a higher reservation survival probability than group 2, probably because the sequential loss in survival probability was more salient in group 4 (which had savings financing presented before Medicare financing). The S60 and S20 vignettes were presented to group 2 respondents after they had received the first set of vignettes that included Medicare coverage. Therefore, there is some evidence of an ordering effect that is related to the sequence with which the vignettes were presented. Our simple dummy variable for group, however, limits our ability to explain more fully the underlying reasons for the ordering effect.

Table 5 Adjusted Odds Ratios from Ordered Logistic Regressions

Explanatory Variables	Odds Ratios for Having a Higher Level of Reservation Threshold								Odds Ratios of an Increase in Reservation Threshold	
	Conditional on Financing by Medicare		Conditional on Financing by Patient's Savings		Conditional on 60% Survival Probability		Conditional on 20% Survival Probability		When Financing Changes from Medicare to Own Savings	
(1)	(2)		(3)		(4)		(5)		(6)	
	Odds Ratios	95% CI	Odds Ratios	95% CI	Odds Ratios	95% CI	Odds Ratios	95% CI	Odds Ratios	95% CI
Male	0.61	(0.47, 0.77)**	0.53	(0.41, 0.68)**	0.56	(0.44, 0.72)**	0.60	(0.46, 0.78)**	0.64	(0.46, 0.91)*
Black	0.26	(0.18, 0.38)**	0.24	(0.17, 0.35)**	0.27	(0.18, 0.40)**	0.23	(0.16, 0.34)**	0.53	(0.31, 0.90)*
Hispanic	0.70	(0.35, 1.42)	1.25	(0.57, 2.75)	1.00	(0.49, 2.03)	0.73	(0.34, 1.56)	2.87	(1.15, 7.13)*
Married	0.75	(0.56, 1.00)*	0.84	(0.62, 1.14)	0.83	(0.62, 1.11)	0.71	(0.51, 0.97)*	1.07	(0.70, 1.63)
Respondent in poor/fair health	1.02	(0.77, 1.34)	0.98	(0.73, 1.31)	0.98	(0.74, 1.30)	1.01	(0.74, 1.37)	0.93	(0.61, 1.40)
Spouse in poor/fair health	0.65	(0.47, 0.90)**	0.67	(0.48, 0.94)*	0.72	(0.52, 1.00)*	0.61	(0.43, 0.86)**	0.92	(0.59, 1.44)
Respondent has/had cancer	1.23	(0.87, 1.73)	1.22	(0.84, 1.76)	1.24	(0.88, 1.76)	1.17	(0.79, 1.72)	1.18	(0.71, 1.98)
Protestant	1.00	(0.67, 1.48)	0.86	(0.57, 1.32)	0.95	(0.64, 1.42)	0.92	(0.59, 1.42)	0.78	(0.44, 1.35)
Catholic	0.86	(0.55, 1.34)	0.75	(0.47, 1.20)	0.86	(0.55, 1.35)	0.76	(0.46, 1.24)	0.90	(0.48, 1.68)
AHEAD	0.74	(0.49, 1.12)	0.98	(0.63, 1.51)	0.83	(0.55, 1.25)	0.89	(0.57, 1.40)	1.97	(1.07, 3.64)*
Age	1.00	(0.98, 1.02)	1.00	(0.98, 1.02)	1.00	(0.98, 1.02)	0.99	(0.97, 1.01)	0.98	(0.95, 1.01)
Education	1.00	(0.96, 1.05)	1.00	(0.95, 1.04)	0.99	(0.95, 1.03)	1.01	(0.97, 1.06)	1.00	(0.94, 1.06)
Household wealth	1.00	(0.98, 1.01)	1.00	(0.98, 1.01)	0.99	(0.98, 1.01)	1.00	(0.98, 1.02)	1.00	(0.98, 1.03)
Group 1	0.64	(0.47, 0.88)**	0.71	(0.51, 0.99)*	0.71	(0.52, 0.98)*	0.62	(0.44, 0.87)**	1.24	(0.77, 1.99)
Group 3	0.74	(0.54, 1.02)	0.79	(0.57, 1.10)	0.76	(0.55, 1.04)	0.79	(0.55, 1.11)	1.17	(0.73, 1.88)
Group 4	1.17	(0.85, 1.61)	1.50	(1.06, 2.11)*	1.26	(0.92, 1.74)	1.36	(0.94, 1.95)	1.77	(1.10, 2.86)*
Accept 20% Survival with Medicare									0.60	(0.43, 0.84)**
Sample size	1143		1143		1143		1143		663	
Likelihood ratio										
Chi-square	99.90		107.94		90.33		110.55		49.96	
df	16		16		16		16		17	
P level	< 0.0001		< 0.0001		< 0.0001		< 0.0001		< 0.0001	
Adjusted *R*-square	0.10		0.11		0.09		0.11		0.09	
Test for proportional odds assumption										
Chi-square	23.66		26.30		21.21		19.94		145.94	
df	16		16		16		16		17	
P level	0.10		0.05		0.17		0.22		< 0.0001	

(continued)

Table 5 (continued)

Explanatory Variables	Odds Ratios for Having a Higher Level of Reservation Threshold								Odds Ratios of an Increase in Reservation Threshold	
	Conditional on Financing by Medicare		Conditional on Financing by Patient's Savings		Conditional on 60% Survival Probability		Conditional on 20% Survival Probability		When Financing Changes from Medicare to Own Savings	
(1)	(2)		(3)		(4)		(5)		(6)	
	Odds Ratios	95% CI	Odds Ratios	95% CI	Odds Ratios	95% CI	Odds Ratios	95% CI	Odds Ratios	95% CI
Variables in *partial* proportional odds model that are significantly different from those in the regular proportional odds model										
Group 4 (low/medium v. high threshold)	0.29	(0.18, 0.46)**							1.06	(0.43, 2.61)
Group 4 (low v. medium/high threshold)	0.24	(0.16, 0.36)**	(no variables with		(no variables with		(no variables with		0.55	(0.32, 0.94)*
AHEAD (low/medium v. high threshold)	0.83	(0.55, 1.26)	$P < 0.10$)		$P < 0.10$)		$P < 0.10$)			
AHEAD (low v. medium/high threshold)	0.66	(0.43, 1.00)*								
Hispanic (low/medium v. high threshold)									6.11	(1.94, 19.19)**
Hispanic (low v. medium/high threshold)									2.03	(0.75, 5.51)

The dependent variables for these ordered logistic regressions are the various reservation thresholds as bounded by the cutoffs in the vignettes and are coded as follows. For columns 2 and 3: "reservation survival probability less than 20%" = 1; "reservation survival between 20% and 60%" = 2; "reservation survival above 60%" = 3. For columns 4 and 5: "reservation wealth level less than savings depletion" = 1; "reservation wealth between savings depletion and current wealth" = 2; "reservation wealth > current wealth" = 3. For column 6: "no shift in reservation survival" = 1; "shift from less than 20% to 20% to 60% or shift from 20% to 60% to greater than 60%" = 2; "shift from less than 20% to greater than 60%" = 3. CI, confidence interval; AHEAD, Asset and Health Dynamics Among the Oldest Old Study.

*$P < 0.05$. **$P < 0.01$.

