REVIEW ARTICLE

Prostate Health: Screening and Management

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ABSTRACT

Prostate health is a critical concern for aging men, given the high prevalence of conditions such as prostate cancer and benign prostatic hyperplasia (BPH). Prostate cancer remains the most commonly diagnosed malignancy among American men, with significant morbidity and mortality rates. Concurrently, BPH affects a substantial portion of the male population, leading to lower urinary tract symptoms that can severely impact quality of life. This review aims to provide a comprehensive overview of current guidelines and practices in prostate health, focusing on early detection, appropriate screening, and effective management strategies.

INTRODUCTION

As men age, prostate health becomes increasingly important due to the high prevalence of prostate-related conditions such as cancer and benign prostatic hyperplasia (BPH). Prostate cancer is the most commonly diagnosed malignancy in American men, with an estimated 288,300 new cases and 34,700 deaths expected in the United States in 2023.[1] BPH is the enlargement of the prostate gland, which, as male patients age, leads to lower urinary tract symptoms such as frequency (needing to urinate often), urgency (a sudden need to urinate), nocturia (waking up at night to urinate), and weak urine stream. These symptoms can significantly impact the quality of life for affected men.

This represents a public health concern due to the high prevalence and potential complications that prostate-related conditions can impose on individuals. Prostate cancer poses a burden with potential for morbidity and mortality. Early detection and appropriate treatment are vital to mitigate these impacts.

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The goal of this review is to discuss current guidelines for prostate cancer screening, the role of prostate-specific antigen (PSA) testing and digital rectal exam (DRE), as well as the management of common urologic issues like BPH. The American Urological Association (AUA) recommends PSA-based screening in conjunction with shared decision-making (SDM) to weigh the risks and benefits of screening.[2] The American Cancer Society (ACS) also emphasizes the importance of SDM for men between the ages of 55 to 69 years, recommending against routine screening for men over 70 years.[3]

The AUA, in its latest guideline, emphasizes the use of PSA levels to guide screening intervals and the need for confirmatory testing before proceeding with further evaluation.[2] This aligns with the ACS recommendation for PSA testing in men at higher risk, such as those with a family history of prostate cancer or African American men.[3] For management of BPH, many treatment options are available, including lifestyle modifications, pharmacotherapy, and surgical interventions.

METHODS

This review is formulated from current evidence from major clinical guidelines and peer-reviewed literature. The primary source is from the guideline provided by the AUA, ACS, and US Preventive Services Task Force (USPSTF). Literature was identified through various publication platforms such as *Journal of Urology*, American Family

Physician, and Annals of Internal Medicine searches focusing on prostate cancer screening, PSA testing, DRE, BPH management, and emerging biomarkers. Priority was given to systematic reviews, meta-analyses, and recent clinical trials, while studies and established guidelines were included regardless of publication date when they represent current standard of care.

Note: While some references in this review predate 5 years, they represent established consensus guidelines and landmark studies that continue to inform current practice. Where available, more recent evidence has been incorporated to reflect contemporary approaches.

PROSTATE CANCER SCREENING: IMPORTANCE

Prostate cancer detection in early stages through screening allows for a higher percentage of successful treatments. In the United States, this type of cancer represents approximately 15.4% of all newly diagnosed cancer cases and accounts for 5.8% of cancer-related fatalities.[1] The likelihood of developing prostate cancer rises with age, and major risk factors include advancing years, a family history of the disease, and African American ancestry.[4] Studies suggest that screening men between 55 and 69 years old can lower mortality rates associated with prostate cancer.[1]

SCREENING GUIDELINES AND EXPERT RECOMMENDATIONS

The AUA advises PSA-based screening in men aged 55 to 69 years and prioritizes SDM, ensuring individuals understand both the advantages and drawbacks of screening.[2] Likewise, the ACS endorses SDM and suggests initiating screening at age 50 years for those at average risk, with earlier consideration for individuals facing greater risk.[3] The USPSTF advises that men within the 55 to 69 years age bracket should make screening decisions on an individual basis after evaluating both potential benefits and risks.[5] Table 1 shows the overlapping recommendations for prostate cancer screening among the three organizations.

TABLE 1: Prostate cancer screening guidelines by major organizations.

Organization	Age Range (Years)	Key Recommendations
AUA	55-69	PSA-based screening with SDM; individualized approach based on risk factors
ACS	≥50 (average risk), ≥45 (high risk)	SDM; earlier screening for African American men and those with family history
USPSTF	55-69	Individual decision making after discussion of benefits and harms; Grade C recommendation

Who Should Get Screened?

