Diagnosis and treatment of prostate cancer

In this article...
- Risk factors associated with prostate cancer
- How prostate cancer is diagnosed and treated
- The nurse’s role in caring for men with prostate cancer

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Abstract

Nurses are often key workers for patients with prostate cancer and are responsible for ensuring men have the support they need throughout their cancer journey. This article provides an overview of the patient pathway.

Prostate cancer is the most common cancer in men in the UK. Its incidence has risen by 22% in the past decade (Cancer Research UK, 2012a); in 2010, 40,975 cases were diagnosed (CRUK, 2012b). This rise is due to the increasing age of the population and improvement in diagnostic tests.

Survival trends from 2005-09 indicate that 93.5% of men diagnosed with prostate cancer are expected to survive for at least one year, and 81.4% for five years or more (CRUK, 2012c). In 2011, there were 10,793 deaths in the UK due to prostate cancer. Although the death rate has fallen by 20% over the last 30 years, it remains the second most common cause of death from cancer among men, accounting for 13% of all male cancer deaths (CRUK, 2013a).

Risk factors
The identified risks of prostate cancer are age, family history and ethnic origin; there is no evidence that lifestyle changes reduce risk (CRUK, 2013b).

Age
The risk of developing prostate cancer increases with age and most diagnoses are in men aged 75-79 years. Between 2008 and 2010, only 1% of diagnoses were in men aged 50 years or under, and 75% of men were over 65 years of age (CRUK, 2012a).

Family history
Men whose father was diagnosed with prostate cancer have a 112-140% increased risk; those who also have a brother with the disease have a 187-230% greater risk. A second-degree relative (uncle, nephew, grandfather) diagnosed with the condition increases risk by 90-95% (CRUK, 2013b).

Men whose mother was diagnosed with breast cancer have a 19-24% increased risk of prostate cancer (CRUK, 2013b). Mutation of the BRCA2 gene, which is most commonly associated with breast cancer risk, causes a fivefold increased risk of prostate cancer; this risk can be more than sevenfold higher in men under 65 years (CRUK, 2013b).

Ethnic origin
Black men living in the UK are at three times the risk of prostate cancer as Caucasian men (Ben-Shlomo et al, 2007); they are diagnosed an average of three to five years earlier than white men. Asian men have a lower risk (National Cancer Intelligence Network and CRUK, 2009).

The prostate gland
The prostate gland develops after puberty due to the testosterone surge. It is similar in size and shape to a walnut, and positioned at the base of the bladder, surrounding the urethra between the rectum and symphysis pubis (Fig 1). The ejaculatory ducts open just lateral to the verumontanum, where the contents of the seminal vesicles are emptied; seminal fluid and prostatic secretions are mixed to form semen.

The prostate gland is divided into four

| TABLE 1. AGE-SPECIFIC PSA RANGE |
|---|---|
| Age | PSA reference range |
| 50-59 | >3ng/ml |
| 60-69 | >4ng/ml |
| 70-79 | >5ng/ml |
| 80+ | No reference range |

NICE (2005)
Prostate cancer

Most prostate cancers are adenocarcinomas (generally glandular in origin); occasionally other types, such as small cell or urothelial cancers, are found.

Prostate adenocarcinomas are graded using the Gleason sum score of 1 (well-differentiated cells) to 5 (poorly differentiated cells); the sum is calculated by adding the scores for the most widespread and second most widespread cells. For example, if most cells are poorly differentiated and the second most widespread are not quite so poorly differentiated the sum score would be $5+4=9$; $3+3=6$ is the lowest grade diagnosed by needle biopsy (Dasgupta and Kirby, 2012).

Signs and symptoms

Localised prostate cancer is usually asymptomatic. It is often diagnosed incidentally, following investigation of lower urinary tract symptoms, which include:

- Poor urinary flow;
- Urinary frequency, particularly at night;
- Urinary hesitancy;
- Feeling of incomplete bladder emptying;
- Urinary urgency;
- Incontinence;
- Urinary tract infection.

Men with locally advanced disease may present with symptoms of: haematuria; haemospermia (blood in semen); erectile dysfunction; difficulty passing urine; retention of urine or anuria; and pain in the penis, perineum or suprapubically.

Symptoms of metastatic disease include bone pain, pathological fracture, spinal cord compression, anaemia, leg lymphoedema, and hypercalcæmia (Dasgupta and Kirby, 2012).

Diagnosis and treatment

Prostate cancer is diagnosed using a combination of prostate-specific androgen (PSA) blood testing, digital rectal examination (DRE), biopsy and magnetic resonance imaging (MRI) scan; a bone scan may be used for staging.