One question we set out to answer was whether people would recommend as part of health policy that the hypothetical woman in the vignettes forego breast cancer treatment that potentially entailed impoverishing herself or her spouse. A corollary question, then, is whether those who recommended that the patient accept treatment under Medicare financing would recommend that the patient forego treatment when the treatment had to be financed by the patient's own savings. The answer is a resounding yes, among many of the respondents. This is depicted in Table 3, where the respondents are classified into different cells of the table with different superscript letters, based on whether they would recommend accepting or rejecting treatment with different financing and survival (as defined in the note at the bottom of Table 3). Respondents in the cells along the diagonal did not change their recommendation when financing changed from Medicare to the patient's own savings. Respondents off the diagonal, however, changed their recommendations when financing changed from Medicare to the patient's savings. Those in cell b recommended that the patient accept treatment with a 20% survival when it was Medicare financed but recommended that the patient reject treatment when it had the same 20% survival but had to be financed by the patient's savings; under patient savings financing, these same respondents recommended that the patient accept the treatment when the survival was higher at 60%. Respondents in cell d recommended the treatment with 20% survival when Medicare financed but rejected treatment even with 60% survival when patient savings financed. Respondents in cell e rejected treatment at 20% survival even when it was Medicare financed, accepted it when survival was 60% and Medicare financed, but rejected it when the treatment had 60% survival but had to be self-financed by the patient. Therefore, respondents in the off-diagonal cells (b, d, and e) switched their recommendations when financing changed from Medicare to the patient's own savings.

One relevant question is who would be more likely to switch recommendations when the financing switched from Medicare to the patient's own savings. Column 6 in Table 5 shows the results from an ordered logistic regression of the determinants of the *changes* in the respondent's reservation survival probability thresholds when financing changed from Medicare to the patient's own savings (having controlled for baseline choice). Column 6 compares those who switched treatment recommendations (thus implying a shift in reservation survival probability thresholds when financing switched from Medicare to the patient's own savings) with those who did not switch—by comparing the characteristics of respondents who fall into cells b, c, and e v. those in cells a and d of Table 3. Because the respondents in cell f of Table 3 already recommended that the patient reject treatment under Medicare and were not able to switch their answers when the financing switched to the patient's own savings, we deleted these respondents in the regression. Furthermore, because respondents in rows 2 and 3 of Table 3 differed in their baseline reservation thresholds (and thus their recommendations) under Medicare financing, we included a dummy variable "accept 20% survival with Medicare financing" to the regression in column 6 of Table 5.

The results of this regression show that male and black respondents were far less likely to switch treatment recommendations even if it meant depleting the patient's own savings. Interestingly, Hispanic respondents were far more likely to change their minds (than whites and blacks) and to recommend that the patient opt out of treatment when financing for the treatment changed from Medicare to the patient's own savings. Respondents in the AHEAD cohort were more likely to opt out as well, having controlled for age. Finally, marital status, health status, spouse's health status, cancer history, education, and household wealth were not significant determinants of switches in treatment recommendations when financing changed from Medicare to the patient's savings.

Because ordered logistic regression models make the proportional odds assumption,[16] we tested and corrected for this violation with a series of ordered logistic regressions using *partial* proportional odds models. The variables that differed significantly between proportional odds and partial proportional odds models are presented in the bottom panel of Table 5. Our main findings do not change with the less restrictive partial proportional odds models. In fact, the only difference in the odds ratios pertains to the size rather than the direction of the effect. The only nontrivial size difference was the odds of Hispanics switching from accepting to rejecting treatment when financing changed from Medicare to patient savings (column 6 of Table 5), with the original odds ratio of 2.79 (from the proportional odds model) increasing to 5.46 (with the partial proportional odds model); this reflects the fact that most Hispanics who recommended accepting Medicare-financed treatment

at 20% survival switched to rejecting the treatment even at 60% survival when the treatment had to be financed by the patient's savings.

DISCUSSION

With a unique data set that included elderly and near elderly respondents in the United States and their answers to a set of vignettes about end-of-life health care treatment decisions on behalf of a hypothetical elderly woman, we explored how elderly and near elderly adults assess EOL medical treatment choices with varying probabilities of success and with substantially different financial implications. Before we discuss some of the main results and implications, we shall first highlight the limitations of our study, so that the results can be interpreted in light of these limitations.

Our study suffers from 2 main limitations. First, the respondents were asked about their opinion on cancer treatment choices for an anonymous, *hypothetical* woman in her 80s of unknown race or ethnicity. Although the answers should reflect the respondents' health policy choices, it is unclear whether some respondents also answered these vignettes taking the perspective of making the treatment choices for themselves or their spouse, rather than for a hypothetical person. Decisions based on the respondent's own life compared with that of a hypothetical person will likely depend on the emotional context, financial status, or other personal factors. We have controlled for some of these effects by including a set of demographic covariates, but our statistical analyses have not fully accounted for all the factors related to actual v. hypothetical answers that would bias our results.

Another important limitation to our study is that the respondents may have had difficulty in fully understanding the rather complex vignettes used to collect the data. For instance, the vignettes used 20% and 60% as survival probabilities, and some respondents may have had trouble interpreting probabilities. The way the vignettes were presented to the respondents also does not necessarily reflect how physicians normally convey information for treatment choices. In fact, physicians do not have uniform methods of presenting outcomes and uncertainty. Differences in the framing of outcomes (survival v. mortality, for instance) and the level of uncertainty (relative risk reduction, number of people needed to treat, probabilities) have both been shown to result in different treatment choices.[17] Although the literature recommends presenting information using multiple modalities, using charts, graphs, and simple heuristics (such as using 1-in-10 instead of 10% probability), there is no consensus about how best to present these kinds of information even during the "informed consent" process.[18] Clearly, more research is needed in this important part of physician-patient clinical decision making, especially when physicians themselves are also influenced by framing and the way risk and uncertainty are presented.[19]

In view of these limitations, our study does have some interesting although sometimes perplexing findings. We found that many respondents would recommend foregoing costly EOL treatments for a hypothetical woman in a set of vignettes when the treatment cost would wipe out the patient's savings. Among the total of 663 respondents who would recommend opting for care when it was financed by Medicare (cells a, b, c, d, and e in Table 3), 243 (or 36.7% of them; cells b, d, and e in Table 3) would not recommend accepting the same treatment if the woman in the vignette had to deplete savings to pay for the treatment. These numbers indicate that when treatment cost is not covered by Medicare, the respondents feel that the patient must be "compensated" with a higher treatment survival probability for them to recommend accepting treatment. Viewing this from an alternative angle, when treatment cost is covered by Medicare, respondents would recommend opting for care that even had a low survival probability. This latter phenomenon is the well-studied and well-documented moral hazard,[20] which essentially says that people will consume more care when the out-of-pocket cost is low.

Although it seems self-evident that people would be more likely to recommend opting for treatment if the patient's out-of-pocket costs were low, it is interesting that many of the respondents would recommend against treatment even when it entailed a low financial cost to the patient (e.g., respondents in cell f in Table 3). This may reflect concerns about various direct, indirect, and intangible costs related to the treatment. The vignettes state that Medicare will pay *most* of the costs, and as such, respondents may believe that the patient's out-of-pocket costs would still be significant even under the Medicare financing option because it does not cover *all* of the costs. The vignettes also indicated that the subject "would have to rely on others for personal care during the treatment." Nonmonetary costs associated with

caregiving and the monetary costs of hiring a caregiver may be important in actual treatment decisions.[21] In addition to these direct medical and nonmedical costs, there is also the pain and suffering associated with the treatment. However, it is difficult to assess how these costs induced any type of response bias. For instance, in terms of the pain and suffering, respondents with a history of cancer did not differ in their recommendations from those who have never had cancer (see Table 5).

Our study also found that black respondents were far more likely to recommend opting for treatment regardless of survival probability or payment source, a finding consistent with many prior studies.[22] White respondents were more likely to recommend opting out of care if that care meant depletion of the patient's savings. Interestingly, Hispanics were even more likely than whites to recommend opting out of such care; their treatment recommendations were the most sensitive to change in how the treatment would be financed. This finding needs to be further explored in other data sets because as far as we know, this has not been documented in the literature.

