The Economics of Prostate Cancer Screening

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By Barnett S. Kramer, MD, MPH [2]

Drs. Benoit and Naslund venture into the complex arena of medical economics and cost-effectiveness analysis of prostate cancer screening—a task that is made all the more difficult because of the dual paucity of data on costs and effectiveness. Their underlying premises are that cost control is a dominant concern in the prostate cancer screening debate and that cost-effectiveness analyses have been used to “justify denial of prostate cancer screening.” Both of these assumptions bear scrutiny.

Drs. Benoit and Naslund venture into the complex arena of medical economics and cost-effectiveness analysis of prostate cancer screening—a task that is made all the more difficult because of the dual paucity of data on costs and effectiveness. Their underlying premises are that cost control is a dominant concern in the prostate cancer screening debate and that cost-effectiveness analyses have been used to “justify denial of prostate cancer screening.” Both of these assumptions bear scrutiny.

Why Screen for Prostate Cancer?
The analyses presented in the literature by skeptics of widespread prostate screening[1,2] or by those who specifically recommend against it[3-7] focus primarily on the uncertainty over whether routine screening would lead to net benefit or harm. Society must, at this point, weigh theoretical benefits against the known, substantial morbidity incurred by screening and subsequent therapy. The “costs” of dominant concern are human, not economic. It is not yet a matter of whether, as the authors suggest, “society must decide if the years of life saved in these men warrants the use of its limited health care resources.” First, society needs to decide if years of life are saved at all, and, if so, at what cost of morbidity and treatment-related mortality. To couch the debate primarily in terms of interest rates and returns on bonds runs the risk of trivializing the central Hippocratic concern of harm without proven benefit.

Where is the evidence that cost considerations have presented a major impediment to prostate cancer screening? In the late 1980s, the United States entered the largest “epidemic” of any cancer since the start of formal national cancer record-keeping—an epidemic largely attributable to prostate-specific antigen (PSA) screening.[8] From 1984 to 1990, Medicare data showed a 575% increase in the use of radical prostatectomy.[9]

The authors state that breast cancer screening was implemented without knowledge of its effect on breast cancer mortality. Actually, widespread breast cancer screening in the United States did not begin until early reports from the randomized Health Insurance Plan (HIP) of New York study showed a statistically significant mortality reduction in the screened arm.[10] In fact, the study was able to show statistical significance relatively quickly because there was virtually no population screening outside of the trial and therefore virtually no contamination effect in the control arm of the study. In contrast, any randomized prostate cancer screening study in the United States has to contend with the possibility of contamination of the control arm due to the national enthusiasm for, and easy availability of, prostate cancer screening. This may delay our ability to assess the net benefits and harms of screening by years.

Cost-Effectiveness Analyses
Drs. Benoit and Naslund do point out some of the complexities in performing cost-effectiveness analyses. It is incorrect, however, to assume that the most “cost-effective” strategy would be to withhold any treatment of prostate cancer. Even if this were the least costly approach, its effectiveness in terms of life-years saved would be zero, and the ratio of cost to effectiveness would explode to infinity. Hence, such an approach could be the least cost-effective strategy of all.

The authors go on to point out the difficulties associated with discounting future life-years saved. However, discounting life-year benefits is not a matter of interest rates or economic indicators. Rather, discounting life-years saved in the distant future is performed because personal values demand it. Most people would attach considerably more value to an additional year of life if they
were otherwise to die tomorrow than they would if they were to die in 25 years. Such valuation is
difficult to account precisely, since it depends on an individual’s point of view, but that should not
undermine the concept of discounting. In the case of prostate cancer, men are in the position of
weighing the immediate risk of morbidity (and even small mortality risk) against the potential of
extending their life in the more distant future by some unknown amount.

Quality-of-Life Adjustments
Another complicated area in some models is the assessment of quality-of-life adjustments. These
valuations, again, are personal and are difficult to generalize in any statistical model. However, the
authors feel that the assignment of a value of 1.0 in some models to men who are disease-free (ie, a
value equivalent to full health) is perhaps an underestimate. The authors suggest the sense of
well-being and gratitude associated with successful therapy may provide added value. Although
many urologists may agree, the valuations are ideally judged from the vantage point of the patient.
For a value greater than 1.0, the assumption would have to be that men must undergo radical
prostatectomy in order to feel healthier than someone without any medical problems.
Likewise, the issue of possibility of overdiagnosis is both complicated and central to any assessment
of screening effectiveness. The authors feel that there would be little chance of overdiagnosis, based
on the size and histologic characteristics of screen-detected cases. Aside from the differences in
biological behavior between the asymptomatic lesions that surface in a screening program and
clinically symptomatic lesions that look similar under a microscope, and the fact that we only know
the natural history of the latter,[11] even the screen detection of lesions with lethal potential could
nevertheless represent some overdiagnosis. The patient may be destined to die of an unrelated
disease before the prostate cancer would ever cause symptoms. Changing the estimates of the
amount of overdiagnosis can have considerable impact on the theoretical effectiveness of a
screening test.

Despite the uncertainties attached to so many assumptions, I believe the authors have done the
reader a valuable service. Some previous models have been based on assumptions derived from
complete structured literature searches on the risks and benefits of prostate cancer screening and
treatment, as well as its costs.[3,4,6,7,12,13] Benoit and Naslund have shown that selection of a
particular case series can substantially change both the numerator and denominator of a
cost-effectiveness calculation, and therefore the output of a statistical model in either direction. That
is the nature of calculation for any ratio with uncertainties in both the numerator and denominator.
The authors therefore demonstrate both the problems and the utility of current cost-effectiveness
calculations for prostate cancer screening. The power of models is that they expose our uncertainties
and show how modest changes in assumptions can change the calculated outcome. In this case, one
of the most important unknowns is the efficacy of treatment. Problems arise when we try to rely on
the output as the final word. Hence, the comparison of their cost-effectiveness conclusions for
prostate cancer screening cannot be accurately compared to the ratios for other health strategies,
such as hypertension control, coronary artery bypass, screening mammography, and colon cancer
screening.

Randomized Trials
In contrast to prostate cancer screening, those interventions have a proven and quantifiable
effectiveness established in randomized controlled trials. Their cost-effectiveness calculations are
therefore more reliable and useful in allocating health resources. Some well-intended past decisions
to launch screening programs in the absence of proof of benefit have led to national harm. For
example, the screening program for neuroblastoma in all newborns in Japan led to a dramatic
increase in the diagnosis of, and operations for, neuroblastoma, but this increase in screen-detected
disease did not lead to any decrease in incidence of late-stage disease or mortality.[14,15] A similar
experience has been reported from Quebec.[16]
I fully agree with Benoit and Naslund that current cost estimates and treatment efficacy for prostate
cancer screening are unknown, and that randomized trials are necessary to settle the issue and
permit accurate assessment of net risks, benefits, and economic costs. One such trial is in progress
in the United States and has enrolled about 45,000 of the targeted 74,000 male study
participants.[17] Randomized trials are the fastest route to the answer,[1] and are more reliable than
modifying assumptions in currently available statistical models. In the meantime, particularly since
several of the parameters in cost-effectiveness models hinge on personal values known only to the
man facing the option of screening, we should present the uncertainties to each man and allow him
to make the decision.
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