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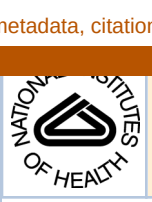

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# Resident Physicians' Life Expectancy Estimates and Colon Cancer Screening Recommendations in Elderly Patients

**Carmen L. Lewis, MD, MPH**, **Charity G. Moore, PhD, MSPH**, **Carol E. Golin, MD, MPH**, **Jennifer Griffith, DrPH, MPH**, **Alison Tytell-Brenner, BS**, and **Michael P. Pignone, MD, MPH**

Division of General Medicine and Clinical Epidemiology (CLL, CEG, MPP) and the Cecil G. Sheps Center for Health Services Research (CLL, CGM, CEG, JG, AT-B, MPP), University of North Carolina, Chapel Hill

## Abstract

**Background—**Colon cancer screening recommendations for patients aged 75 years and older should account for variation in older adults' health states, life expectancies, and potential to benefit from screening.

**Purpose—**To assess if resident physicians incorporate health state and life expectancy information when making recommendations about colon cancer screening for adults aged 75 years and older.

**Methods—**Resident physicians at a university internal medicine program completed a survey in which they made life expectancy estimates and screening recommendations for hypothetical 75- and 85-year-old women patients with good, fair, or poor health states. Outcomes of interest included accuracy of residents' life expectancy estimates (compared with life table data), effect of health state and life expectancy on screening recommendations, and whether providing life table information affected the initial screening recommendation for the 85-year-old hypothetical patients.

**Results—**Residents' life expectancy estimates demonstrated moderate agreement with life table estimates. Their recommendations for colon cancer screening for the 75-year-old patient vignettes varied appropriately by health state and by their estimates of life expectancy. Receiving information about life expectancy from life tables affected residents' recommendations for one of the three 85-year-old hypothetical patients, the woman in good health. Many resident physicians reported uncertainty about the potential to benefit from screening for each patient scenario.

**Conclusions—**Resident physicians appropriately used life expectancy and health state to make colon cancer screening recommendations for older adults. Residents reported substantial uncertainty with regard to the potential benefit of screening.

### Keywords

decision making; aged; aged 80 and older; mass screening; colorectal cancer

Colon cancer screening decreases disease-specific incidence and mortality in adults younger than 75 years of age,[1–7] but few trials have included adults older than 75 years.[8] Because colon cancer is slow growing, the benefit from screening is not realized until at least 5 years and perhaps as many as 10 years after screening test completion. Therefore, a life expectancy of at least 5 years is thought to be required to reap the potential mortality

Address correspondence to Carmen L. Lewis, MD, MPH, Division of General Medicine and Clinical Epidemiology, University of North Carolina, Chapel Hill, NC 27599; lewiscl@med.unc.edu.

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benefits of screening,[3] and life expectancy estimates based on an individual's age and health state are important in determining who could potentially benefit.[9–11]

Consequently, an individualized approach to colon cancer screening has been recommended for patients aged 75 years and older to account for variation in older adults' life expectancies and potential to benefit from screening.[12] Both the American Cancer Society and the American Geriatrics Society state that life expectancy should be considered when making colon cancer screening recommendations.[9,13] This approach requires complex decision making. The potential net benefit from colon cancer screening is estimated by balancing the risk of developing and dying from colon cancer with the risk of dying from other causes and the possibility of complications from screening.

Although individualized decision making is recommended for colon cancer screening, it is unclear if physicians actually base their recommendations on this principle.[14–17] If so, physicians' recommendations should vary depending on a patient's age, health state, and their estimated life expectancy. Furthermore, an individualized decision-making approach may be difficult for physicians to implement. Estimating an individual's life expectancy is notoriously difficult,[18] and it is unclear whether physicians' life expectancy estimates are accurate enough to make appropriate recommendations to patients about their potential to benefit from colon cancer screening. To make appropriate recommendations, physicians must be able to estimate whether an individual is likely to live at least 5 years, given their age and health state.