We also found that women were far more likely than men to switch out of treatment that they had recommended accepting under Medicare financing but now had to be paid out of the patient's pocket. In separate regressions stratified by marital status (not reported in the tables), this gender differential was significant only among married respondents; that is, married women were much more likely to recommend switching out of treatment when Medicare no longer paid, but women who were not married were not significantly more likely than unmarried men to recommend switching out of treatment. Many reasons are possible why there is this strong gender differential in recommendations. The vignettes asked about an elderly married woman with a threatening form of cancer needing treatment, and it is possible that the respondents were more altruistic than selfish: married male respondents might have identified more with the husband in the vignettes and felt that the wife should get care even if it meant impoverishing the patient's husband, but married female respondents might have identified more with the woman in the vignette and felt that the patient herself should forego care to prevent impoverishing her spouse. Willingness-to-pay studies among couples where one spouse has mild to moderate dementia and the other spouse is a caretaker have found evidence of altruism motives between the dyad.[23] One way to further study this treatment recommender v. treatment recipient gender effect would be to randomize the gender of the cancer patient in the hypothetical vignettes in future research. Another possible reason for the gender differential is that men might be more aggressive than women in opting for medical treatments, as in treatments for coronary artery disease.[24] In regressions not reported in the tables, we included a proxy for risk aversion for the HRS subsample, but it was not significant in any of the regressions, suggesting that any aggressiveness in opting for treatment among men was not due to risk tolerance. Despite our inability to test for the various reasons for this gender differential, further research is needed on this issue because it could have important welfare and policy implications. Given that women and men differed in their recommendations in these vignettes, the use of spouses as durable powers of attorney to make EOL care decisions should be further examined because women and men clearly had different preferences. This is an additional piece of evidence that discordant decisions could be likely even with advance directives.[25]

Finally, we found that the order in which the various treatment options were presented had an effect on the recommendation of uptake for the treatment. The ordering effect could be due to starting point bias in that the respondents latched onto their first answer as the framework to answer the subsequent vignettes. The respondents could also have been affected by framing. Each vignette was framed with both gain and loss: the survival probability was framed as a gain, and the financing was framed as a loss. Prior research has found that framing had an impact on the patient's decisions.[11] Moreover, in going from one vignette to the next, the sequence of vignettes was presented as gains, losses, or some combination of the two. Prior studies have documented ordering effects in willingness to pay for medical care for the public, but starting point bias and framing were found not to be dominant explanations.[26] The vignettes in our data were much more personal and asked the respondents to make a specific treatment choice for a woman in the vignette. Some of our findings do suggest that framing (in terms of whether the sequence of vignettes was presented as losses or gains across the vignettes) was a potential explanation for some of the ordering effect. The complexity of the vignettes and of their sequences of presentation, however, prevented us from further exploring the reasons for the ordering effect. Nevertheless, future research on ordering effects and their clinical relevance is warranted.

REFERENCES

1. DeNavas-Walt C, Proctor BD, Lee CH. Income, Poverty, and Health Insurance Coverage in the United States: 2005. US Census Bureau, Current Population Reports, P60–231. Washington, DC: Government Printing Office; 2006.

2. McGarry K, Schoeni RF. Widow(er) poverty and out-of-pocket medical expenditures near the end of life. J Gerontol B Psychol Sci Soc Sci. 2005;60:S160–8.

3. Fan JX, Zick CD. The economic burden of health care, funeral, and burial expenditures at the end of life. J Consum Aff. 2004;38: 35–55.

4. Zick CD, Fan JX, Chang K. Impending widowhood and health care spending. Soc Sci Res. 2004;33:538–55.

5. Morrison RS. Health care system factors affecting end-of-life care. J Palliat Med. 2005;8(Suppl 1):S79–87.

6. Rabow MW, Hauser JM, Adams J. Supporting family caregivers at the end of life: "they don't know what they don't know." JAMA. 2004;291:483–91.

7. Schulz R, Beach SR. Caregiving as a risk factor for mortality: the Caregiver Health Effects Study. JAMA. 1999;282:2215–9.

8. Heeringa SG, Connor JH. Technical Description of the Health and Retirement Survey Sample Design. Ann Arbor: Institute for Social Research, University of Michigan, Ann Arbor; 1995.

9. Heeringa SG. Technical Description of the Asset and Health Dynamics (AHEAD) Survey Sample Design. Ann Arbor: Institute for Social Research, University of Michigan, Ann Arbor; 1995.

10. Health and Retirement Study, 1995 AHEAD and 1996 HRS, public use dataset. Produced and distributed by the University of Michigan with funding from the National Institute on Aging (grant number NIA U01AG009740). Ann Arbor, MI, 1995, 1996. Available from: http://hrsonline.isr.umich.edu

11. Armstrong K, Schwartz JS, Fitzgerald G, Putt M, Ubel PA. Effect of framing as gain versus loss on understanding and hypothetical treatment choices: survival and mortality curves. Med Decis Making. 2002;22:76–83.

12. Lehmann EL. Nonparametrics: Statistical Methods Based on Ranks. San Francisco: Holden-Day; 1975.

13. Franses PH, Cramer M. On the number of categories in an ordered regression model. Erasmus University Rotterdam Econometric Institute Report 2002–15. Available from: http://www2.eur.nl/WebDOC/doc/econometrie/fewec020020501105232.pdf

14. Cramer JS, Ridder G. Pooling states in the multinomial logit model. J Econometrics. 1991;47:267–72.

15. Ai C, Norton EC. Interaction terms in logit and probit models. Econ Lett. 2003;80:123–9.

16. Stokes ME, Davis CS, Koch GG. Categorical Data Analysis Using the SAS System. 2nd ed. Cary, NC: SAS Publishing, BBU Press and John Wiley Sons; 2000.

17. Wills CE, Holmes-Rovner M. Patient comprehension of information for shared treatment decision making: state of the art and future directions. Patient Educ Couns. 2003;50:285–90.

18. Moxey A, O'Connell D, McGettigan P, Henry D. Describing treatment effects to patients: How they are expressed makes a difference. J Gen Intern Med. 2003;18:948–59.

19. McGettigan P, Sly K, O'Connell D, Hill S, Henry D. The effects of information framing on the practices of physicians. J Gen Intern Med. 1999;14:633–42.

20. Pauly MV. The economics of moral hazard: comment. Am Econ Rev. 1968;58:531–7.

21. Byock IR. End-of-life care: a public health crisis and an opportunity for managed care. Am J Manag Care. 2001;7:1123–32.

22. Searight HR, Gafford J. Cultural diversity at the end of life: issues and guidelines for family physicians. Am Fam Physician. 2005;71:515–22.

23. Konig M, Zweifel P. Willingness-to-pay against dementia: effects of altruism between patients and their spouse caregivers. Working paper, University of Zurich, September 2004.

24. Heidenreich PA, Shlipak MG, Geppert J, McClellan M. Racial and sex differences in refusal of coronary angiography. Am J Med. 2002;113:200–7.

25. Fagerlin A, Ditto PH, Hawkins NA, Schneider CE, Smucker WD. The use of advance directives in end-of-life decision making. Am Behav Sci. 2002;46:268–83.

26. Stewart JM, O'shea E, Donaldson C, Shackley P. Do ordering effects matter in willingness-to-pay studies of health care? J Health Econ. 2002;21:585–99.

