Prostate Cancer Screening

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Objective: *To review the current state of prostate cancer screening and future directions.*

Data Sources: *Nursing, medical and scientific literature related to prostate cancer screening, and national and international professional recommendations.*

Conclusion: *Prostate cancer screening has been a topic of robust discussion for a number of years. Research continues to examine novel options for prostate cancer screening to either replace or compliment the prostate specific antigen test, but require additional validation before they will be widely accepted into clinical practice.*

Implications for Nursing Practice: *As new data emerges and professional organizations update their recommendations, it is important for oncology nurses to keep abreast of the latest developments to educate patients.*

Key Words: *prostate cancer, prostate cancer screening, prostate specific antigen (PSA).*

Prostate cancer is the most common non-cutaneous malignancy in American men, with 161,360 new cases expected to be diagnosed in 2017, and an estimated 26,730 men will die from the disease.[1] There are close to 3 million men living in the United States that have been diagnosed with prostate cancer.[1] Prostate cancer is the second leading cause of cancer death in the US, behind lung cancer.[1] According to the World Health Organization's International Agency for Research on Cancer, 1.1 million men were diagnosed with prostate cancer worldwide in 2012, accounting for 15% of all cancer diagnosed in men.[2] An estimated 307,000 deaths occurred from prostate cancer worldwide, making it the fifth leading cause of cancer death in men. Rates of prostate cancer are highest in North America, New Zealand/Australia, and in Western and Northern Europe, and lowest in Asian populations.[2] This is thought to be because of the availability and use of prostate-specific antigen (PSA) for screening for prostate cancer.

While the exact cause of prostate cancer is unknown, the leading risk factor for prostate cancer is advanced age. Approximately 75% of prostate cancers are diagnosed in men older than age 65.[3] Prostate cancer is rare before the age of 50. In addition to advanced age, race is thought to be a risk factor for prostate cancer, although the exact association is not well understood. African American men have the highest incidence and death rate from prostate cancer, are less likely to be screened, more likely to have advanced disease at the time of diagnosis, and less likely than other races to receive aggressive forms of treatment.[4] There is a strong

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association between family history and risk for prostate cancer. Men who have a first-degree relative (eg, father, brother, son) with prostate cancer have a two to three times greater risk of being diagnosed, and this risk is believed to be increased with the number of relatives diagnosed with prostate cancer.[5]

The prostate gland is an accessory reproductive gland that secretes alkaline seminal fluid that forms part of the ejaculate, which aids in the nourishment and motility of sperm. It is partially glandular and muscular and lies within the lower pelvis, beneath the bladder and anterior to the rectum. The posterior aspect of the prostate can be palpated through the rectum. The central, peripheral, transition, and fibromuscular zones comprise the four sections of the prostate, with 75% of prostate cancers developing in the peripheral zone.[6]

Current Recommendations for Cancer Prevention and Early Detection and Screening

Screening for prostate cancer is nothing short of controversial and is one of the most hotly debated health care issues to date. Opponents of PSA screening cite concern for over diagnosis of non-lethal cancers leading to overtreatment, resulting in bothersome treatment-related side effects, psychological distress, and significant medical costs. Proponents of PSA screening cite advocacy for shared decision-making, data that survival among men with prostate cancer is related to several factors (including extent of tumor at the time of diagnosis), and lack of robust data supporting other screening modalities.

Prevention

The exact etiology of prostate cancer is unknown, rendering it impossible to make specific recommendations regarding preventive measures. Several trials have been conducted to study the effects of medications and dietary modifications on the prevention of prostate cancer. The enzyme 5-alpha-reductase in the prostate converts testosterone into dihydrotestosterone, which has a strong effect on the development of the prostate gland. Two large trials have been conducted to study the effects of two 5-alpha-reductase inhibitors, finasteride and dutasteride, on the prevention of prostate cancer.

The Prostate Cancer Prevention Trial enrolled 18,882 men without prostate cancer who were randomized to either the placebo arm or daily finasteride arm. Finasteride interferes with the formation of dihydrotestosterone.[7] Participants underwent annual digital rectal exam (DRE) and PSA, and, at the conclusion of the 7-year intervention, underwent prostate biopsies if their PSA level was >4.0 ng/mL or if they had a palpable prostate nodule. Recipients of finasteride were found to have a 25% reduction in prostate cancer prevalence, but the men in the intervention arm who were diagnosed with prostate cancer were more likely to have a more aggressive disease than men in the placebo arm who were diagnosed with prostate cancer (37% *vs* 22.2%).[7] Ultimately, analysis of these findings make it unclear as to whether finasteride may increase the true incidence of high-grade prostate cancer.

The Reduction by Dutasteride of Prostate Cancer Events trial studied the effects of dutasteride on prostate cancer prevention. Dutasteride inhibits both isoenzymes of 5-alpha-reductase. Men were randomized to either placebo or daily dutasteride and followed for 4 years. While dutasteride did decrease the risk of developing a low-grade prostate cancer by 27%, it did not reduce the risk of developing a more high-grade tumor.[8] The US Food and Drug Administration has not approved either finasteride or dutasteride for the prevention of prostate cancer. Although the Prostate Cancer Prevention Trial and the Reduction by Dutasteride of Prostate Cancer Events trial show that finasteride and dutasteride reduce the risk of being diagnosed with low-risk prostate cancer, neither demonstrated a reduction in the development of high-risk disease, nor did they study the impact of 5-alpha-reductase inhibitors on prostate cancer mortality.

Dietary intake and its association with prostate cancer development and prevention has been widely studied. The largest of the dietary supplement trials, the Selenium and Vitamin E Prevention Trial, randomized over 35,000 men into four groups; placebo, daily vitamin E, daily selenium, or daily vitamin E and selenium. Analysis following a median 7-year follow-up resulted in neither supplement, taken alone or in combination, reducing the incidence of prostate cancer.[9] The Heart Outcomes Prevention Evaluation (HOPE) trial (placebo *vs* daily vitamin E) and the Physicians Health Study II (placebo, daily vitamin E, daily vitamin C, or daily