The purpose of our research is to assess whether physicians use an individualized approach for colon cancer screening recommendations in adults aged 75 and older. Because this is an area of new inquiry, we chose to first examine medical resident physicians' decision making in this pilot study. We sought to examine the following questions: 1) Are resident physicians able to adequately estimate life expectancy to make appropriate screening recommendations for individuals aged 75 years and older? 2) Do resident physicians' recommendations for colon cancer screening in adults aged 75 years and older vary by the patient's health state and the resident's life expectancy estimates? 3) Do resident physicians report uncertainty when deciding whether an older individual could potentially benefit from colon cancer screening? 4) Do residents' recommendations about screening change when given median life table estimates for people of the same age and similar health state? To answer these questions, resident physicians responded to questions about clinical vignettes that represented patients with varying health states and life expectancies.

## METHODS

### Participants

We surveyed internal medicine residents from October through November 2005 at the University of North Carolina. Residents were approached to participate during their outpatient clinic sessions or in a conference unrelated to colon cancer screening. Residents were excluded if they were preliminary residents or medicine-pediatrics residents on their pediatrics rotation. The Office of Human Research Ethics Biomedical Institutional Review Board at the University of North Carolina approved the study.

### Questionnaire

The questionnaire took approximately 10 min to complete. We first asked about demographic information. We then presented 3 clinical vignettes developed to represent women aged 75 in good, fair, and poor health. After each vignette, we asked resident physicians to estimate the life expectancy of the women represented by each clinical vignette. These questions were in an open-ended format. We also asked what they would

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recommend in regard to colon cancer screening by asking, “Which of the following most closely reflects what you would do in your practice: (1) discuss the issues and recommend against colon cancer screening; (2) discuss the issues and recommend that the patient undergo colon cancer screening; (3) discuss the issues and let the patient decide whether she wants to undergo screening; or (4) do not offer colon cancer screening.” After each vignette, we also asked, “Are you at all uncertain about this patient’s potential to benefit from screening?” Responses offered were “yes” or “no.”

We also asked the resident physicians to provide life expectancies for the same clinical vignettes assuming the patients were aged 85 years instead of 75 years. To determine whether physicians would change their screening recommendations, we initially asked if they would recommend screening the 85-year-old patient in the vignettes; the responses offered were “yes” or “no.” At the end of the survey, on a separate page, we again presented the vignettes about the 85-year-old patients, along with information about median life expectancy from life tables appropriate to their age and health state.[10] We then asked again whether the physicians would recommend screening, using the “yes/no” format. We requested that they not change their previous answers after receiving this information. For this pilot study, we chose to use different response options for the 85-year-old patient vignettes than we offered for the 75-year-old patient vignettes for 2 reasons. First, we were unsure how the response options for the 75-year-old patient vignettes would be received. Second, we wanted to determine if providing life table estimates would change screening recommendations, so we did not want to provide the option to let the patient decide.

## Clinical Vignettes

The investigators developed 3 clinical vignettes with good, fair, and poor health states. The vignettes were as follows.

1. Vignette representing a woman in a good health state

   Mrs. Watson is a 75-year-old woman with hypertension for 10 years that has been well controlled with hydrochlorothiazide. She is otherwise healthy. She walks several miles every other day, is active in her church, and travels frequently with her husband to see her grandchildren out of state.

2. Vignette representing a woman in a fair health state

   Mrs. Perry is a 75-year-old woman with chronic obstructive pulmonary disease and well-controlled hypertension. She has severe osteoarthritis in both knees, which limits her ability to walk outside her house. She experiences shortness of breath with activities only when she does not take her inhalers.

3. Vignette representing a woman in a poor health state

   Mrs. Brandon is a 75-year-old woman with severe heart failure due to coronary artery disease. She has shortness of breath with exertion despite optimal medical management. She was revascularized more than 10 years ago but is not a candidate for repeat coronary artery bypass graft. She is able to perform activities of daily living independently but must perform them slowly because of shortness of breath.

Five health services researchers and 7 practicing physicians reviewed and refined the vignettes until all agreed that the patients represented could be classified as good, fair, and poor health for their age.

