A web-based prediction tool to help with decisions between treatment and management options for localised prostate cancer.

March 2020, Wendy Winnall, PhD Scientific writer for PCFA

For men with localised prostate cancer, the decision between different treatment and active surveillance options is a very important one. These men want to know their risks of difficult side effects from these options. New research from the US has created a web-based prediction tool for side effects to help men and their doctors in making this decision.

Choosing between management strategies for localised prostate cancer

There are times that a man with prostate cancer is particularly in need of trustworthy information. One of these is when deciding on treatment or management for localised prostate cancer. Men who have recently been diagnosed with localised prostate cancer usually choose between surgery, radiotherapy or active surveillance. Active surveillance is when a low-risk tumour is monitored to delay or avoid treatment until it becomes necessary (if it does). Other possible options for these men are focal therapies.

Choosing between surgery, radiotherapy and active surveillance is often a difficult task. Both surgery and radiotherapy lead to very similar chances of success in terms of removing the tumour and avoiding it's return. For a low-risk, slow growing cancer, there is evidence that active surveillance is a safe option with similar outcomes to active treatment on average.

Despite the success of surgery and radiotherapy in saving lives, there are difficult side effects that sometimes result from these treatments. Deciding between them requires men and their doctors to weigh up the risks of side effects with the benefits of the treatment. What men need at this stage is trustworthy and comprehensive information from their doctors about these risks.

What factors affect quality-of-life after prostate cancer treatment?

Men facing surgery or radiotherapy want to know what are their chances of side effects that will reduce their quality of life? Side effects such as problems having sex, urinary and bowel incontinence are the more common problems that make everyday life more difficult. To make this

decision, men want to know how bad it will be and how long it will last. No-one can say for certain, but using information from the experiences of many patients, predictions can be made. Making these predictions is difficult, because every man has his own unique set of circumstances.

In order to make predictions, we need to know the factors that affect the chances of side effects. It's also useful to know how much influence each of these factors has on the chances of side effects on average.

We know from previous research that some of the factors affecting side effects after treatment include:

- the severity of the cancer (PSA level, Gleason score etc.)
- age of the man
- ability to have sex before treatment
- level of urinary and bowel problems before treatment
- overall health before treatment

How can we use this information to make predictions about the chance of problematic side effects?

Web-based tool to predict side effects

A new study from the US has created a web-based tool to predict the risks of side effects after prostate cancer treatments. The authors of the study are a collective of researchers from many different US states. The study lead was Dr Aaron Laviana from the Vanderbilt University Medical Center in Nashville, Tennessee.

To perform this study, the researchers used data from 2,563 men from US cancer registries. These men were diagnosed with localised prostate cancer in 2011 and 2012. They had either surgery, active surveillance or radiotherapy (external beam only, not brachytherapy). The registries collected information from these patients at the time of treatment or start of active surveillance, then up to 5 years afterwards. Information was collected about their cancer, their ability to have sex before treatment and other factors that may affect their risk of side effects. Patient-reported outcomes were collected by a mailed survey at the time of treatment, then at 6 months, 12 months, 3 years and 5 years after treatment or start of active surveillance.

The researchers then used this information to devise a mathematical model (an equation) to predict the chances of problematic side effects for these men. After coming up with an initial model, they optimised it, removing factors that had little to no influence, to make a simpler and more accurate tool.

The final equation is used in a web-based prediction tool to predict the risk of problematic side effects for the different management strategies. The website includes a survey to fill in and produces results that are best interpreted with the help of a doctor. Below are examples of the questions and some hypothetical results.

In general, would you say your health is:

- ○ Excellent
- ● Very good
- ○ Good
- ○ Fair
- ○ Poor
- ○ Very poor

What is your most recent PSA result:

4.9

What is your Gleason results:

- ● 6 or less
- ○ 3 + 4
- ○ 4 + 3
- ○ 8,9,10

Sexual Domain questions

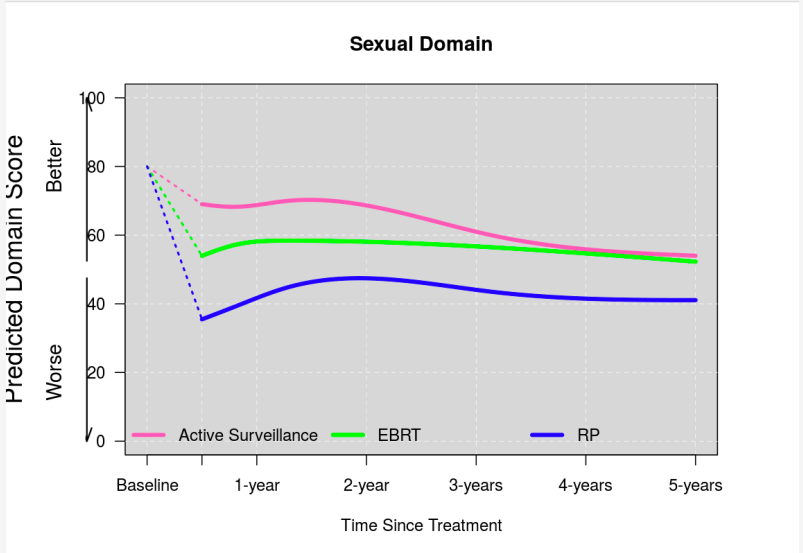
During the last 4 weeks (or the 4 weeks prior to treatment, if you have already started therapy)

How would you rate your ability to have an erection?

- ○ Very poor to none
- ○ Poor
- ○ Fair
- ● Good
- ○ Very good

How would you rate your ability to reach orgasm (climax)?

- ○ Very poor to none
- ○ Poor
- ○ Fair
- ● Good



Treatment Choice	Baseline	1-Year After Treatment	3-Year After Treatment	5-Year After Treatment
Active Surveillence	80.00	68.8 (65.4, 72.2)	61 (57.2, 64.8)	54 (50, 58)
EBRT	80.00	58.1 (54.6, 61.7)	56.7 (52.9, 60.6)	52.3 (48, 56.5)
RP	80.00	41.7 (38.6, 44.8)	44.1 (40.7, 47.5)	41.1 (37.4, 44.7)

What does this mean for Australian men?

Predictions are never going to be exactly right for everyone. The best we can hope for is a prediction that is close to accurate for the majority of men. There will always be men whose experiences end up very differently from the prediction.

The researchers calculated that the factors in their model could account for less than half of the variety of experiences by these men. This means that there are other factors affecting the risk of side effects that were not included in the model. These would be factors that are unknown or difficult to quantify, such as genetics. What this means is that the prediction tool is limited and doesn't include unknown factors that are likely to affect the outcome. This is always going to be the case and does not mean that the predictions are entirely useless.

Another limitation of this tool is that the data came from men who were diagnosed and treated in 2011 to 2012. Much has changed in that period of time. In particular, radiotherapy and surgery techniques have improved and bowel side effects are less common in Australia. The prediction tool

has been *internally validated* – meaning that the it is optimised for the men involved. But it is yet to be *externally validated*. This important step is necessary to determine if the prediction tool is useful for different groups of patients.

It's important to remember that this data come from the experiences of men in the US being treated 9 years ago. So the web-based tool is not set up to be optimal for Australian men today. With future research and validation, we hope to have a prediction tool that Australian men and their doctors can confidently use to help make decisions about management of their localised prostate cancer.