Cancer Screening in Elderly Patients
A Framework for Individualized Decision Making

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Considerable uncertainty exists about the use of cancer screening tests in older people, as illustrated by the different age cutoffs recommended by various guideline panels. We suggest that a framework to guide individualized cancer screening decisions in older patients may be more useful to the practicing clinician than age guidelines. Like many medical decisions, cancer screening decisions require weighing quantitative information, such as risk of cancer death and likelihood of beneficial and adverse screening outcomes, as well as qualitative factors, such as individual patients' values and preferences. Our framework first anchors decisions through quantitative estimates of life expectancy, risk of cancer death, and screening outcomes based on published data. Potential benefits of screening are presented as the number needed to screen to prevent 1 cancer-specific death, based on the estimated life expectancy during which a patient will be screened. Estimates reveal substantial variability in the likelihood of benefit for patients of similar ages with varying life expectancies. In fact, patients with life expectancies of less than 5 years are unlikely to derive any survival benefit from cancer screening. We also consider the likelihood of potential harm from screening according to patient factors and test characteristics. Some of the greatest harms of screening occur by detecting cancers that would never have become clinically significant. This becomes more likely as life expectancy decreases. Finally, since many cancer screening decisions in older adults cannot be answered solely by quantitative estimates of benefits and harms, considering the estimated outcomes according to the patient's own values and preferences is the final step for making informed screening decisions.

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CURRENTLY CONSIDERABLE UNcertainty exists about the best use of cancer screening tests in older people.[1] Part of this stems from a lack of randomized controlled trials of screening interventions that have included patients older than 75 years. This requires physicians to extrapolate data about the effectiveness of screening in younger patients and apply it to older patients. Even if the effectiveness of screening is similar in the elderly population, uncertainty remains about how to apply data from randomized trials to an individual elderly patient. Trials show average effectiveness of an intervention, but they generally do not address individual patient characteristics, such as comorbid conditions or functional status, which may change the likelihood of receiving benefit or harm from screening. Care in applying data from trials to individuals is especially important for older adults, since individual variability in health status and disability increases with age.[2]

The important issues that need to be considered when making individualized cancer screening decisions in elderly patients are not addressed by the often conflicting recommendations made by guideline panels and organizations that base their recommendations primarily on age. For example, for mammography, the US Preventive Services Task Force recommends that screening cease at age 70 years,[1] the American College of Physicians discourages screening after age 75 years,[3] the American Geriatrics Society recommends possible discontinuation at age 85 years,[3] and the American Cancer Society recommends annual screening for all women older than 40 years with no upper age limit.[4] Although most health care professionals would agree that clinical judgment should supersede age-cutoff guidelines when the potential harms or benefits from a screening test strongly weigh in a particular direction, there is little guidance about how to apply clinical judgment to screening decisions in older people.

We propose that a conceptual framework to guide cancer screening decisions in older patients may be more useful than age guidelines to the practicing clinician. Frameworks for weighing the benefits and harms of screening have been developed,[5-7] but none specifically address how to organize informed decision making for elderly patients that include consideration of an individual patient's characteristics and preferences. Like many medical decisions, informed screening decisions are best made by weighing quantitative estimates of benefits and risks with more subjective qualitative judgments of val-

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ues and preferences. Our framework first anchors decisions through quantitative estimates of life expectancy, risk of cancer death, and screening outcomes based on published data. Our framework then concludes with qualitative consideration of the estimated benefits and harms based on a patient's unique values and preferences.