## Median Life Table Estimates

We used the framework of Walter and Covinsky[10] to develop our life table estimates of life expectancy. They proposed that clinicians could adequately estimate the likely benefit from

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cancer screening by categorizing patients into 3 categories for age: 1) the healthiest patients with few serious comorbidities, 2) those in poor health with multiple serious comorbidities, and 3) a middle group between these 2 extremes with moderate comorbid conditions. Once they classify older patients into 1 of these 3 groups, clinicians can then use corresponding median life table estimates broken into the upper, middle 2, and lower quartiles for gender and 5-year age increments. We designed the health states for the patient vignettes—good, fair, and poor—to correspond with the upper, middle, and lower quartiles of the life table estimates, respectively. Using the Walter framework, life table estimates are as follows:

- for women at age 75: 17 years for the upper quartile, 12 years for the middle quartiles, and 7 years for lowest quartile, and
- for women at age 85: 10 years for the upper quartile, 6 years for the middle quartiles, and 3 years for the lowest quartile.

We compared residents' life expectancy estimates to the appropriate life tables. We used 5 years of life expectancy as the clinically important threshold because it is the minimal life expectancy needed to obtain a potential benefit from colon cancer screening.[3] Residents' estimates were considered to be in agreement with life tables if their estimate matched the life table estimate either above or below this threshold. For example, if the median life table estimate was more than 5 years, we considered residents' life expectancy estimates to be in agreement if their estimate was more than 5 years and not to be in agreement if their estimate was less than 5 years. We also provided the life table estimates for the 85-year-old patient vignettes in the questionnaire to determine whether residents would change their recommendations when provided with this information.

### Data Analysis

For the open-ended questions about life expectancy estimates, we collapsed responses into 4 mutually exclusive categories: less than 2 years, 2 to less than 5 years, 5 to 10 years, and more than 10 years. We then calculated the percentage of each category for each vignette to assess how resident estimates of life expectancy agreed with life table estimates at 75 and 85 years of age. To determine whether recommendations were associated with the 3 health states and the resident estimates of life expectancy, we compared recommendation responses across all vignettes using generalized logistic regression. Pairwise comparisons of health states (good to fair, good to poor, fair to poor) were made using Stuart-Maxwell tests of marginal homogeneity.[19–22] We used logistic regression to determine whether a resident's uncertainty of screening benefit was associated with the dichotomized response of recommending to let the patient decide versus some other recommendation. McNemar's test was used to compare change in responses given before and after actual life table estimates were provided to the resident physicians for the persons portrayed in the vignettes at age 85. For this analysis, we combined across all the 3 health state vignettes but controlled for these in the model. All logistic regression analyses were conducted using SAS's PROC SURVEYLOGISTIC, accounting for multiple (clustered) responses within resident physicians.

## RESULTS

Fifty-two of 77 eligible residents were approached (68% of the total number of residents; the remainder were not available during recruitment in clinic), and 50 (96% of those approached) chose to participate. The mean age of the participants was 29 years; 73% were white, 20% were Asian/American Indian, 4% were African American, and 2% were Hispanic. Fifty percent were male.

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### Are Resident Physicians Able to Adequately Estimate Life Expectancy to Make Appropriate Screening Recommendations for Individuals Aged 75 and Older?

The residents' life expectancy estimates demonstrated moderate agreement with life table estimates when a cutoff of greater or less than 5 years is used as a comparison (Table 1). For the 75- and 85-year-old patient vignettes with good health status and life table estimates of 17 years and 10 years, respectively, no residents estimated the life expectancy to be less than 5 years for the 75-year-old patients and only 4 (8%) estimated the life expectancy to less than 5 years for the 85-year-old patients. There was also good agreement for the vignettes about the 85-year-old patients representing the poor health state. Ninety-two percent of the residents estimated the life expectancy to be less than 5 years compared with 3 years by the life table method.

There was some disagreement between residents' estimates and median life table estimates for the 75-year-old patient scenario in the poor health state. The median life table estimate at the lowest quartile for 75- to 80-year-olds is estimated to be 7 years. More than half of the residents estimated life expectancy to be less than 5 years, with 16% estimating less than 2 years. For the vignettes with fair health state, the agreement was good for the 75-year-old patient; only 3 (6%) of the residents estimated the life expectancy to be less then 5 years when the life table estimate was 12 years. However, for the 85-year-old patient in fair health, more than half of the physicians estimated the life expectancy to be less than 5 years compared with the life table estimate of 6 years.

### Do Resident Physicians' Recommendations for Colon Cancer Screening in Adults Aged 75 and Older Vary by the Patient's Health State and the Resident's Life Expectancy Estimates?