Average Risk: Screening is generally recommended for men between 55 and 69 years old.[2,3]

Higher Risk: Family history of prostate cancer or African American ancestry are higher risk factors; these individuals are urged to start screening as early as 40 to 45 years old.[3]

Risk Assessment Tools: Validated risk calculators can help guide screening decisions

- Rotterdam Prostate Cancer Risk Calculator
- UCSF-CAPRA Score for Prostate Cancer Risk
- D'Amico Risk Classification for Prostate Cancer

Patient-Centered Care and SDM

The conversation about screening should occur between the patient and healthcare professional. It is important to discuss the risks and benefits to ensure that the patient's health goals are considered.

UNDERSTANDING PSA TESTING

PSA is a test that measures PSA level in the blood, which may rise in men with prostate cancer. A normal PSA level is ≤4 ng/mL, though age-adjusted reference ranges are increasingly used (≤2.5 ng/mL for men aged 40 to 49 years, ≤3.5 ng/mL for men aged 50 to 59 years, ≤4.5 ng/mL for men aged 60 to 69 years, and ≤6.5 ng/mL for men aged 70 to 79 years).

PSA Collection

PSA collection requires a simple blood draw, ideally performed before DRE. Factors that can affect PSA accuracy include recent ejaculation, vigorous exercise, prostate manipulation, urinary tract infections, and certain medications (5α-reductase inhibitors can reduce PSA by approximately 50%).

While there is a correlation between PSA levels and cancer risk, the test has limitations. False positives occur in 12% to 15% of cases and overdiagnosis remains a concern, often leading to unnecessary follow-up procedures or treatments.[4] Overdiagnosis refers to the detection of cancers that would never have caused symptoms or death during a patient's lifetime, potentially leading to unnecessary anxiety, biopsies, and treatments with associated adverse effects. Given the variability in PSA test accuracy, abnormal results frequently require further diagnostic evaluations.[2]

Advantages: Can detect prostate cancer in its early stages, potentially reducing mortality rates.[1]

Disadvantages: High chance of false positives, potential for overdiagnosis, risk of unnecessary treatment and anxiety/stress.[1]

DRE: A SUPPORTING BUT LIMITED TOOL

DRE is an examination in which the physician manually checks the prostate gland through the rectum. The efficacy of DRE varies significantly with physician experience, with sensitivity ranging from 15% to 40% and specificity from 85% to 95% for detecting prostate cancer. Studies show that experienced urologists achieve higher detection rates than primary care physicians, though variability remains substantial.

While it can be used alongside the PSA test, current evidence suggests limited effectiveness as a standalone screening test.[5] The positive predictive value of DRE alone is approximately 6% to 25%, depending on the population studied. Although using DRE and PSA together may offer marginally increased detection, DRE as a tool for routine screening is not strongly recommended by current guidelines.[3]

KEY CHALLENGES IN PROSTATE CANCER SCREENING

One of the biggest challenges in prostate cancer screening is finding the right balance between early detection and potential downsides, such as overdiagnosis and overtreatment. Additionally, anxiety associated with screening results and the complexity of making informed choices add to the difficulty of implementing an effective screening strategy.[3]

Recent Advances and Research

According to the USPSTF—a group of healthcare experts who make recommendations for preventative care—men around age 40 years with average risk should participate in prostate health screening tests to trend their PSA levels.[5] Current evidence suggests that by trending these data, prostate cancer staging and disease progression may be identified.[6] PSA level screening tests have been shown to decrease deaths related to metastatic prostate cancer and other prostate diseases.[5] However, ongoing debates exist regarding the validity of using PSA levels for prostate cancer detection. One study found that screening PSA levels leads to only a slight reduction in disease-specific mortality over a 10-year screening period; however, it does not affect overall mortality.[7] As a result, there is ongoing development of other screening techniques, such as using urinary markers or 5α-reductase inhibitors. Alongside this debate is another that argues increased screening may lead to increased false positives and excessive biopsies or imaging procedures, leading to overdiagnosis and overtreatment. The main argument within this debate is that the decrease in mortality related to prostate-specific diseases is more likely due to treatment advances than screening advancements.[7]

The United States Food and Drug Administration (FDA) has recognized several biomarkers for prostate cancer diagnosis. The purpose of these biomarkers is to detect the presence of various factors produced by tumors and to measure specific disease processes. One common biomarker, PSA, is traditionally used first-line for the detection of prostate cancer.[8] While PSA is the most common, other biomarkers have been recently approved by the FDA. These two markers include ProPSA as part of the Prostate Health Index (PHI) and Prostate Cancer Antigen 3 (PCA3). Some examples include Prostate Health Index (PHI), Prostate Cancer Antigen 3 (PCA3), and ProPSA. The PHI is a mathematical formula that includes three separate biomarkers: PCA3, total PSA, and percent PSA 2. The measurements from these biomarkers aid in creating more patient-specific management recommendations. ProPSA has aided in indicating early disease process and tumor aggression.[8] Patients with suspected prostate cancer, due to PSA level or DRE, can benefit from the prostate-specific gene known as *PCA3*, due to its ability to be easily detected in post-DRE urine samples. These biomarkers, along with others undergoing FDA approval, show promising results for more advanced prostate cancer detection.