Risk of Dying

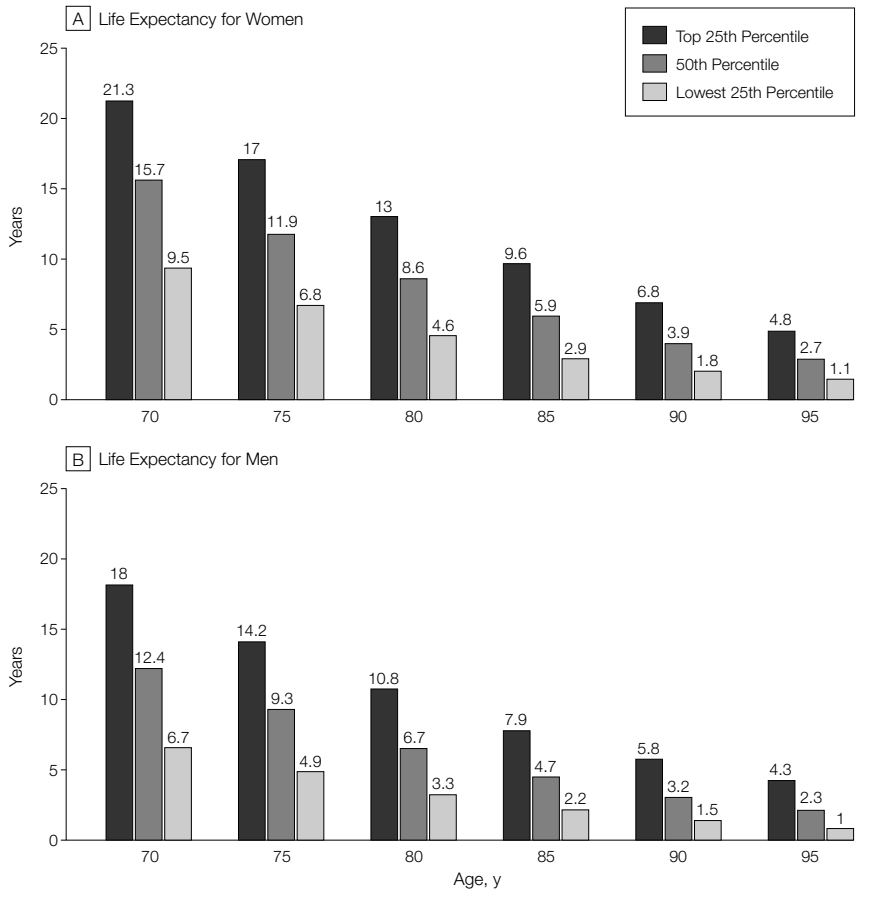
Our framework starts with considering the risk of dying of a screen-detectable cancer since the maximum potential benefit of screening is defined by a person's risk of dying of a screen-detectable cancer, not his or her risk of being diagnosed as having cancer. Finding an asymptomatic cancer in a person who will die of something else before the cancer would become symptomatic does not benefit the patient. The risk of death due to cancer can be estimated by considering the life expectancy of the individual and the age-specific mortality rate of the particular cancer. With advancing age, the mortality rates of most cancers increase,[8] but overall life expectancy decreases.[9] The need to weigh these 2 opposing factors makes cancer screening decisions in the elderly complex.

Median life expectancies of persons in the United States are summarized in tables of vital statistics by age and sex, but there is great variation in life expectancy within each age-sex subgroup.[10] Therefore, although it is useful to know median life expectancies, it is more helpful to have a general idea of the distribution of life expectancies at various ages. For example, when making screening decisions about a 75-year-old woman, it is useful to know that approximately 25% of 75-year-old women will live more than 17 years, 50% will live at least 11.9 years and 25% will live less than 6.8 years.[9] The FIGURE presents the upper, middle, and lower quartiles of life expectancy for the US population according to age and sex and illustrates the substantial variability in life expectancy that exists at each age. Although it is impossible for physicians to predict the exact life expectancy of an individual patient, it is possible for physicians to make reasonable estimates of whether a patient is likely to live substantially longer or shorter than an average person in his/her age cohort. For example, Fried et al[11] prospectively stratified elderly community-living persons into groups whose 5-year mortality ranged from 2% for the healthy patients to 39% for those with multiple cardiovascular risk factors. Such estimates of life expectancy would allow for better estimations of potential benefits and risks of screening than focusing on age alone.

There are many variables physicians can use to estimate whether an older patient is typical of someone at the middle of their age-sex cohort or is more like someone in the upper or lower quartiles. For example, the number and severity of comorbid conditions and functional impairments are strong predictors of life expectancy in older people.[12,13] Congestive heart failure (CHF), end-stage renal disease, oxygen-dependent chronic obstructive lung disease, or severe functional dependencies in activities of daily living are examples of risk factors that would cause an elderly person to have a life expectancy substantially below the average for his/her age.[14] The absence of significant comorbid conditions or presence of functional status considerably better than age-group averages identifies older adults who are likely to live longer than average.