Effect of Guidelines on Primary Care Physician Use of PSA Screening: Results from the Community Tracking Study Physician Survey

Carmen E. Guerra, MD, MSCE, Phyllis A. Gimotty, PhD, Judy A. Shea, PhD, José A. Pagán, PhD, J. Sanford Schwartz, MD, Katrina Armstrong, MD, MSCE

Background. *Little is known about the effect of guidelines that recommend shared decision making on physician practice patterns. The objective of this study was to determine the association between physicians' perceived effect of guidelines on clinical practice and self-reported prostate-specific antigen (PSA) screening patterns.* ***Methods.*** *This was a cross-sectional study using a nationally representative sample of 3914 primary care physicians participating in the 1998–1999 Community Tracking Study Physician Survey. Responses to a case vignette that asked physicians what proportion of asymptomatic 60-year-old white men they would screen with a PSA were divided into 3 distinct groups: consistent PSA screeners (screen all), variable screeners (screen 1%–99%), and consistent nonscreeners (screen none). Logistic regression was used to determine the association between PSA screening patterns and physician-reported effect of guidelines (no effect v. any magnitude effect).* ***Results.*** *Only 27% of physicians were variable PSA screeners; the rest were consistent screeners (60%) and consistent nonscreeners (13%). Only 8% of physicians perceived guidelines to have no effect on their practice. After adjustment for demographic and practice characteristics, variable screeners were more likely to report any magnitude effect of guidelines on their practice when compared with physicians in the other 2 groups (adjusted odds ratio = 1.73; 95% confidence interval = 1.25−2.38; P = 0.001).* ***Conclusions.*** *Physicians who perceive an effect of guidelines on their practice are almost twice as likely to exhibit screening PSA practice variability, whereas physicians who do not perceive an effect of guidelines on their practice are more likely to be consistent PSA screeners or consistent PSA nonscreeners.* ***Key words:*** *prostate-specific antigen; mass screening; guidelines; physicians' practice patterns.* ***(Med Decis Making 2008;28:681–689)***

Clinical practice guidelines are "systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances."[1] Clinical practice guidelines have been shown to influence practice in settings where the guidelines have clear recommendations for or against a particular intervention or process.[2–6] In these settings, clinical guidelines may reduce variation in health care quality and improve equity in health care.

However, the effect of guidelines that advocate shared decision making on physician practice patterns is unknown. Shared decision making is the process by which physicians and patients share information with each other, take steps to participate in the decision-making process, and agree on a course of action.[7] Prostate cancer–screening guidelines advocate shared decision making. Prostate cancer is the most common cancer in US men, but the utility of screening for prostate cancer with a prostate-specific antigen (PSA) test is controversial.[8] Although there are 2 large randomized clinical trials currently in progress to determine the utility of PSA screening to date,[9,10] it is unknown whether screening reduces mortality from prostate cancer. Therefore, beginning in 1996 and 1997, the guidelines from the American Cancer Society,[11] American College of Physicians,[12] and the US Preventive Services Task Force[13] recommended shared decision about PSA screening (see the appendix).

A previous physician focus group study demonstrated that physicians who routinely screen with a PSA were more likely to report that clinical practice

Address correspondence to Carmen E. Guerra, MD, MSCE, Division of General Internal Medicine, University of Pennsylvania School of Medicine, 1221 Blockley Hall, 423 Guardian Drive, Philadelphia, PA 19104-6021; e-mail: carmen.guerra@uphs.upenn.edu.

DOI: 10.1177/0272989X08315243

guidelines were not a factor in their screening decisions.[14] We hypothesized that physicians who report a strong effect of guidelines on clinical practice are more likely to be variable PSA screeners because PSA screening guidelines call for incorporating patient preferences and values in decision making. As considerable time, effort, and resources are devoted to developing and implementing guidelines, knowing the effect of guidelines that promote shared decision making on physician practice patterns has important implications on future efforts to create and implement guidelines.

METHODS

This study was approved by the Institutional Review Board at the University of Pennsylvania. We used cross-sectional survey data from the 1998–1999 (Round Two) Community Tracking Study (CTS) Physician Survey.[15,16] The CTS Physician Survey is a biannual longitudinal telephone survey of non–federally employed physicians at 60 sites (51 metropolitan US areas and 9 nonmetropolitan US areas) and of a supplemental national sample of physicians conducted by the Center for Studying Health System Change, which is sponsored by the Robert Wood Johnson Foundation. Data for Round Two were collected just after the concept of shared decision making was introduced in the guidelines in 1996 and 1997 in response to the widespread interest in and rapid uptake of PSA screening for prostate cancer.[17]

The aim of the CTS Physician Survey is to track changes in the health care system and the effects of these changes on the delivery of care by physicians. Participants of the CTS Physician Survey are physicians who provide direct care to patients at least 20 h per week in an office-based or hospital practice. It excludes residents and fellows. Details of the survey are available at www.hschange.org/index.cgi?data = 98. The total number of completed interviews for the 1998–1999 survey was 12,280, for a response rate of 60.9%.

The CTS Physician Survey contains information on physician demographics, medical education, specialty, board certification, practice setting, number of years in practice, practice ownership, practice revenue, source of practice revenue, and provision of charity care. In addition, the survey asks about the perceived effect of clinical practice guidelines on practice. The 1998–1999 round of the CTS Physician Survey also measured PSA screening practice style using a case vignette.

Selection of Study Subjects

Of the 12,280 total responders in the 1998–1999 CTS Physician Survey, 7556 were primary care physicians. For this study, we excluded primary care physicians practicing pediatrics, obstetrics and gynecology, and subspecialties ($n = 3642$) because they are less likely to provide care for the reference patient described in the case vignette: an adult male patient presenting for prostate cancer screening. The final analytic sample consists of 3914 primary care physicians in family practice, internal medicine, and general practice.

Data Collection

Data for the 60 sites were collected by the Center for Studying Health System Change using stratified random sampling with probability proportional to population size. The supplemental sample was selected with stratified random sampling and was included to increase the precision of the national estimates. The sample frame was developed by combining lists of physicians from the American Medical Association and the American Osteopathic Association. Primary care physicians were oversampled in the site sample. The CTS Physician Survey was conducted using a telephone interview. Use of the data was made available through a restricted data use agreement between the principal investigator and the Inter-university Consortium for Political and Social Research at the University of Michigan.

Dependent Variable

The dependent variable is the physician responses to the PSA screening case vignette, which reads as follows:

Received 15 November 2007 from the Division of General Internal Medicine, University of Pennsylvania School of Medicine, Philadelphia (CEG, JAS, JSS, KA); Leonard Davis Institute of Health Economics, University of Pennsylvania School of Medicine, Philadelphia (CEG, JAS, JSS, KA); Abramson Cancer Center, University of Pennsylvania, Philadelphia (CEG, JSS, KA); Department of Biostatistics, University of Pennsylvania School of Medicine, Philadelphia (PAG); and Department of Economics and Finance and the Institute for Population Health Policy, University of Texas–Pan American, Edinburg, Texas (JAP). The results of this work were previously presented at the 29th annual meeting of the Society of General Internal Medicine, 29 April 2006, Los Angeles, California. Revision accepted for publication 6 January 2008.

> What about PSA (Prostate-specific Antigen) screening in an asymptomatic 60 year old white man who has no family history of prostate cancer and a normal digital rectal exam? For what percentage of such patients would you recommend a PSA test? Consider all your patients with similar clinical descriptions.

Responses ranged from 0% to 100%. Responses were collapsed to create 3 categories: consistent screeners, consistent nonscreeners, and variable screeners, to represent those who would screen all (100%), none (0%), and some (1%–99%) of the patients represented in the case vignette, respectively. Each of these 3 variables were dichotomized to compare the level to all other physicians, thereby creating three 0/1 variables.