**Health state—**Resident physicians' recommendations for colon cancer screening for the 75-year-old patient vignettes varied by the health state (Table 2; modeling results for health state effect for all vignettes combined, $P < 0{:}0001$). For the 75-year-old patient vignette in good health, residents recommended either that the patient receive screening ($n = 33$, 66%) or that the patient decide about screening ($n = 17$, 34%). For the other 2 scenarios, the majority would let the patient decide. Two of every 5 physicians would recommend against screening for the poor health state scenario or would not offer screening to the patient at all. All pairwise comparisons in recommendations between health states were significant, and Stuart-Maxwell tests of marginal homogeneity were used: good to fair, $P < 0{:}001$; good to poor, $P < 0{:}0001$; fair to poor, $P < 0{:}0001$.

**Life expectancy estimates—**The resident physicians' screening recommendations also varied appropriately with their life expectancy estimates for the patient vignettes (Table 2). Overall, none of the residents who estimated the life expectancy to be less than 2 years recommended screening. At the other end of the spectrum, those who estimated the life expectancy to be more than 10 years either recommended that screening be performed or would let the patient decide. When life expectancies were estimated to be between 2 and 10 years, a majority of resident physicians recommended that the patient decide about screening.

### Do Resident Physicians Report Uncertainty When Deciding Whether an Older Individual Could Potentially Benefit from Colon Cancer Screening?

A high proportion of the resident physicians reported uncertainty about the potential to benefit from screening for each patient vignette. For the 75-year-old patient vignettes, 48%, 86%, and 80% reported uncertainty about the potential benefit for the good, fair, and poor health state patient vignettes, respectively. For the 85-year-old patients, the proportion increased to 86% for the good health state vignette and decreased to 79% and 71% for the

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patient vignettes representing the fair and poor health states, respectively. Resident physicians who reported uncertainty were more likely to recommend that the patient decide about screening across all 3 vignettes at age 75 (odds ratio = 3.26, 95% confidence interval [CI] = 1.27, 8.38; relative risk = 1.98; 95% CI = 1.18, 5.99).[23]

### Do Residents' Recommendations about Screening Change When Given Median Life Table Estimates for People of the Same Age and Similar Health State?

For the 85-year-old patient vignettes, 43% of physicians recommended screening for the patient scenario representing the good health state initially; after the life table estimates were provided, the proportion recommending screening increased to 69% (26% change; 95% CI = 11%, 42%; $P$ = 0:0008) There was no change in recommendations for the fair health state scenario; 8 residents (16%, $n$ = 49) recommended screening before and after life table estimates. For the poor health state scenario, 4 residents (6%, $n$ = 49) recommended screening initially, but after life table estimates were provided, only 1 resident (2%) recommended screening (−6% change; 95% CI = −14%, 26%; $P$ = 0:08).

## DISCUSSION

We found that resident physicians' estimates of life expectancy had moderate agreement with median life table estimates using a cutoff of less than or greater than 5 years for comparison. Medical resident physicians appeared to account for health state and life expectancy in their recommendations for colon cancer screening in women 75 years of age and older. Consistent with current guideline recommendations,[9,13] residents most frequently recommended screening for the 75-year-old patient vignette in good health with a life expectancy of well over 5 years. For the other 2 vignettes representing patients with multiple comorbid conditions that could limit life expectancy and make the potential benefit less certain, residents most frequently recommended letting the patient decide, which is consistent with the recommendations to respect patient preferences. A high proportion of residents reported uncertainty with all patient vignettes, and their reported uncertainty about the benefit of screening was associated with a recommendation to let the patient decide about screening. We found that providing life table estimates changed residents' recommendations in 1 scenario, the 85-year-old patient in good health, but not for those in fair or poor health.

Previous studies assessing physicians' ability to estimate patients' life expectancies primarily address survival predictions at the end of life[18,24] or survival associated with specific disease states.[25,26] In general, these studies concluded that physician predictions were inaccurate. However, these studies examined physicians' ability to predict the time of a patient's death. In our study, we compared residents' estimates of life expectancy with life table estimates using a cutoff of less than or greater than 5 years for comparison. This task required less precision. For colon cancer screening decisions in older adults, this level of precision is adequate because physicians need only to determine whether a patient is likely to live longer than 5 years to determine the potential benefit from screening.