PSA

Prostate-specific antigen is a protein produced by cells in the prostate; its role is to liquefy ejaculated semen, increasing sperm motility.

Prostate abnormalities, such as benign enlargement, infection and cancer, can increase the amount of PSA released into the bloodstream, so PSA is measured using a blood test (Dasgupta and Kirby, 2012). Trauma, for example from catheterisation, can also raise the PSA result.

Table 1 shows the age-specific PSA reference ranges.

The PSA test is not an accurate diagnostic test for prostate cancer. Only around 25% of men with a PSA of 4-10ng/ml who have a biopsy will be diagnosed with prostate cancer (Burford et al, 2009), while Thompson et al (2004) found that 15% of those with a PSA less than 4ng/ml had prostate cancer on biopsy.

Although there is no national programme to screen for prostate cancer, men aged over 50 who request screening, after considering the consequences, should be given a PSA test (Burford et al, 2009). Table 2 lists the benefits and risk of this test in asymptomatic men.

DRE

Prostate size can be estimated on DRE, which can identify abnormalities suggestive of prostate cancer, including nodules, asymmetry, induration (hardness) and attachment to surrounding tissues – which suggests advanced disease.

Transrectal ultrasound scan and biopsy

Biopsies of the prostate, guided by an ultrasound probe inserted into the rectum, are performed for men with raised age-specific PSA and/or abnormal DRE. TRUS allows prostate volume to be assessed accurately and any abnormal areas seen in the peripheral zone can be targeted for biopsy.

Prophylactic antibiotics are essential due to a 0-2% risk of serious infection including bacteraemia, urosepsis or abscess (NCCC, 2014). Other side-effects include blood in urine, stools and semen – which can still be present after two weeks, pain and fever; an estimated 1.4% of patients experience symptoms severe enough to require admission to hospital (Rosario et al, 2012).

MRI scan

Multiparametric MRI scans the whole prostate and is used to stage prostate cancer following biopsy and before treatment planning for men expected to have curative treatment. The MRI scan will show if tumours are confined to the prostate and is used to stage prostate cancer following biopsy and before treatment planning for men expected to have curative treatment. The MRI scan will show if tumours are confined to the prostate or if there is any local or distant spread of disease (Kirkham et al, 2013).
Nursing Practice
Review

**TABLE 2. PSA SCREENING IN ASYMPTOMATIC MEN**

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>A normal age-specific result can be reassuring</td>
<td>A normal result might give false reassurance; Thompson et al (2004) found 15% of men with “normal” PSA had prostate cancer when biopsied</td>
</tr>
<tr>
<td>Localised prostate cancer might be identified and treated</td>
<td>PSA cannot differentiate between low-risk and high-risk cancers</td>
</tr>
<tr>
<td>Three readings over 1-2 years can show PSA velocity; biopsy would be considered if there was a rise 0.35-4.0ng/ml/year (minimum three readings)</td>
<td>PSA may be raised due to a benign condition. Biopsies may still be needed to exclude cancer, exposing these men to risks of prostate biopsy side-effects</td>
</tr>
</tbody>
</table>

Prostate cancer might be treated that may not have affected life expectancy but treatment results in side-effects that affect quality of life

Kirby and Patel (2014); Burford et al (2009)

**Bone scan**

Radioisotope bone scans are performed to look for bone metastases. A bone scan is unlikely to be positive when PSA <10ng/ml (NICE, 2014) and is therefore performed only for men with intermediate or high risk of disease.

Patients suspected to have metastatic prostate cancer – for example those with a PSA >20ng/ml or X-rays that show possible metastases as the cause of bone pain – will probably have a bone scan performed instead of a TRUS.

**Treatment options**

All patients diagnosed with prostate cancer will have a review of their medical history, histology and any imaging that has been performed, and a risk category will be assigned to their disease (NICE, 2014). Treatment will depend on risk category and stage of disease.

**Localised disease**

Active surveillance is recommended for men with low-risk localised prostate cancer; they also have the choice of radical prostatectomy or radical radiotherapy.

Although active treatment would be recommended to men with intermediate or high-risk localised prostate cancer, some choose active surveillance. Table 3 describes the staging of prostate cancer. The aim of active surveillance is early detection of disease progression, so treatment can be provided while the disease is still curable. Patients avoid the risk of side-effects until necessary, and some never need treatment. One of the main disadvantages is anxiety, and some patients choose treatment over the uncertainty of living with untreated cancer (NHS, 2012).