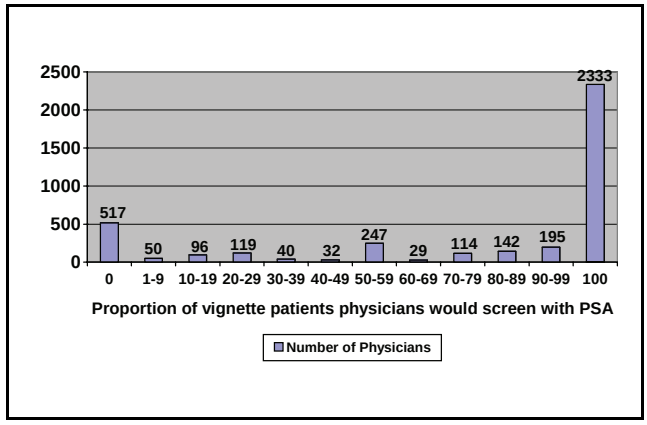

Figure 1 Distribution of physician responses to case vignette.

Independent Variables

The independent variable in this study is the physicians' perceived effect of guidelines on their practice derived from the following question:

> How large an effect does your use of formal, written practice guidelines such as those generated by physician organizations, insurance companies or HMOs [health maintenance organizations] or government agencies, have on your practice of medicine?

Each response was based on a 6-point scale with anchors at *no effect* and *very large effect*. For this analysis, we dichotomized the independent variable into no effect (reference) versus any magnitude effect.

Covariates

The multivariate models adjust for physician age; gender; race; Latino ethnicity; practice specialty; board certification status; foreign medical graduate status; practice setting; number of years in practice; salaried status; income in 1997; Medicare, Medicaid, and managed care as a source of practice revenue; and provision of any charity care.

Statistical Analysis

All statistical analyses were conducted using Stata/SE version 8.2.[18] Descriptive statistics were used to examine the demographic and practice characteristics of consistent screeners, consistent nonscreeners, and variable screeners and their responses to the case vignette. An unadjusted and a multivariate logistic regression model were estimated for each of the 3 groups of physicians, consistent screeners, consistent nonscreeners, and variable screeners, that compared the perceived effect of guidelines in each of the screening group to the other 2 screening groups, yielding a total of 6 regression models. Multivariate models adjusted for physician and practice characteristics. All logistic regression models were estimated taking into account the CTS Physician Survey's complex design. Given the fixed sample size for the current study of 3914 primary care physicians who participated in the 1998–1999 CTS Physician Survey and completed the PSA screening vignette, using a 2-sided statistical test, with an α set at .05 and a minimum detectable difference of 10% probability of being a consistent screener among those who declare no effect versus those who declare any effect of guidelines, this study had 93% power.

RESULTS

Figure 1 shows the frequency of physician responses to the case vignette. The majority (60%) of physicians reported they would recommend screening to all asymptomatic 60-year-old white men (consistent screeners), whereas only 13% reported they would not recommend screening to any such patients (consistent nonscreeners). The remaining 27% of physicians reported that they would recommend screening to 1% to 99% of such patients (variable screeners).

Only 319 (8%) of the physicians perceived guidelines to have no effect on practice, whereas the remaining 3591 (92%) physicians perceived at least some effect of the guidelines. Of these, 13% reported a very small, 27% a small, 35% a moderate, 14% a large, and 4% a very large effect of guidelines on practice.

Table 1 presents the physician and practice characteristics of physicians who were classified as consistent nonscreeners, variable screeners, and consistent screeners. *P* values are presented for the relationship between the 3 categories of screeners and the independent variable and are based on the np trend statistic. Compared with the remainder of physicians, physicians who were variable PSA screeners were least likely to be white ($P = 0.003$), most likely to practice internal medicine ($P = 0.05$), and most likely to be solo practioners ($P < 0.0001$).

Table 2 shows the results of unadjusted and multivariate logistic regression models for the association between the perception of any effect of guidelines on practice and PSA screening pattern. After adjustment for demographic and practice characteristics, physicians who were variable PSA screeners were more likely to report any magnitude effect of guidelines on their practice when compared with physicians in the other 2 groups (adjusted odds ratio [AOR] = 1.73; 95% confidence interval [CI] = 1.25−2.38; $P = 0.001$). Given the heterogeneity in the comparison groups, we compared variable screeners to each of the other 2 groups in separate analyses. When variable screeners were compared with consistent screeners only (omitting the consistent nonscreeners), the AOR was 1.83 (95% CI = 1.32−2.54; $P = 0.001$; not shown in the table). A comparison with consistent nonscreeners did not yield statistically significant results (not shown in the table). Table 2 also shows that in multivariate models physicans who consistently screened their patients with a PSA test were significantly less likely to report any magnitude effect of guidelines on their clinical practice when compared with physicians in the other 2 groups (AOR = 0.61; 95% CI = 0.47−0.79; $P < 0.0001$). Physicians who consistently did not screen their patients did not signficantly differ in the reported effect of guidelines when compared with the other 2 groups of physicians (AOR = 1.16; 95% CI = 0.79−1.71; $P = 0.43$).

Table 3 shows the results of the unadjusted and multivariate logistic regression models for the association between being a variable PSA screener (compared with all other physicians) and physician and practice characteristics as well as the perception that guidelines have any effect on practice (v. no effect). In both unadjusted and multivariate models, an income of $200,000 to $299,999, providing any charity care in the previous month, Medicaid as a source of practice revenue, and the perception that guidelines had an effect on practice were directly associated with being a variable screener. In addition, in multivariate models, nonwhite physicians were more likely to be a variable screeners, and Latino physicians were less likely to be variable screeners.

DISCUSSION

One of the 1st clinical practice guidelines to be widely used was created in 1938 by the American Academy of Pediatrics to provide parameters for the immunization of children.[19] Clinical practice guidelines have since become commonplace, and as of 2007, there were 2249 clinical practice guidelines in the National Guideline Clearinghouse, the national repository of evidence-based guidelines.[20] Considerable time, effort, and resources are devoted to developing and implementing guidelines.[21] Thus, knowledge of how physicians perceive and interpret guidelines is important for providing high-quality care. To our knowledge, this one is the 1st study to use nationally representative physician survey data to examine physician PSA screening patterns and their perceived effect of guidelines on clinical practice.

Our research shows several important findings. First, the majority of physicians (60%) reported that they consistently recommend PSA screening to all their asymptomatic 60-year-old patients. This finding is consistent with previous research that has shown that many, if not most, physicians order screening PSAs at least occasionally.[22–34] Thus, it is not surprising that 75% of men older than 50 years in the United States have previously had a PSA test.[35]

Second, although guidelines recommend shared decision making, only 27% of physicians are variable PSA screeners. Thus, the majority of physicians have a consistent screening strategy, indicating that they may be less responsive to patient values and preferences. From this perspective, the message of shared decision making appears to have had only a limited impact on clinical practice. Research on patients supports this inference. In a cross-sectional analysis of data from the 2000 National Health Interview Survey, approximately one third of men reported their physician did not discuss advantages and disadvantages of prostate cancer screening before offering testing.[36] Two additional studies suggest the problem is even more concerning: one fourth of men who have undergone PSA testing were unaware they had been tested.[37,38] These findings add to the concern that a significant proportion of men are not being given the opportunity to make an informed decision about prostate cancer screening and that the prostate cancer screening guideline recommendation of shared decion

Table 1 Characteristics of Primary Care Physicians Who Are Consistent Nonscreeners, Variable Screeners, and Consistent Prostate-Specific Antigen Screeners