To our knowledge, our study is the first to describe physician recommendations for colon cancer screening in elderly patients since recommendations for individualized decision making were proposed.[10,27] Prior to these recommendations, an older study by Cooper and colleagues[15] used a similar approach and found that physicians' recommendations for colon cancer screening in older adults varied with health state. Using vignettes representing patients aged 65 and 75 years, Cooper and others examined the effect of age and comorbidities on colon cancer screening test selection (fecal occult blood testing or sigmoidoscopy) or recommendations for no testing. For patients aged 75 years, recommendations for fecal occult blood test screening ranged from 91% for a healthy patient

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to 32% for a terminal patient with lung cancer. The researchers did not offer the physicians the option to let the patient decide; therefore, it is difficult to directly compare those results to the present study because many residents in our study recommended this option. Heflin and colleagues[28] examined self-reported breast and cervical cancer screening recommendations and found, as did we, that physicians incorporate health state into their recommendations when asked about their practices. However, other studies examining the association between screening test completion and health state have not consistently demonstrated that patients in poorer health are screened less frequently.[14,16,17,29] At present, it is not clear whether patient preference or physician recommendations account for these findings.

We believe our findings have several important clinical implications. Given that physician recommendations are a major determinant of screening behavior, inappropriate recommendations could drive overuse or underuse of colon cancer screening in older adults. Physicians' recommendations may be inappropriate in 2 ways. The recommendations could be based on inaccurate life expectancy estimates or the recommendation does not account for the need to have 5 years of life expectancy to benefit from screening. If we consider the appropriateness of 150 recommendations made across the 3 clinical vignettes in this way, we find that 31% resulted in accurate life expectancy estimates and appropriate recommendations given this accurate estimate. Fifteen percent could be considered inappropriate (5% inappropriate recommendations given an accurate life expectancy estimate and 11% with inaccurate life expectancy estimates leading to inappropriate recommendation). However, the majority of the recommendations (53%) were to let the patient decide, suggesting that patient preference could be a major determinant of utilization in older adults.

Another important finding in our study is the association we found between physician uncertainty and the recommendation to let the patient decide about screening. We are not aware of other studies that have shown this association. It is not clear from our findings whether physician uncertainty encourages physicians to share decision making with patients or whether uncertain physicians would pressure patients to make decisions alone. Future studies are needed to confirm our findings and explore the association between physician uncertainty and patient participation in more depth.

Our study has some important limitations. We surveyed trainees and not practicing physicians. Life expectancy estimates from practicing physicians could differ significantly, although it is unclear whether their estimations would be more or less accurate.[26,30–32] Practicing physicians' recommendations about screening may differ as well; to address this, we plan to perform a similar survey with practicing physicians. We should also mention that the study was performed in 1 academic institution with a strong focus on studying colon cancer screening and prevention. Residents in other programs may be less knowledgeable about these issues. In addition, residents were responding to vignettes, which may not reflect what they would do in actual practice. Evidence suggests, however, that physicians' responses to vignettes are a fair approximation of actual practice, at least for some conditions.[33,34] Our measure of uncertainty was generic, and therefore, we are unable to differentiate what kind of uncertainty residents are reporting. They may be uncertain about the patient's potential benefit from screening either because they are unaware of the life expectancy needed to benefit or they are unsure about their estimate of the patient's life expectancy. From our debriefing with the residents, it appears to be the latter, but future research would benefit from a more specific measure. The women represented in the vignettes were the youngest in the age categories, so the life table estimate may be somewhat of an underestimation of their life expectancy. Although this could have had some effect on the accuracy of the residents' estimations, it is likely negligible given our criteria

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for agreement. Furthermore, the vignettes address only women, and our results may not generalize to men. Finally, our study was small and was therefore unable to detect modest-sized effects or to explore subgroup analyses fully. Future studies are needed to confirm the findings generated here.

In this study, we found that resident physicians' life expectancy estimates moderately agree with life table estimates. In addition, our findings support the notion that resident physicians use an individualized approach to colon cancer screening recommendations in older adults that incorporates the physician's assessment of the health state of the patient and the physician's life expectancy estimate. Residents report substantial uncertainty in regard to the benefit for screening, and this uncertainty appears to influence physicians to encourage patient participation in the screening decision. Providing life table estimates may influence screening recommendations in some patients, but additional research is needed to confirm these findings.

