Risk Prediction Tools in Oncology

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Cancer prediction tools are widely available to clinicians, and the data retrieved from these tools can assist with patient counseling sessions on risk, prognosis, treatment, and recurrence. Current tools are able to synthesize data in a concise, unbiased, and evidence-based method, allowing patients to make better-informed decisions about their treatment options. As useful as these tools can be, clinicians must understand their limitations and evaluate the tools for quality and applicability.

At a Glance
- Historically, a prognostic discussion with a patient regarding a cancer diagnosis was based on physician judgment.
- Studies looking at clinician prognostic capabilities have found them to be inaccurate.
- Prediction tools have allowed for more objective diagnostic and prognostic capabilities.

Historically, when a patient had a cancer diagnosis and discussed his or her prognosis or risk of recurrence with the oncologist, the discussion was often solely based on the judgment of the physician. Studies that have looked at clinician prognosis capabilities have found that the prognosis tends to be inaccurate because of intentional and unintentional bias with an overestimate of survival time (Glare et al., 2003). This overestimate might be related to previous experiences that the clinician had in which the prognosis given to the patient was shorter than the actual survival. Another possibility is that the clinician could be overly optimistic about a new treatment (Lynn, Teno, & Harrell, 1995).

The development of and easy access to prediction tools have allowed for more objective diagnostic and prognostic capabilities that a clinician can use along with clinical judgment to offer more accurate information to a patient (Knaus et al., 1995; Teno et al., 2000). Risk prediction tools are decision aids that provide information about a cancer, treatment, or prognosis. These tools can use cancer staging information to estimate treatment outcomes or patient characteristics to determine risk.

Nomograms

A nomogram is a type of prediction tool that includes a graphic image of a mathematical formula with clinical parameters that may be continuous or categorical (Isariyawongse & Kattan, 2012). Medical nomograms use biologic and clinical variables, such as age, grade of tumor, clinical stage, or pathologic stage, to determine a probability of cancer recurrence or death. During a patient visit, the clinician can input test results into a computer- or smartphone-based calculator and receive a numeric answer. The numeric answer may provide information about a patient's risk of recurrence, prognosis, and prediction of pathologic stage that can then be discussed during the visit (Kattan & Marasco, 2010).

Prediction Tools

Breast Cancer Risk Assessment Tool

The Breast Cancer Risk Assessment Tool has been developed by researchers at the National Cancer Institute ([NCI], 2015a) and the National Surgical Adjuvant Breast and Bowel Project (NSABP) to estimate a woman's risk of developing invasive breast cancer. The tool questions the user to obtain patient information, such as medical, reproductive, and breast cancer history, including breast cancer history of first-degree relatives, such as mother, sister, and daughter. Once information is provided, the tool estimates the risk for developing invasive breast cancer during a specific amount of time.

Melanoma Risk Assessment Tool

The Melanoma Risk Assessment Tool has been developed by scientists at the NCI (2015b), the University of Pennsylvania, and the University of California, San Francisco. This tool estimates a person's risk of developing invasive melanoma by evaluating patient information, such as age, gender, race, prior sunburns, complexion, current number and size of skin moles, and extent of freckling. The tool has been developed for use by clinicians during a patient visit and assesses whether a patient is at increased risk of melanoma. This information will help inform the clinician's discussion of screening interventions.

Partin Tables

The Partin Tables show the probability that prostate cancer is confined to the prostate, as well as whether there is lymphatic invasion, seminal vesicle involvement,