Characteristic of Physicians	Consistent Nonscreeners ($n = 517$)	Variable Screeners ($n = 1064$)	Consistent Screeners ($n = 2333$)	*P* Value[a]
Age, $\bar{x}$ (s)	45.2 (9.8)	46.3 (10.4)	48.8 (11.1)	< 0.0001
Male, *n* (%)	351 (67.9)	782 (73.5)	1837 (78.7)	< 0.0001
Race, no. (%)				0.003
White	377 (72.9)	764 (71.8)	1774 (76.0)	
Black	24 (4.6)	54 (5.1)	99 (4.2)	
Asian	79 (15.3)	184 (17.3)	288 (12.3)	
Native	3 (0.5)	3 (0.3)	12 (0.5)	
Other	8 (1.6)	11 (1.0)	28 (1.2)	
Hispanic/Latino ethnicity, *n* (%)	26 (5.0)	48 (4.5)	132 (5.7)	0.30
Specialty, *n* (%)				0.05
Family practice	207 (40.0)	382 (35.9)	828 (35.5)	
Internal medicine	289 (55.9)	635 (59.7)	1378 (59.1)	
General practice	21 (4.6)	47 (4.4)	127 (5.4)	
Board certified, no. (%)	450 (87.6)	863 (81.7)	1844 (79.7)	< 0.0001
Foreign medical graduate, *n* (%)	105 (20.3)	267 (25.1)	553 (23.7)	0.32
Type of practice, *n* (%)				< 0.0001
Solo, 2, or group physician practice	215 (41.6)	611 (67.4)	1481 (63.5)	
Hospital or medical school	48 (9.3)	74 (7.0)	166 (7.1)	
HMO	155 (30.0)	226 (21.2)	395 (16.9)	
Other	99 (19.4)	153 (14.4)	291 (12.5)	
No. of years in practice, $\bar{x}$ (s)	13.1 (10.2)	14.1 (10.2)	17.0 (11.3)	< 0.0001
Salaried, *n* (%) ($n = 2876$)	349 (67.5)	626 (58.8)	1172 (50.2)	0.02
Annual net income in 1997, $\bar{x}$ (s)	123,011 (58,567)	125,561 (58,966)	139,464 (65,631)	< 0.0001
Source of practice revenue, $\bar{x}$ (s)				
Medicare	33.2 (21.4)	35.9 (20.7)	34.9 (21.3)	0.38
Medicaid	15.4 (15.3)	14.9 (15.4)	10.3 (13.5)	< 0.0001
Managed care	51.4 (30.1)	45.1 (27.4)	48.2 (27.6)	0.66
No charity care provided in previous month, *n* (%)	169 (32.7)	280 (26.3)	746 (32.0)	0.28
How large an effect does your use of formal, written practice guidelines such as those generated by physician organizations, insurance companies or HMOs, or government agencies have on your practice of medicine? *n* (%)				
No effect	38 (7.4)	65 (6.1)	216 (9.2)	
Very small effect	55 (10.6)	120 (11.3)	315 (13.5)	
Small effect	112 (21.7)	300 (28.3)	630 (27.0)	
Moderate effect	216 (41.8)	390 (36.8)	757 (32.5)	
Large effect	68 (13.2)	149 (14.0)	324 (13.9)	
Very large effect	28 (5.4)	37 (3.5)	90 (3.9)	

Note: HMO = health maintenance organization. In some cases, percentages do not add up to 100% because of rounding.
a. *P* values are based on np trend.

making is not being implemented. Much research has been conducted on guideline implemenation. A recent literature review of the facilitators of guideline implementation found that among the 70 successful facilitators identified in the literature, 7 categories emerged: 1) data feedback, 2) reminders or checklists, 3) peer review and in-person feedback, 4) direct supervision, 5) in-service or other educational interventions, 6) mandates, and 7) monetary incentives.[39] Multifaceted interventions targeting different barriers to change are likely to be required to effectively change physician PSA screening behavior.[40–43]

Third, although only a small minority (8%) of physicians report that guidelines have no effect on their clinical practice, those physicians are much less likely to be variable PSA screeners. Our findings

Table 2 Association Between the Perception of Any Effect of Guidelines on Practice and Being a Consistent Nonscreener, Variable Screener, and Consistent Screener of Prostate-Specific Antigen

How Large an Effect Does Your Use of Formal, Written Practice Guidelines Such as Those Generated by Physician Organizations, Insurance Companies or HMOs, or Government Agencies Have on Your Practice of Medicine?	Unadjusted Model			Multivariate Model		
	OR	95% CI	*P*-value	OR	95% CI	*P*-value
Consistent Nonscreener ($n = 517$)	1.38	0.94-2.02	0.10	1.16	0.79-1.71	0.43
Variable Screener ($n = 1,061$)	1.76	1.27-2.42	0.001	1.73	1.25-2.38	0.001
Consistent Screener ($n = 2,332$)	0.56	0.42-0.74	0.0001	0.61	0.47-0.79	0.0001

Note: HMO = health maintenance organization; OR = odds ratio; CI = confidence interval. Each model compares physicians with a specific screening pattern against the other 2 groups of physicians. Models are adjusted for physician age; sex; race; Latino ethnicity; specialty; board certification status; foreign graduate status; practice type; number of years in practice; salaried status; income earned in 1997; proportion of Medicare, Medicaid, and managed care as a source of revenue; and charity care provided in the previous month.

are similar to prior focus group research[14] that shows that routine PSA screeners were less likely to be familiar with the guidelines about PSA screening compared with routine nonscreeners. In fact, in that same study, routine screeners were frequently unable to describe the recommendations of any specific organization, were unaware of the controversy about PSA screening, and believed that population-based screening was universally endorsed. In addition, most routine screeners in that study said that clinical guidelines were not a factor in their screening decisions and that, instead, their practices were based on their clinical experience. Less is known about variable screeners, but one hypothesis is that physicians who are variable screeners interpret the current guidelines in a way that recognizes that screening decisions should be individualized. Based on the findings of this study, clinical guidelines that recommend individualized, informed, shared decision making appear to have some impact on clinical practice: Physicians who report guidelines have an effect on clinical practice are more likely to have PSA screening practice patterns consistent with shared decision making.

Fourth, the current research demonstrates that physicians who are consistent PSA screeners differ from those who are consistent nonscreeners and variable screeners in other ways. Compared with all the remainder of physicians, consistent PSA screeners are more likely to be older, male, white, and in practice longer and to have a higher income and are less likely to be board certified, salaried, and have the lowest proportion of Medicaid as a source of revenue. Conversely, consistent PSA nonscreeners had personal and practice characteristics that were the opposite of consistent screeners. It is possible that the demographic profile of the physicians who are routine screeners represents a group of physicians who are paternalistic, whereby patient input is not sought and thus practice variation is reduced. Cooper and others[14] previously demonstrated that consistent screeners and consistent nonscreeners vary in substantive ways. The major factor influencing PSA practice patterns for consistent screeners was professional and personal experience that supported PSA screening and patient expectations to be screened, whereas the major factor influencing consistent nonscreeners was the lack of definitive evidence of the benefit of PSA screening.

Our study has several limitations. First, the question about screening guidelines in the CTS Physician Survey was not specific to PSA screening, and the data did not allow us to evaluate which clinical practice guidelines are responsible for the perceived effect of guidelines on practice, thereby creating the potential for misclassification bias. Physicians receive guidelines from multiple organizations through different media, and they assimilate the contents of these to largely varying degrees depending on the source. In fact, physicians may experience "guideline fatigue" and not adopt a clinical practice guideline at all.[44] A potential solution is to convene a multisociety task force composed of members of all the relevant organizations to design a single, uniform set of clinical practice guidelines about a topic, as was done with the case of colorectal cancer screening.[45] Although design and approval of these guidelines are more time and labor intensive, such guidelines have the potential to be much more widely and consistently implemented.