Life expectancy estimates can be used to approximate the risk of dying of a screen-detectable cancer, which is useful in deciding whether a person is likely to benefit from screening. Consider an

Figure. Upper, Middle, and Lower Quartiles of Life Expectancy for Women and Men at Selected Ages



Data from the Life Tables of the United States.[9]

80-year-old woman with class IV CHF who is considering screening mammography. Although the median life expectancy of an 80-year-old woman is 8.6 years, this patient, because of her severe comorbidity, is probably in the lower quartile of life expectancy and is likely to live less than 5 years. Next, the risk of dying of breast cancer can be approximated by multiplying life expectancy by the age-specific breast cancer mortality rate. The Surveillance, Epidemiology, and End Results Program (SEER)[15] reports that women aged 80 to 84 years have an annual breast cancer mortality rate of 157/100 000. Therefore, the risk of dying of breast cancer for an 80-year-old woman who is expected to live less than 5 years is estimated to be less than $5 \times 157/100\,000 = 0.8\%$.

TABLE 1 presents population-based estimates of the risk of dying of the 3 major screened cancers according to sex, age, and life expectancy. These risks were calculated by multiplying life expectancy by published age-specific cancer mortality rates and should be viewed as estimates that provide some quantitative knowledge of the average risk of dying of a screen-detectable cancer to help anchor screening decisions. Table 1 emphasizes the importance of considering life expectancy when making screening decisions, as illustrated by the example that an 85-year-old woman in the upper quartile of life expectancy has more chance of benefiting from cancer screening than a 75-year-old woman in the lower quartile. Some patients may have additional factors that increase their risk for dying of certain cancers, such as family history or race, requiring individualized tailoring of our baseline estimates. However, many risk factors become less important relative to older age and life expectancy.[17]

Benefits of Cancer Screening

The next step is to consider the potential benefits of screening for specific cancers. If screening were 100% effective at preventing cancer death, the patient's benefit would approximate his/her risk of dying of a screen-detectable cancer. However, the actual likelihood of benefit from screening will always be substantially less than this value, since screening may miss early-stage malignancies, detect disease too advanced or aggressive to respond to treatment, or detect indolent cancers that are not likely to produce clinical symptoms.[1]

Even screening, effective in early detection, may not benefit patients with short life expectancies since the benefit from screening is not immediate. For example, in the randomized controlled trials of fecal occult blood testing (FOBT)[18-20] and mammography[21,22] the cancer-specific survival curves between the screened and unscreened groups do not separate significantly until at least 5 years after the start of screening. This period could be even longer for patients older than 70 years since some evidence suggests that the length of time that a screen-detectable cancer remains clinically asymptomatic increases with advancing age for both breast and colorectal cancer.[23-25] The reason for the delay between the onset of screening and a survival benefit is probably because screening results in benefit by detecting cancers that would have resulted in death after more than 5 years. Cancers destined to result in death before 5 years may be too aggressive for patients to benefit from early detection and treatment. This suggests that older patients who have life expectancies of less than 5 years will not derive survival benefit from cancer screening.

For patients with estimated life expectancies greater than 5 years, it is important to consider what is known about the absolute benefit of cancer screening tests. The absolute benefit of a screening test can be conveyed by the absolute risk reduction (the absolute difference in proportions of patients with a given outcome from 2 treatments or actions), or more effectively by calculating the number needed to screen (NNS), which is the reciprocal of the absolute risk reduction.[26,27] Considering patients at average risk for developing a screened cancer, the approximate NNS to prevent 1 cancer-specific death is listed in TABLE 2 for screening tests that have been shown to be effective in reducing cancer-specific mortality. Although prostate-

Table 1. Risk (Percentage) of Dying of Cancer in Remaining Lifetime for Men and Women at Selected Ages and Life Expectancy Quartiles*

