A FEDERAL advisory panel recently set off a controversy by recommending that most women without special risk factors delay breast cancer screening until they turn 50, not 40 — and that mammograms then take place only every other year.

These guidelines, which differ from those of some other professional or advocacy organizations, have been called a rash misjudgment and an example of ostrich-like thinking. But this criticism is unfair, both to the scientists who prepared the report and to ostriches (who don’t actually bury their heads in the sand in an attempt to hide).

The new report makes some good arguments, and a discussion of the underlying numbers and a bit of probability theory may help explain how the scientists reached their conclusions — and help us evaluate the policy implications. Analyzing this problem also highlights the difficulties in gauging health care reform: Should we continue any test that offers some chance of preventing a death, regardless of the odds or the costs associated with the testing?

To begin, it’s important to understand that patients who aren’t at high risk for cancer might have several reasons to choose against being screened for it. “Should I Be Tested for Cancer?,” a 2004 book by H. Gilbert Welch, a Dartmouth Medical School professor, provides a dispassionate discussion of these issues.

First, it is the nature of cancer screening that there are a lot of false positives, or what Dr. Welch calls “cancer scares.” For women in their 40s, the risk of a false-positive mammogram is on the order of 10 percent each time they take one. If women are tested regularly for many years, many will thus have at least one cancer scare.

It cannot be easy to hear that a routine mammogram shows that you might have cancer. But how alarmed should you be? This is where basic probability theory helps.

Here is a quiz: Suppose that there is a one-in-1,000 chance that a woman in her 40s with no symptoms has breast cancer, and that 90 percent of the time a mammogram correctly classifies women as having cancer or not. If a woman in this group tests positive on her mammogram, what is
the chance that she has cancer? The answer is not 90 percent. It is less than 1 percent, because of the large number of false positive results. (A table showing the math is at nytimes.com/business.)

Thankfully, breast cancer is rare enough in this age group that a vast majority of positive hits are false positives. Do patients understand this while they are waiting for the results of the subsequent tests?

A second reason for not being tested is that you might not always want to know you have cancer. That may sound crazy, but it’s not.

For example, if you are old enough, you might not want to know that you have prostate cancer, which is typically slow-growing. Most men, if they live long enough, will get prostate cancer — we know this from autopsies of men over 70 who died from something else.

Although prostate cancer doesn’t cause many deaths, once you know you have it you’ll have a hard time resisting the temptation to undertake treatments, which carry significant risk of adverse side effects like impotence or incontinence. For older men, the best course of action is often “watchful waiting” — just checking to see if the cancer becomes worse. But most men who get a diagnosis of prostate cancer end up being treated.

The tricky thing about breast cancer screening is that mammograms often discover tiny tumors in the breast ducts called ductal carcinoma in situ (D.C.I.S.). You might think that the possibility of finding such tumors is exactly why one has a mammogram. But no one knows what happens if such tumors are left untreated, because when found they almost always are treated, with surgery, radiation or both. Yet there is considerable circumstantial evidence that not all such tumors lead to health problems.

For one thing, all of this extra detection of early cancers has had not led to a corresponding decrease in advanced cancers — the ones that matter most. Furthermore, there is autopsy evidence that many women not known to have had breast cancer have small cancers when they die. One study of such autopsies found that almost 40 percent of women in their 40s had D.C.I.S.

Because the lifetime risk of dying from breast cancer is less than 3 percent, these numbers suggest that many small cancers may not lead to fatal disease. (The risk of developing breast cancer at some point in life is considerably higher: roughly 1 in 8 women will receive such a diagnosis, according to the National Cancer Institute.)

So what are the true costs of routine cancer screening for women in their 40s?

The numbers show that about 2,000 women need to be screened regularly for a decade to avert one breast cancer death. But according to Dr. Welch, during that decade between 4 and 20 of these women will be “overdiagnosed” and get radiation, chemotherapy or a mastectomy unnecessarily.

About 5 to 15 women will get treatment at a younger age than they would have otherwise, without improving their health outcomes. Most were going to do fine without screening by beginning treatment of their cancer when the symptoms became evident, and a few were destined to die whether or not they had early screening because their cancer was fast-growing.
And when you add up a decade of false positives, hundreds of these women will have received false alarms — and about half of these will have received biopsies. Of course, reasonable people may disagree about whether those costs are greater than the benefits. (Notice that I have intentionally not mentioned any dollar amounts.) These are tough decisions, but anyone who even suggests that some test be done less often is accused of condoning “rationing,” an all-purpose slur against any change that might reduce costs.

It is safe to say that our current medical care system is not designed to do well at making these decisions. Careful medical and scientific recommendations are turned into political footballs, and doctors are often paid for testing and treating and run the risk of being sued or rendered guilt-ridden for not doing so.

One can make a good case that we don’t want the government making these choices, but few want those decisions made by private insurance companies, either.

It all makes me depressed. I think I’ll go bury my head in some sand.

*Richard H. Thaler is a professor of economics and behavioral science at the Booth School of Business at the University of Chicago.*