Second, the literature shows that there may be other important drivers of PSA screening that we did not have data for and thus could not adjust for,

Table 3 Unadjusted and Multivariate Logistic Regression Results for the Association between Variable Screeners and Physician Demographic Characteristics, Practice Characteristics, and Perceived Effect of Guidelines

Characteristic of Physicians Who Are Variable PSA Screeners	Unadjusted Model			Multivariate Model		
	OR	95% CI	*P* Value	OR	95% CI	*P* Value
Age	0.98	0.97–0.99	0.003	0.99	0.94–1.02	0.25
Female	1.28	0.89–1.84	0.18	1.07	0.80–1.42	0.65
Nonwhite race (compared with white)	1.09	1.01–1.18	0.25	1.09	1.02–1.17	0.01
Hispanic (compared with not Hispanic)	0.90	0.68–1.19	0.45	0.72	0.53–0.97	0.03
Specialty						
Family practice (reference)	—	—	—	—	—	—
Internal medicine	0.95	0.79–1.15	0.65	0.91	0.78–1.07	0.25
General practice	0.72	0.40–1.30	0.27	0.84	0.49–1.46	0.54
Board certification	1.05	0.78–1.43	0.73	1.01	0.76–1.33	0.96
Foreign medical graduate	1.12	0.78–1.60	0.64	0.89	0.59–1.34	0.58
Type of practice (%)						
Solo, 2, or group physician practice (reference)	—	—	—	—	—	—
HMO	0.95	0.64–1.40	0.78	1.16	0.77–1.73	0.47
Hospital or medical school	1.18	0.94–1.48	0.14	1.09	0.88–1.35	0.41
Other	1.03	0.83–1.29	0.79	0.87	0.66–1.16	0.35
Number of years in practice	0.98	0.97–0.99	< 0.0001	1.00	0.97–1.04	0.92
Salaried	1.08	0.98–1.19	0.125	1.12	0.98–1.28	0.09
Annual income in 1997						
$0–$99,999 (reference)	—	—	—	—	—	—
$100,000–$199,999	0.75	0.52–1.09	0.14	0.76	0.52–1.12	0.16
$200,000–$299,999	0.49	0.30–0.82	0.007	0.51	0.31–0.85	0.01
≥$300,000	0.69	0.29–1.64	0.39	0.75	0.31–1.83	0.52
Provide any charity care in previous month	1.31	1.08–1.59	0.008	1.23	1.01–1.51	0.04
Source of practice revenue						
% Medicare (*s*)	1.00	1.00–1.01	0.18	1.00	1.00–1.01	0.04
% Medicaid (*s*)	1.02	1.10–1.02	< 0.0001	1.01	1.01–1.02	< 0.0001
% Managed care (*s*)	0.99	0.99–1.00	< 0.0001	0.99	0.99–1.00	< 0.0001
How large an effect does your use of formal, written practice guidelines . . . have on your practice of medicine?						
Any effect versus no effect	1.76	1.27–2.42	0.001	1.73	1.25–2.38	0.001

Note: PSA = prostate-specific antigen; OR = odds ratio; CI = confidence interval; HMO = health maintenance organization. A consistent screener is defined as screening with PSA at least 80% of patients represented by vignette. All *P* values are 2 tailed.

for example, concerns about medical-legal risk.[46] Third, the dependent variable, PSA screening, was measured using a single isolated variable: a case vignette. Although the case vignette allowed us to control for patient factors and isolate the physician factors associated with PSA screening decision making, a broader assessment of a range of clinical scenarios would strengthen our results. However, several studies have supported the validity of case vignettes in measuring actual physician behavior as responses to case vignettes are correlated with actual clinical behavior.[47–50] Fourth, there is the potential for nonresponse bias, given that the response rate for the 1998–1999 CTS Physician Survey was 61%, a response rate that is not unusually low for physician surveys. Finally, the inferences drawn from this cross-sectional study are limited because this study cannot prove causality between the effect of guidelines and the PSA screening behavior of physicians.

Despite these limitations, this is one of the largest studies to examine the relationship between physician attitudes, guidelines, and PSA screening patterns. These results can inform health care policy makers who seek to improve the quality of cancer screening decisions and develop effective clinical guidelines.

ACKNOWLEDGMENT

Dr. Guerra acknowledges the National Cancer Institute (grant K01 CA-097925) and the Robert Wood Johnson Foundation Amos Medical Faculty Development Program (grant 051895) for their grant support as well as the Center for Studying Health System Change for granting the authors the use of the Community Tracking Study Physician Survey restricted data for the analyses described in this article. Dr. Pagán acknowledges the financial support of the Department of Defense (grant W81XWH-06-1-0334).

APPENDIX

Organization	Year	Recommendation from Guidelines
American Cancer Society[11]	1997	"The ACS recommends that both the PSA test and the digital rectal exam be offered annually, beginning at age 50, to men who have a life expectancy of at least 10 years and to younger men who have a high risk. Information should be provided to patients about the risks and benefits of screening."
American College of Physicians[12]	1997	"Rather than screening all men for prostate cancer as a matter of routine, physicians should describe the potential benefits and known harms of screening, diagnosis, and treatment; listen to the patient's concerns; and then individualize the decision to screen."
US Preventive Services Task Force[13]	1996	"Routine screening for prostate cancer with DRE, serum tumor markers (e.g., PSA), or Transrectal Ultrasound is not recommended ("D" recommendation). Patients who request screening should be given objective information about the potential benefits and harms of early detection and treatment."

Note: PSA = prostate-specific antigen; DRE = digital rectal examination.

REFERENCES

1. Field M, Lohr K, eds. Clinical Practice Guidelines: Directions for a New Program. Washington (DC): National Academy Press; 1990.

2. Weingarten SR, Riedinger MS, Conner L, et al. Practice guidelines and reminders to reduce duration of hospital stay for patients with chest pain. Ann Intern Med. 1994;120(4):257–63.

3. Grimshaw J, Russell I. Effect of clinical guidelines on medical practice: a systematic review of rigourous evaluations. Lancet. 1993;342:1317–22.

4. Grimshaw J, Freemantle N, Wallace S, et al. Developing and implementing clinical practice guidelines. Qual Health Care. 1995;4:55–64.

5. Wachtel TJ, O'sullivan P. Practice guidelines to reduce testing in the hospital. J Gen Intern Med. 1990;5:335–41.

6. Rhew D, Reidinger M. A prospective, multicenter study of a pneumonia practice guideline. Chest. 1998;114(1):115–9.

7. Sheridan SL, Harris RP, Woolf SH; Shared Decision-Making Workgroup of the U.S. Preventive Services Task Force. Shared decision making about screening and chemoprevention: a suggested approach from the U.S. Preventive Services Task Force. Am J Prev Med. 2004;26(1):56–66.

8. Jemal A, Siegel R, Ward E, Murray T, Xu J, Thun MJ. Cancer statistics, 2007. CA Cancer J Clin. 2007;57(1):43–66.

9. Schroder FH. Detection of prostate cancer: the impact of the European Randomized Study of Screening for Prostate Cancer (ERSPC). Can J Urol. 2005;12 Suppl 1:2–6.

10. Taylor KL, Shelby R, Gelmann E, McGuire C. Quality of life and trial adherence among participants in the prostate, lung, colorectal, and ovarian cancer screening trial. J Natl Cancer Inst. 2004;96(14):1083–94.