	Age 50 y			Age 70 y			Age 75 y			Age 80 y			Age 85 y			Age 90 y		
	Life Expectancy of Women, y																	
	40	33	24.5	21.3	15.7	9.5	17	11.9	6.8	13	8.6	4.6	9.6	5.9	2.9	6.8	3.9	1.8
Cancer																		
Breast	4.4	3.1	2.0	3.3	2.2	1.2	2.8	1.8	0.9	2.4	1.5	0.7	1.9	1.2	0.6	1.4	0.8	0.4
Colorectal	3.8	2.2	1.0	3.5	2.0	0.9	3.3	1.9	0.9	3.0	1.8	0.8	2.5	1.6	0.8	1.8	1.0	0.5
Cervical	0.34	0.26	0.18	0.22	0.15	0.08	0.19	0.12	0.07	0.15	0.10	0.05	0.12	0.07	0.04	0.08	0.05	0.02
	Life Expectancy of Men, y																	
	36	28.5	19.6	18	12.4	6.7	14.2	9.3	4.9	10.8	6.7	3.3	7.9	4.7	2.2	5.8	3.2	1.5
Cancer																		
Colorectal	4.1	2.3	1.0	3.8	2.1	0.9	3.5	1.9	0.8	3.2	1.8	0.8	2.7	1.6	0.8	2.0	1.1	0.5

*Life expectancy quartiles correspond to upper, middle, and lower quartiles as presented in the Figure. Data are presented as percentages. Risks for 50-year-old patients are included for comparison. Risks were calculated by multiplying life expectancy by age-specific cancer mortality rates from Surveillance, Epidemiology, and End Results (SEER) *Cancer Statistics Review 1973-1996*.[15] Since cancer screening in the United States among elderly patients remains low, these cancer mortality risks approximate those expected for patients who have not received regular cancer screening.[16] For example, to estimate the risk of dying of breast cancer for an 80-year-old woman with a life expectancy of 8.6 years, we multiplied the annual breast cancer mortality rate for women aged 80 to 84 years (157/100 000) by 5 = 0.785%. Next we multiplied the annual mortality rate for women older than age 80 years (200.5/100 000) by 3.6 = 0.722% and added these numbers to get the overall risk of 1.5%.

specific antigen (PSA) testing is frequently performed, we did not include it in the table because no compelling evidence currently demonstrates that PSA testing reduces prostate cancer mortality. We calculated the numbers in Table 2 by applying the reported risk reduction of each screening test to the baseline risks for dying from a screen-detectable cancer from Table 1. All the numbers in Table 2 assume a 5-year delay between the onset of screening and survival benefit.[31] The numbers are presented according to age and life expectancy since life expectancy defines the potential number of years available for screening. For example, 240 very healthy 80-year-old women would have to be screened with mammography during their remaining lifetime to prevent 1 death from breast cancer. This value is similar to the NNS of 226 for screening 50-year-old women with mammography for 24.5 years since the mortality rate from breast cancer increases with age and healthy older women have substantial life expectancies. The values in Table 2 illustrate that the NNS dramatically increases as life expectancy decreases from the upper to the lowest quartile.

Our estimates are based on published data of cancer mortality rates and screening efficacy, but the strength of the evidence that cancer screening is effective in older adults is limited by the small number of older patients included in screening trials. Likewise, for elderly patients who have received regular screening in the past, there are no data about whether some benefit from screening persists for several years after stopping regular screening. However, based on the relative risk reductions seen in clinical trials in younger patients, our estimates can be tailored to reflect that the baseline risk of dying from breast cancer may be reduced by approximately 26% in patients who have received regular screening mammography in the past, and the baseline risk of dying from colorectal cancer may be reduced by 18% in patients who have received regular FOBT screening.[19,20,22] For cervical cancer, decision models suggest that elderly women who have had repeated normal Pap smears during their reproductive years do not benefit from continued Pap testing.[32,33]

There is not a fixed NNS for each screening test at each age. There are several factors, beyond chronological age, that determine the NNS, which include the individual's estimated baseline risk of dying from a screen-detectable cancer, the relative risk reduction of the screening test, and the life expectancy over which the patient is expected to be screened. By remembering which factors determine the NNS, we can better estimate the likelihood that an elderly patient might derive survival benefit.

Harms of Cancer Screening

Considering the potential harms of screening is the third step in our framework. All cancer screening tests potentially pose direct and indirect harms. Harms that would be accepted to treat a symptomatic patient with known disease are less acceptable when they are caused by screening tests, which benefit only a few individuals but expose all screened individuals to the harms. In our framework, harms from each round of

Table 2. Number Needed to Screen (NNS) Over Remaining Lifetime to Prevent 1 Cancer-Specific Death for Women and Men at Selected Ages and Life Expectancy Quartiles*