Furthermore, biomarker measurements, specifically PSA measurements, can result in false positives. These false positives pose an issue when attempting to diagnose prostate cancer; however, using medical imaging, the impact of these false positives can be reduced.[9] More specifically, magnetic resonance imaging (MRI) has proven effective in detecting, staging, and characterizing prostate cancer. This information can then be used to aid in determining treatment and management.[9] Additionally, prebiopsy multiparametric MRIs (mpMRIs) have proven useful in detecting and grading prostate cancer while also providing key information necessary for biopsy.[10] mpMRIs have a high negative predictive value, which increases the detection of prostate cancer and decreases the number of unnecessary prostate biopsies.[10]

Currently, high-risk patients with prostate cancer have limited treatment options, primarily using medications such as 5α-reductase inhibitors.[6] However, newer options, such as immunotherapy and gene therapy, are being studied as potential treatment options. Historically, prostate cancer has been considered immunologically "cold," meaning that it had a low immunologic response.[11] However, newly FDA-approved immunotherapies have become part of the standard of care for prostate cancer after showing promising results in patients with aggressive cancers.

Using these immunotherapies, cancer cells can be targeted and ultimately destroyed, utilizing the body's own immune response. This treatment option has shown promise by increasing survival rates and producing deep and long-term remission in patients with metastatic prostate cancer who previously had limited treatment options.[11] One of the first FDA-approved immune checkpoint inhibitors was ipilimumab, which showed approximately two to three times higher survival benefit after 3 years.[11] When ipilimumab was combined with nivolumab, studies showed a 15% increase in survival rates.[11] Immunotherapies are beginning to show promising results in prostate cancer treatment, allowing a few to become standard of care. However, many immunotherapies are still undergoing research, which could bring new therapeutic approaches for advanced prostate cancer.

Additionally, gene therapy is another emerging treatment that aims to effectively alter or express a specific gene in tumor cells while limiting additional harm to healthy cells.[12] There are many mechanisms by which gene therapy attempts to alter cancer cells, including programmed cell death (apoptosis), altering enzymes to generate harmful compounds, or directly suppressing tumor genes. Recently authorized medications, such as rucaparib and olaparib, have shown efficacy in the treatment of prostate cancer by slowing disease progression, decreasing pain, and potentially extending the lives of prostate cancer patients receiving these treatments.[12] While these new treatment modalities show positive outcomes, the most effective treatments are combination therapies. These therapies combine immunotherapy, chemotherapy, radiation therapy, and/or hormone therapy and have proven to be more effective than single standalone treatments.[12]

BENIGN PROSTATIC HYPERPLASIA (BPH)

BPH is a prevalent nonmalignant enlargement of the prostate gland that predominantly affects aging men, with incidence rates exceeding 50% by age 60 years and reaching up to 90% by age 85 years.[14,15] BPH arises from the hyperplasia of stromal and epithelial cells, particularly within the transitional zone, driven by hormonal imbalances especially in androgen and estrogen signaling, chronic inflammation, and growth factor pathways.[13-15] Clinically, BPH presents as lower urinary tract symptoms (LUTS), which include obstructive symptoms such as hesitancy and a weak stream, as well as irritative symptoms like frequency, urgency, and nocturia.[13] These symptoms profoundly disrupt quality of life by impairing sleep, increasing anxiety, and limiting daily function and mobility.

Diagnosis of BPH

Diagnosis of BPH begins with a detailed clinical assessment, including patient history and the use of validated symptom questionnaires such as the International Prostate Symptom Score (IPSS), which evaluates the severity of LUTS and their impact on quality of life.[16,17] Physical examination through DRE provides a general assessment of prostate size and consistency, though its accuracy in determining prostate volume is limited.[17]

Imaging and laboratory evaluations complement clinical assessment: uroflowmetry measures urine flow rate, with a Qmax (highest rate the urine flows) less than 10 mL/s indicating possible obstruction; postvoid residual (PVR) volume assessed by ultrasound helps detect incomplete bladder emptying; and PSA levels aid in excluding malignancy and predicting disease progression.[16-19] These combined diagnostic tools offer a comprehensive framework for evaluating BPH, guiding individualized treatment strategies, and monitoring response to therapy in accordance with guidelines from the AUA.[19]