11. Von Eschenbach A, Ho R, Murphy GP, Cunningham N, Lins N. American Cancer Society Guideline for the early detection of prostate cancer update 1997. CA Cancer J Clin. 1997;47(5):261–4.

12. American College of Physicians. Clinical guideline, part III: screening for prostate cancer. Ann Intern Med. 1997;126(6): 480–4.

13. US Preventive Services Task Force. Screening for Prostate Cancer: Guide to Clinical Preventive Services. 2nd ed. Baltimore (MD): Williams & Wilkins; 1996.

14. Cooper C, Merritt T, Ross L, John L, Jorgensen C. To screen or not to screen, when clinical guidelines disagree: primary care physicians' use of the PSA test. Prev Med. 2004;38:182–91.

15. Metcalf CE, Kemper P, Kohn LT, Pickering JD. Site Definition and Sample Design for the Community Tracking Study. Washington (DC): Center for Studying Health System Change; 1996.

16. Community Tracking Study Physician Survey: 1998-1999 Program. Version ICPSR. Ann Arbor (MI): Inter-university Consortium for Political and Social Research; 2004.

17. Mulley A. Supporting the patient's role in decision making. J Occup Med. 1990;32:1227–8.

18. Stata/SE Statistical Software Release 8.2. College Station (TX): Stata Corporation; 2004.

19. American Academy of Pediatrics. Policy Reference Guide of the American Academy of Pediatrics. Elk Grove Village (IL): American Academy of Pediatrics; 1997.

20. National Guideline Clearinghouse. Available from: URL: http://guideline.gov/browse/guideline_index.aspx. Accessed 13 November 2007.

21. Woolf SH, DiGuiseppi CG, Atkins D, Kamerow DB. Developing evidence-based clinical practice guidelines: lessons learned by the US Preventive Services Task Force. Ann Rev Public Health. 1996;17:511–38.

22. Hoffman RM, Papenfuss MR, Buller DB, Moon TE. Attitudes and practices of primary care physicians for prostate cancer screening. Am J Prev Med. 1996;12(4):277–81.

23. Raich PC, Zoeter MA, Hagan M, et al. Perception of preventive health needs in a prostate-cancer screening population: a preliminary report. J Cancer Educ. 1997;12(4):224–8.

24. Bunting PS, Goel V, Williams JI, Iscoe NA. Prostate-specific antigen testing in Ontario: reasons for testing patients without diagnosed prostate cancer. CMAJ. 1999;160(1):70–5.

25. McKnight JT, Tietze PH, Adcock BB, Maxwell AJ, Smith WO, Nagy MC. Screening for prostate cancer: a comparison of urologists and primary care physicians. South Med J. 1996;89(9):885–8.

26. Voss JD, Schectman JM. Prostate cancer screening practices and beliefs. J Gen Intern Med. 2001;16(12):831–7.

27. Hicks RJ, Hamm RM, Bemben DA. Prostate cancer screening: what family physicians believe is best. Arch Fam Med. 1995;4(4):317–22.

28. Williams RB, Boles M, Johnson RE. Use of prostate-specific antigen for prostate cancer screening in primary care practice. Arch Fam Med. 1995;4(4):311–5.

29. Austin OJ, Valente S, Hasse LA, Kues JR. Determinants of prostate-specific antigen test use in prostate cancer screening by primary care physicians. Arch Fam Med. 1997;6(5):453–8.

30. Kripalani S, Weinberg AD, Cooper HP. Screening for breast and prostate cancer: a survey of Texas primary care physicians. Tex Med. 1996;96(12):59–67.

31. Lawson DA, Simoes EJ, Sharp D, et al. Prostate cancer screening—a physician survey in Missouri. J Community Health. 1998;23(5):347–58.

32. Edlefsen KL, Mandelson MT, McIntosh MW, Andersen MR, Wagner EH, Urban N. Prostate-specific antigen for prostate cancer screening: do physician characteristics affect its use? Am J Prev Med. 1999;17(1):87–90.

33. Little B, Ho KJ, Gormley G, Young M. PSA testing in general practice. Prostate Cancer Prostatic Dis. 2003;6(2):154–8.

34. Moran WP, Cohen SJ, Preisser JS, Wofford JL, Shelton VJ, McClatchey MW. Factors influencing use of the prostate-specific antigen screening test in primary care. Am J Manag Care. 2000;6(3):315–24.

35. Sirovich BE, Schwartz L, Woloshin S. Screening men for prostate and colorectal cancer in the United States. JAMA. 2003;289:1414–20.

36. Han PK, Coates RJ, Uhler RJ, Breen N. Decision making in prostate-specific antigen screening National Health Interview Survey, 2000. Am J Prev Med. 2006;30(5):394–404.

37. Jordan TR, Price JH, King KA, Masyk T, Bedell AW. The validity of male patients' self-reports regarding prostate cancer screening. Prev Med. 1999;28(3):297–303.

38. Chan ECY, Vernon SW, Ahn C, Greisinger A. Do men know that they have had a prostate-specific antigen test? Accuracy of self-reports of testing at 2 sites. Am J Public Health. 2005;94(8):1336–8.

39. Sonnad SS, Kurichi JE, Guerra CE. Facilitators in successful guideline implementation. Paper presented at: the 27th Annual Meeting of the Society for Medical Decision Making; 2005; San Francisco, CA. Available from: URL: http://smdm.confex.com/smdm/2005ca/techprogram/P2305.HTM Accessed 8 November 2007.

40. Bero LA, Grilli R, Grimshaw JM, et al. Closing the gap between research and practice: an overview of systematic reviews of interventions to promote the implementation of research findings. BMJ. 1998;317(7156):465–8.

41. Lemelin J, Hogg W, Baskerville N. Evidence to action: a tailored multifaceted approach to changing family physician practice patterns and improving preventive care. CMAJ. 2001;164(6):757–63.

42. Grol R, Wensing M. What drives change? Barriers to and incentives for achieving evidence-based practice. Med J Aust. 2004;180(6 Suppl):S57–60.

43. Oxman AD, Thompson MA, Davis DA, Haynes RB. No magic bullets: a systematic review of 102 trials of interventions to improve professional practice. Can Med Assoc J. 1995;153(10):1423–31.

44. Restrepo MI, Anzueto A. Guidelines for the diagnosis and treatment of adult lower respiratory tract infections: a true "European cooperative effort." Eur Respir J. 2005;26:979–81.

45. Winawer S, Fletcher R, Rex D, et al. Colorectal cancer screening and surveillance: clinical guidelines and rationale—update based on new evidence. Gastroenterology. 2003;124(2):544–60.

46. Merenstein D. Winners and losers. JAMA. 2004;291(1):15–6.

47. Dresselhaus TR, Peabody JW, Luck J, Bertenthal D. An evaluation of vignettes for predicting variation in the quality of preventive care. J Gen Intern Med. 2004;19(10):1013–8.

48. Peabody J, Luck J, Glassman P, Dresselhaus TR, Lee M. Comparison of vignettes, standardized patients, and chart abstraction: a prospective validation study of 3 methods for measuring quality. JAMA. 2000;283:1715–22.

49. Elstein AS, Holmes MM, Ravitch MM, Rovner DR, Holzman GB, Elstein AS. Medical decisions in perspective: applied research in cognitive psychology. Perspect Biol Med. 1983;26:486–501.

50. Peabody JW, Luck J, Glassman P, et al. Measuring the quality of physician practice by using clinical vignettes: a prospective validation study. Ann Intern Med. 2004;141(10):771–80.