	RRR (95% CI)	Age 50 y			Age 70 y			Age 75 y			Age 80 y			Age 85 y			Age 90 y		
		Life Expectancy of Women, y																	
		40	33	24.5	21.3	15.7	9.5	17	11.9	6.8	13	8.6	4.6	9.6	5.9	2.9	6.8	3.9	1.8
Screening test																			
Mammography	0.26 (0.17-0.34)†	95	133	226	142	242	642	176	330	1361	240	533	...	417	2131	...	1066	...	...
Papanicolaou smear	0.60‡	533	728	1140	934	1521	4070	1177	2113	8342	1694	3764	...	2946	15 056	...	7528	...	...
Fecal occult blood	0.18 (0.01-0.32)§	145	263	577	178	340	1046	204	408	1805	262	581	...	455	2326	...	1163	...	...
		Life Expectancy of Men, y																	
		36	28.5	19.6	18	12.4	6.7	14.2	9.3	4.9	10.8	6.7	3.3	7.9	4.7	2.2	5.8	3.2	1.5
Screening test																			
Fecal occult blood‖	0.18 (0.01-0.32)§	138	255	630	177	380	1877	207	525	...	277	945	...	554	...	...	2008	...	...

*Life expectancy quartiles correspond to upper, middle, and lower quartiles as presented in the Figure. The NNS is based on the baseline risk of dying of a screen-detectable cancer (Table 1), the relative risk reduction (RRR) of the screening test, and the life expectancy over which the patient is expected to be screened. Patients with life expectancies of less than 5 years are unlikely to derive any survival benefit from cancer screening, which is denoted by ellipses. The numbers for 50-year-old patients are included for comparison. For example, we first estimated the risk of dying of breast cancer for an 80-year-old woman with a life expectancy of 8.6 years who has regular mammography screening during this period. We assumed a 5-year lag before mortality benefit starts. We mutiplied the annual breast cancer mortality rate for women aged 80 years to 84 (157/100 000) by 5, which equals 0.785%. Next we multiplied the annual rate for women older than age 85 years (200.5/100 000) by 3.6 and reduced this number by 26% (the RRR of mammography), which equals 0.534%. Adding these numbers together gives an estimated risk of 1.319%. Since the estimated risk of dying of breast cancer without screening is 1.5068% (Table 1), the absolute risk of dying of breast cancer without screening is 1.5068% minus 1.319%, which is 0.1878%. The NNS is 1/0.001878 and equals 533.

†RRR estimate for breast cancer mortality from a meta-analysis of screening mammography in women aged 50 to 74 years.[22]

‡RRR estimate represents mid point of reported mortality reductions from population-based studies of screening papanicolaou smears in women aged 20 through 79 years since no randomized controlled trials have been done.[28,29]

§RRR estimate for colorectal cancer mortality from a randomized study of screening biennial fecal occult blood testing (nonrehydrated) in people aged 45 to 75 years.[19]

‖Alternative methods for colorectal cancer screening, such as colonoscopy, would have lower numbers to treat since the RRR of these tests are probably higher than that of fecal occult blood testing.[30] Fecal occult blood testing is presented since it is the only test for colorectal cancer screening that has been studied in randomized controlled trials.

screening are considered according to the likelihood of 3 types of adverse effects: (1) complications from additional diagnostic procedures due to inaccurate test results, (2) identification and treatment of clinically unimportant cancers, and (3) psychological distress from screening.

For screening mammography approximately 77 to 86 per 1000 women older than 70 years will require additional testing after screening, and about 86% of these women will not have invasive cancer.[34] Thus, there is approximately 1 false-positive mammogram result for every 15 mammographies performed. The most common test following an abnormal result is diagnostic mammography, followed by biopsy. There is a small complication rate from biopsy, which includes infection and scarring.[35] In terms of colon cancer screening, the standard workup for an abnormal FOBT result is a colonoscopy. Approximately 89 to 96 per 1000 patients older than 65 years will require additional workup after FOBT,[36] but this number increases with advancing age and slide rehydration to as high as 160 per 1000 for patients older than 80 years who undergo rehydrated FOBT.[37] Approximately 86% to 98% of patients with a positive FOBT will not have an early-stage cancer. Complications of colonoscopy include perforation (1/1000), serious bleeding (3/1000), and cardiorespiratory events from intravenous sedation (5/1000).[38]

