

Decision tool for prostate cancer patients helps men customize treatment in anxious time

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An online decision tool created in part by a graduate student at the University of California Irvine helps men diagnosed with prostate cancer sort through an intimidating flurry of possible treatments and customize treatment plans of their own, according to a study in the current issue of *Interfaces*, a journal of the Institute for Operations Research and the Management Sciences.

"Decision Making with Prostate Cancer: A Multiple-Objective Model with Uncertainty" is by Jay Simon, who received his doctorate this spring and is scheduled to join the faculty of the Naval Postgraduate School. The study appears in a special issue of *Interfaces* containing applications of operations research models to healthcare problems.

His research, says Simon, "gives a patient the opportunity to see all the available information in one place and personalize it, tailor it, and incorporate his own preferences."

The tool allows men to enter their own data, compare it with available research, score different options, and derive a "life score" that guides their decision.

Making decisions about prostate cancer treatment is unique, the author writes. Patients diagnosed with other diseases often face restricted options. By contrast, because prostate cancer in many cases progresses

slowly, men with the disease choose from a variety of possible cares. These can be evaluated using multiattribute utility theory, which is used by operations researches and decision scientists to evaluate trade-offs.

"Two main factors are critical in making the treatment decision," the author writes.

"First, it is necessary to quantify as probabilities the uncertainties involving death and side effects over time. A decision analyst accomplishes this mainly by collecting and analyzing historical data reported in medical journals. Second, the decision analyst must elicit the patient's individual preferences and incorporate them into the analysis. Because the outcomes involve multiple attributes (e.g., length of life and side effects), it is necessary to know the relative importance that the patient places on each attribute."

The model considers five treatment options:

1. surgery
2. external radiation
3. seed radiation
4. dual radiation
5. no treatment

The model's tasks are specifying and evaluating the uncertainties, and evoking patient preferences. Among the uncertainties considered are patients' expected life span in the absence of cancer and probability of death following each of the treatment options.

Information considered is data from the Social Security Administration, actuarial data, and cure rates reported in medical journals.

The model uses a cancer score to examine measures of prostate cancer severity.

The model considers not only the probability of death from surgery and other procedures, but also the likelihood of enduring side effects. The model expresses the possibility of each side effect's occurrence as comparable to a specific reduction in life span. A "multiobjective" model is then used to determine patients' own preferences, allowing patients to combine their concerns about life expectancy and side effects into scores rating each potential procedure. With scores derived for each, patients can more easily compare scores and decide.

The author observes that running the model repeatedly for different types of patients yields several observations. Most controversial, he writes, is that external radiation is used too often to treat prostate cancer.

"Although it can provide a moderate reduction in side effects," writes Simon, "its cure rate is lower than many people believe because many articles on radiation treatments for [prostate cancer](#) contain a systematic censoring and backdating error."

Among other observations are that surgery usually results in the highest life score for younger men; seed radiation is occasionally more desirable for early stage cancer; and combining low-dose seed radiation and external radiation might be preferable for patients especially concerned about side effects. Confirming general medical practice, the model suggests less aggressive treatment for older patients.

Dr. Simon and colleagues are currently working on an extension of this research that would provide a decision-making tool for men over 40 in

the initial stages of prostate screening. Undiagnosed men in this group often have to make successive decisions about whether or not to have a biopsy and how to interpret PSA results.

Source: Institute for Operations Research and the Management Sciences
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