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**Table 1**

Resident Life Expectancy Estimates for Vignettes Compared with Median Life Table Estimates

| Resident Physicians' Life Expectancy Estimates (Years) | 75-Year-Old Patient Vignettes | | | | | |
|---|---|---|---|---|---|---|
| | Poor Health State (7 Years[a]) | | Fair Health State (12 Years[a]) | | Good Health State (17 Years[a]) | |
| | *n* | % | *n* | % | *n* | % |
| <2 | 8 | 16 | 0 | | 0 | |
| 2 to <5 | 21 | 42 | 3 | 6 | 0 | |
| 5 to 10 | 21 | 42 | 46 | 92 | 14 | 28 |
| >10 | 0 | | 1 | 2 | 36 | 72 |
| **Resident Physicians' Life Expectancy Estimates (Years)** | **85-Year-Old Patient Vignettes** | | | | | |
| | Poor Health State (3 Years[b]) | | Fair Health State (6 Years[b]) | | Good Health State (10 Years[b]) | |
| | *n* | % | *n* | % | *n* | % |
| <2 | 29 | 58 | 7 | 14 | 0 | |
| 2 to <5 | 17 | 34 | 22 | 44 | 4 | 8 |
| 5 to 10 | 4 | 8 | 21 | 42 | 45 | 90 |
| >10 | 0 | | 0 | | 1 | 2 |

[a] Median life table estimates for age and quartile of life expectancy for 75- to 80-year-old patients (lowest, middle 2, and highest quartiles).

[b] Median life table estimates for age and quartile of life expectancy for 85- to 90-year-old patients (lowest, middle 2, and highest quartiles).

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*Med Decis Making*. Author manuscript; available in PMC 2011 October 13.

**Table 2**

Resident Physicians' Screening Recommendations by Their Life Expectancy Estimates for 75-Year-Old Patient Vignette

| Physician Life Expectancy Estimate (Years) | *n* | Recommend Screening, *n* (Row %) | Patient Decide, *n* (Row %) | Recommend Against, *n* (Row %) | Do Not Offer, *n* (Row %) |
|---|---|---|---|---|---|
| Good health state* | | | | | |
| Total | 50 | 33 (66) | 17 (34) | — | — |
| <2 | 0 | — | — | — | — |
| 2 to <5 | 0 | — | — | — | — |
| 5 to 10 | 14 | 11 (79) | 3 (21) | — | — |
| >10 | 36 | 22 (61) | 14 (39) | — | — |
| Fair health state* | | | | | |
| Total | 50 | 13 (26) | 34 (68) | 3 (6) | — |
| <2 | 0 | — | — | — | — |
| 2 to <5 | 3 | — | 3 (100) | — | — |
| 5 to 10 | 46 | 12 (26) | 31 (67) | 3 (7) | — |
| >10 | 1 | 1 (100) | — | — | — |
| Poor health state* | | | | | |
| Total | 50 | 1 (2) | 29 (58) | 11 (22) | 9 (18) |
| <2 | 8 | | 2 (25) | 4 (50) | 2 (25) |
| 2 to <5 | 21 | 1 (5) | 10 (48) | 6 (29) | 4 (19) |
| 5 to 10 | 21 | | 17 (81) | 1 (5) | 3 (14) |
| >10 | 0 | — | — | — | — |
| All vignettes combined (3 for each physician)** | | | | | |
| Total | 150 | 47 (31) | 80 (53) | 14 (9) | 9 (6) |
| <2 | 8 | — | 2 (25) | 4 (50) | 2 (25) |
| 2 to <5 | 24 | 1 (4) | 13 (54) | 6 (25) | 4 (17) |
| 5 to 10 | 81 | 23 (28) | 51 (63) | 4 (5) | 3 (4) |

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| Physician Life Expectancy Estimate (Years) | *n* | Recommend Screening, *n* (Row %) | Patient Decide, *n* (Row %) | Recommend Against, *n* (Row %) | Do Not Offer, *n* (Row %) |
|---|---|---|---|---|---|
| >10 | 37 | 23 (62) | 14 (38) | — | — |

* $P < 0.0001$ for health status and $P < 0.001$ for all pairwise comparisons of health states (adjusted for repeated measures for physicians across the 3 vignettes).

** $P < 0.0001$ for life expectancy estimate (adjusted for repeated measures for physicians across the 3 vignettes).