Individuals who were found not to have cancer after workup of an abnormal screening result clearly have experienced burdens due to screening. However, what is often forgotten is that in elderly patients some of the greatest harms from screening occur by finding and treating cancers that would never have become clinically significant. As life expectancy decreases, the probability of identifying an inconsequential cancer increases.[39] The risk of identifying a clinically insignificant lesion also depends on the likelihood that screening will detect certain neoplasms that are unlikely to progress to symptoms in elderly patients, such as ductal carcinoma in situ (DCIS). For women older than 70 years, there is roughly a 1 in 1000 chance that screening mammography will identify DCIS that would not have been found without screening.[40] Only 7% to 25% of DCIS lesions progress to invasive cancer within 5 to 10 years.[41-43] Yet, due to the inability to distinguish which lesions will progress to invasive cancer, many older women with DCIS undergo mastectomy or lumpectomy combined with radiation.[44] Women who have surgery for DCIS that would have never become symptomatic in their lifetime have suffered serious harm.

Besides the physical harms, the psychological distress caused by cancer screening may be substantial for some elderly patients and caregivers.[45,46] Potential psychological harms range from the emotional pain of a diagnosis of cancer in patients whose lives were not extended by screening through the alarm of false-positive results to the stress of undergoing the screening test itself. Since cancer is one of the most feared diseases in the Western world,[47] some of the greatest psychological harm from screening occurs when a clinically insignificant cancer is identified. False-positive results can also lead patients to "temporarily experience the diagnosis of cancer,"[48] and often these anxieties, once aroused, cannot be allayed easily. A study[49] of women aged 50 through 74 years found that 47% of women who had false-positive "high-suspicion" mammogram results reported mammography-related anxiety even 3 months after learning that they did not have cancer. Similarly, substantial anxiety and discomfort may occur while undergoing the screening test itself or further diagnostic studies, especially among patients with a high predisposition to anxiety.[50] Also, elderly patients may have cognitive, physical, or sensory problems that make screening tests and further workup particularly difficult, painful, or frightening.[51] Considering factors that increase the likelihood of harm is vital to making appropriate screening decisions.

Values and Preferences

The final component of our framework is to assess how patients view the potential harms and benefits we have detailed and how to integrate patients' values and preferences into screening decisions. Cancer screening decisions have traditionally followed the public health strategy in which experts weigh the risks and benefits of an intervention and decide what is appropriate for certain populations. However, this strategy omits patient preferences and values. Since many cancer screening decisions in older adults will not be answered solely by quantitative assessment of benefits and harms, talking to older patients about screening preferences and values is especially important.

The degree to which individuals will discuss their preferences or be involved in screening decisions will vary.[52-54] Ideally, physicians over time should learn about patients and their families and come to understand their values and preferences. The value placed on different health outcomes will vary among patients, as will preferences for screening.[55,56] For example, some women undergoing screening mammography report "peace of mind" after a negative screening result; whereas, women with dementia may receive no such comfort.[57] Physicians should also consider a patient's usual approach to medical decision making to decide how to approach the discussion of screening. In some cases the physician will need to find out the patient's values, apply them to the known risks and benefits of screening, and make a formal recommendation. For other patients, the physician will want to discuss the risks and benefits with the patient and allow the patient to apply his/her values to the problem and come to a decision together. For patients with dementia, discussion about preferences should be held with an involved caregiver. However, it should be remembered that despite being unable to articulate consent, many patients with dementia can still effectively communicate refusal.[58] If a patient is frightened or agitated by a screening test, the caregiver and physician should consider forgoing it. Also, there should be a general discussion prior to screening about the possible procedures and treatments that may be required after an abnormal screening result. Patients who would not

want further workup or treatment of an abnormal result should not be screened.

Where there is patient misperception of cancer risk or screening efficacy physicians should provide information to facilitate informed decision making. Effective risk communication depends on qualitative assessment of patient values, emotional receptivity, communication styles, and intellectual abilities as well as quantitative understanding of benefits and harms of screening options.[59] Although there is evidence that patients are more inclined to overestimate the probability of risks and benefits presented in relative terms compared with those presented in absolute terms (absolute risk reduction or NNS), there is little research on the use of NNS as a communication tool.[60] Our framework uses NNS to present quantitative information since it is a single number that indicates in absolute terms the effort required to achieve a particular goal.[26,61]

Communicating quantitative information and integrating it with patient values is often difficult and will require time during a busy office visit.[62] Our framework is intended to help physicians by providing an organizational system to think through these often complex decisions. In addition, physicians can provide patients with decisional aids, such as pamphlets, videos, or interactive computers, as time-saving supplements to their own discussions with patients.[63]

Case Scenarios

To illustrate the application of our framework consider the following cases:

Case 1. Ms A is a 75-year-old white woman with diabetes, severe dementia, and functional dependency in all activities of daily living. She lives with her daughter and has no prior history of any cancer screening tests.

