EDITORIAL

The Use of Life Expectancy in Cancer Screening Guidelines

Moving with Caution from Model-Based Evidence to Evidence-Based Guidelines

A critical question in preventive medicine is at what age screening for cancer should stop.[1,2] Mandelblatt et al. investigated this important issue for the case of mammography screening, using a Monte Carlo simulation model that included life expectancy as marker of physiologic age.[3] They evaluated the cost-effectiveness of screening until age 70, until age 79, and with no upper age limit. Their simulations suggested that, at a threshold of $60,000 per life-year saved, screening to age 79 is cost-effective only if it is limited to women with life expectancies in the top quartile. At a threshold of $80,000, biennial mammography screening until age 79 has reasonable costs, with the researchers suggesting that "it is cost-effective to screen women with a life expectancy of 9.5 years. This value can be expected for 75% of 79-year-olds, about 50% of 80-year-olds, and 25% of 85-year-olds."[3] As is common with this type of stochastic modeling exercise, the results were somewhat sensitive to different assumptions and parameters in the model. Nonetheless, across a series of sensitivity analyses, Mandelblatt et al.[3] found that life expectancy rather than chronologic age is important in assessments of optimal screening strategies. That is, the benefits of screening depend more on how long a woman has left to live than on her actual age.

The type of research conducted by Mandelblatt et al. is critically important in helping to identify ways to control health care costs through evidence-based medicine. Nonetheless, we need to be cautious in how we translate this kind of "evidence" from a policy simulation into "evidence-based" clinical guidelines, because guidelines that hinge on life expectancy raise important practical and ethical concerns.

First, it is currently impractical to ask clinicians to base screening decisions on life expectancy. Mandelblatt et al. acknowledge this issue, stating that "one practical implication of our analysis is that simple methods to determine life expectancy in clinical settings could aid screening decisions for older women."[3] However, how close are we to having such methods? While clinicians are relatively good at predicting survival among terminally ill cancer patients, they tend to overestimate length of life, even in the face of extensive data regarding outcomes for these patients.[4] In predicting life expectancy for healthier patients, the current tools available are quite crude and are of questionable validity. For example, Roizen has used the popular press to promote his test for determining "real age," yet there is no scientific foundation for his approach.[5] Welch et al.[6] described a method for transforming chronologic age into physiologic age, but their approach is quite simplistic, relying on a single question regarding self-reported health status. Significant investments have been made in gathering and analyzing data from longitudinal population-based studies of older cohorts (such as the Health and Retirement Study) to better understand life expectancy among the elderly and the predictors of successful aging.[7,8] Such research, however, has yet to be translated into validated tools that can be used in clinical practice and public discourse. Thus, how do clinicians know a woman in the top quartile of the life expectancy distribution when they see one? Similarly, there is a 50-50 chance that the 80-year-old woman in the office has 10 more years of life ahead of her. How can a woman and her clinician know for sure?

Second, mammography guidelines based on life expectancy could further complicate physician-patient communication and reduce screening rates. Clinician recommendation is a key predictor of women's use of mammography.[9,10] If breast cancer screening guidelines were revised based on Mandelblatt et al.'s results, clinicians would need to engage patients in relatively lengthy and difficult discussions regarding projected life expectancy before making a recommendation. It seems likely, however, that many physicians would simply refrain from discussing mammography and the unwieldy guidelines with a significant portion of their patients. Because clinician recommendation is so important in mammography use, forgoing these discussions would likely result in decreased screening rates among older women in general. This could have negative consequences, as the incidence of breast cancer rises with age, with risk peaking between the ages 65 to 74 for white women and 75 to 79 for African-American women.[11] Mortality risk also rises steeply with age, with risk highest in the oldest age group. In fact, the age-adjusted breast cancer mortality rate for those 85 and older is 197.1 per 100,000 for white women and 209.6 for African-American women, more than double the rate for women ages 60 to 64 years.[11] A clear guideline that is easy for physicians to interpret, discuss, and implement with women is essential for optimal screening rates in older age groups.

Third, prognosis-based screening guidelines for older adults also raise ethical concerns about how such policies might reinforce social disparities in health. Publicly available life tables provide information for the general population by gender and major racial groups. It is clear, however, that there is great heterogeneity within these groups, and that life expectancy also varies by education, income, ethnicity, and other markers of socioeconomic status (SES) and life experience.[8,12,13] Life expectancy is also affected by comorbidities and health risk behaviors, many of which are more prevalent in lower SES and ethnic minority subpopulations.[14] For example, the projected life expectancy of an African-American woman over age 75 with less than a high school education and diabetes is not in the upper 25% of the distribution. As such, social inequalities in health across the life course will be reflected and reinforced in any screening guideline or policy that uses life expectancy in its criteria. This can be considered as a type of "statistical discrimination."[15]

In summary, a number of practical and ethical issues collide when considering Mandelblatt et al.'s results in the context of clinical guidelines for mammography screening. Although these researchers were *not* issuing screening guidelines or recommendations themselves, their work could be interpreted by some as providing an empiric basis for revised mammography guidelines, especially in regard to the thorny

yet important question of when to stop screening. This is not a far-fetched concern, as screening guidelines that include assessments of life expectancy already exist. For example, both the American Cancer Society and the American Urological Association recommend prostate specific antigen screening for those men who have "at least 10 years of life expectancy."[16,17]

Christakis[18] claims that "prognostication is an essential part of medicine." He has also emphasized that predicting life expectancy is a challenging endeavor, fraught with difficulty and discomfort for patients and physicians alike.[18,19] Christakis' work primarily focuses on end-of-life care, but his clarion call for the development of better prognostic tools and aides can be echoed here in the context of screening guidelines. Of course, it is frustrating that most organizations issuing mammography guidelines have not included explicit recommendations for women older than 70 years of age.[20] As such, the guidelines are murky at ages at which women are at very high risk for being diagnosed with and dying from breast cancer. Nonetheless, until we have better tools for understanding and predicting life expectancy in different social groups, it would be better to remain uncertain about when to stop screening among older women than to open a Pandora's box of practical and ethical challenges. We therefore recommend that the recent work by Mandelblatt et al. be used, not as "evidence" for revising clinical guidelines for mammography screening, but as a springboard for further discourse and debate about cancer screening in older age groups and as fuel for the development of practical and valid prognostic tools for life expectancy.—**Paula M. Lantz, PhD,[1] and Peter A. Ubel, MD,[2]** *[1]Department of Health Management and Policy, School of Public Health and the Institute for Social Research, University of Michigan, Ann Arbor, Mich; and [2]Division of General Internal Medicine, Center for Behavioral and Decision Sciences in Medicine, University of Michigan School of Medicine Ann Arbor Veterans Affairs Medical Center, Ann Arbor, Mich.*

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