Conservative Management

Conservative management is a foundational approach in the treatment of BPH, particularly for men with mild symptoms. Lifestyle modifications such as reducing fluid intake before bedtime, limiting caffeine and alcohol, maintaining a healthy weight, and engaging in regular physical activity have been shown to significantly alleviate LUTS and improve quality of life.[20,21] Patient education on these changes is crucial, as they empower individuals to manage symptoms without immediate pharmacologic or surgical intervention.[22]

In cases where symptoms are not bothersome or progressive, watchful waiting, also referred to as active surveillance, is recommended. This strategy involves regular monitoring of symptoms and prostate health without initiating immediate treatment, offering a safe and effective option for men with stable mild LUTS.[23,24]

OMT Considerations

Osteopathic approaches to LUTS may include techniques targeting pelvic floor dysfunction, sacral and lumbar spine alignment, and autonomic nervous system balance. Specific osteopathic manipulative treatment techniques that may benefit patients with BPH-related symptoms include:

- Pelvic diaphragm release techniques.
- Sacral counterstrain and muscle energy techniques.
- Chapman reflex treatment for urogenital dysfunction.
- Balanced ligamentous tension approaches to the pelvis.

While evidence for OMT in BPH is limited, these approaches may provide adjunctive benefit as part of a comprehensive treatment plan, particularly for patients seeking nonpharmacologic interventions.

Pharmacologic Treatments

Pharmacologic treatment of BPH primarily targets symptom relief and disease progression. Alpha-blockers, such as tamsulosin, act by relaxing smooth muscle in the prostate and bladder neck to improve urine flow and alleviate LUTS; they are fast-acting and effective but may cause side effects like dizziness, hypotension, and ejaculatory dysfunction.[26,27]

In contrast, 5α-reductase inhibitors, such as finasteride and dutasteride, reduce prostate volume by inhibiting the conversion of testosterone to dihydrotestosterone and are particularly beneficial for men with enlarged prostates, though side effects may include decreased libido and erectile dysfunction.[27] Combination therapy with alpha-blockers and 5α-reductase inhibitors has shown superior symptom improvement and reduced risk of BPH progression compared to monotherapy.[28,29] Additionally, antimuscarinic agents may be used in patients with persistent irritative symptoms, such as urgency or frequency, especially when overactive bladder coexists with BPH.[26]

Minimally Invasive Procedures

Minimally invasive procedures for BPH provide a promising balance between efficacy and safety. Transurethral resection of the prostate (TURP) remains a gold standard, offering substantial symptom relief and improved urinary flow, though it carries risks such as bleeding, infection, and retrograde ejaculation.[29,30]

Laser therapies, like HoLEP and GreenLight, have emerged as effective alternatives, showing comparable outcomes to TURP but with reduced perioperative morbidity, including shorter catheterization time and less bleeding.[31,32] Newer approaches such as UroLift and prostatic artery embolization (PAE) also demonstrate efficacy, especially in preserving sexual function, making them appealing for younger or sexually active patients.[33,34]

Surgical Management

Surgical intervention is generally reserved for patients with severe or refractory symptoms, or those experiencing complications like recurrent urinary retention, bladder stones, or renal insufficiency.[34,35] Postoperative care is crucial, with enhanced recovery protocols such as early mobilization and optimized pain management leading to improved outcomes and shorter hospital stays.[37] Despite the small risk of complications, patients typically report significant symptom relief and better quality of life after surgery.[38] Understanding these therapeutic options reinforces the importance of individualized care based on symptom severity, prostate anatomy, and patient preference.

CONCLUSION

This review provides an extensive overview of current practices in prostate health, focusing on detection, screening, and the management of prostate-related conditions. Prostate cancer screening requires clinicians to balance the early detection benefits and the harm from overdiagnosis and overtreatment. SDM remains paramount, with validated risk assessment tools and emerging biomarkers enhancing our ability to personalize care.

For BPH management, the spectrum of available treatments from conservative approaches through surgical intervention allows for truly individualized care based on symptom severity, patient preferences, and anatomic considerations. The integration of osteopathic principles and emerging minimally invasive techniques further expands therapeutic options.

These issues not only impact individual health and quality of life but also present broader public health challenges. By prioritizing education, evidence-based screening protocols, and timely treatment, healthcare providers can help reduce the burden of prostate-related conditions and support healthier outcomes for men as they age. Future research continues to refine our understanding of optimal screening strategies and therapeutic approaches, promising even more personalized and effective care.

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