Case 2. Ms B is an 80-year-old white woman who is widowed, living with her sister. She has no comorbid conditions, walks 3 miles a day, and cooks and cleans for her older sister. She has no prior history of any cancer screening tests.

Our framework starts with estimating the risk of dying of cancer according to estimated life expectancy and cancer-specific mortality rates. Although Ms A is younger than Ms B, her estimated life expectancy is much less. Ms A's severe dementia and functional dependency place her in the lowest quartile of life expectancy for her age. Ms B, on the other hand, has no comorbid conditions and much better functional status than an average 80-year-old woman. She probably falls in the upper quartile of life expectancy for her age, which would give her an estimated life expectancy of 13 years. She, therefore, is at higher risk for dying of a currently occult cancer than Ms A.

The next step is to consider the probability of benefiting from screening according to the patient's estimated risk of dying of cancer and the efficacy of the screening test. Since it takes at least 5 years after starting screening to see a survival benefit between screened and unscreened groups, Ms A is unlikely to derive benefit from any cancer screening test. On the other hand, 80-year-old women with similar life expectancies to Ms B have approximately a 1 in 240 chance for survival benefit from screening mammography, a 1 in 262 chance of survival benefit from screening FOBT, and a 1 in 1694 chance of survival benefit from screening Pap smears. For comparison, it is estimated that 2500 40-year-old women would need to have regular screening mammography for 10 years to prevent 1 death by age 80 years.[31]

But the harms of screening also need to be considered. Ms A has significant dementia and may not understand why her breasts need to be squeezed during mammography or why a speculum needs to be inserted into her vagina to do a Pap smear, so her psychological distress may be substantial. Also, her family members are unsure whether they would want to pursue any type of surgery if a screening result were abnormal, since their main goal is to prevent her from suffering. Ms B, on the other hand, voices her concern about her risk for cancer. She accepts the risks of false-positive examinations and finding clinically insignificant disease. However, she reports that having the tests would give her "peace of mind."

This leads to the final step in our framework, which is the assessment of the patient's values and preferences. Discussion with Ms A's family members shows that preserving her quality of life is their most important goal. Ms A has avoided physicians all her life and does not like undergoing tests. She becomes agitated if anything interrupts her daily routine. Discussion with Ms B reveals that she worries about her health and wants to have a mammogram, Pap smear, and FOBT.

The decision to recommend against cancer screening for Ms A is clear given her low likelihood of benefit, increased likelihood of harm, and her preferences for focusing on quality-of-life issues and avoiding medical testing. Determining whether to screen Ms B may be a "close-call" if one only compares her potential screening benefits with its harms, but the decision to recommend screening becomes clear after she states her preferences.

Of course, it is more difficult when patients with limited life expectancies want screening examinations that offer them little chance of benefit. Recent evidence suggests that patients will frequently withdraw requests for unhelpful treatments when the rationale is discussed with them.[64] Our framework can help stimulate discussions with patients and promote informed cancer screening decisions.

CONCLUSION

We present a framework for guiding physicians and elderly patients to more informed cancer screening decisions by detailing the benefits and harms that need to be weighed when making screening decisions. Patient preferences then act like a moveable fulcrum of a scale to shift the magnitude of the harms or benefits that are needed to tip the decision toward a screening option.

Our framework illustrates potential difficulties for reimbursement and quality assessment systems that apply guidelines based on administrative data to decisions that involve estimating life expectancy and weighing potential benefits and harms according to patient val-

ues and preferences. Third-party payers who wish to provide high-quality care may need to forgo oversimplified guidelines that do not allow for the application of clinical judgment. Similarly, optimizing cancer screening decisions requires systems that reimburse physicians for the complexity and time requirements of these discussions.

Cancer screening discussions and decisions will often be difficult tasks. However, understanding potential risks and benefits of medical interventions and being aware of patient wishes are core principles of good medical practice and should be applied to cancer screening decisions.

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