**Radical prostatectomy**

Removal of the prostate gland and seminal vesicles aims to cure prostate cancer. It is a major operation and offered only to men who are fit and have no other health conditions (NICE, 2014).

Histological examination of the prostate gland can show whether cure has been achieved. If all affected tissue has been removed, PSA will be undetectable on blood tests. If histology or PSA surveillance demonstrates that there is disease progression following prostatectomy, salvage radiotherapy may be possible.

The disadvantages of surgery include potential complications such as pulmonary embolism. Long-term urinary incontinence and erectile dysfunction may be minimised by nerve-sparing techniques during surgery, or treatment with pelvic floor exercises, medication, further surgery or a combination of these (Kirby and Patel, 2014).

**External-beam radical radiotherapy**

External-beam radiotherapy may be offered at any stage of disease. It can be used to cure localised prostate cancer, to improve disease control for locally advanced prostate cancer and for pain control in metastatic prostate cancer (NICE, 2014).

CT and MRI scans are performed before treatment so the radiotherapy beam is targeted precisely to the size and shape of the area to be treated. Shields are used to protect surrounding healthy tissues and reduce the risk of damaging nearby organs including the bladder and bowel (Colley, 2014; Dasgupta and Kirby, 2012).

**Hormone therapy**

Hormone therapy, also called androgen deprivation therapy, is given to treat metastatic prostate cancer or in combination with external beam radiotherapy for localised or locally advanced prostate cancer.

The aim of hormone therapy is to block the production of androgens, including testosterone, upon which most prostate cancers depend for growth. Hormone therapy includes bilateral subcapsular orchidectomy (BSO) (removal of the overall length of survival, compared with radiotherapy or hormone therapy alone (NICE, 2014). It is thought that hormone therapy causes the volume of prostate cancer to shrink, making it more sensitive to radiotherapy (Kirby and Patel, 2014).

**Brachytherapy**

Permanent seed brachytherapy is a form of radiotherapy. It is an option for men with low-risk localised prostate care whose prostate gland volume is <50ml (NICE, 2014).

TRUS (without biopsy) is used to measure prostate volume and shape, and place radioactive seeds in the prostate gland through the perineum. The seeds remain radioactive for up to 10 months. Their half-life is 60 days, so men are advised to avoid prolonged contact with children and pregnant women for two months. Due to a risk of seeds being discharged in semen, they are advised to wear a condom for the first three ejaculations (Colley, 2014; Kirby and Patel, 2014).

The advantage of permanent seed brachytherapy is the radiation dose is confined to the prostate, reducing the risk of damage to other organs. However, swelling of the prostate caused by the procedure means around 5% of men develop urine retention requiring catheterisation. About 15% of these will need transurethral resection of the prostate, which will need to be deferred for one year so the seeds treatment can be completed and for any other side-effects to resolve (Kirby and Patel, 2014).

For men with intermediate or high-risk prostate cancer, high-dose brachytherapy in combination with external beam radiotherapy should be considered, as research suggests this combination may improve overall survival (NICE, 2014).

High-dose brachytherapy is delivered in a similar fashion to permanent seed brachytherapy, but the dose is implanted into the prostate contained in tubes. It is monitored until the correct dose is reached; the tubes are then removed so patients do not need to take precautions following treatment (Dasgupta and Kirby, 2012).
Since about 95% of serum testosterone is produced in the testicles, the advantage of BSO is that it is a one-off treatment and reduces serum testosterone within 12 hours (Dasgupta and Kirby, 2012). However, it is irreversible and men are often reluctant to agree to BSO as it can harm body image.

Luteinising hormone-releasing hormone agonists (LHRH), such as goserelin acetate or leuprorelin injections, work by stopping the production of luteinising hormone (LH), which stimulates the testicles to produce testosterone; these can be given monthly or every three months. Initially, testosterone levels rise with treatment but fall to castrate levels in approximately two weeks. To protect patients from this rise (known as “flare”), they are given an antiandrogen such as cyproterone acetate and bicalutamide for 1-2 weeks before and after their first injection. These drugs prevent testosterone binding to androgen receptors.

Bicalutamide can be given as monotherapy to men with locally advanced high-risk prostate cancer (NICE, 2014); serum testosterone is unaffected by bicalutamide, so fewer patients develop erectile dysfunction than those treated with LHRH and BSO. However, a side-effect of bicalutamide monotherapy is gynaecomastia (breast development) and men prescribed the treatment for six months or more should be offered radiotherapy to their breast buds to prevent this (NICE, 2014).

Gonadotropin-releasing hormone (GNRH) antagonists (degarelix) prevent the production of LHRRH in the hypothalamus, and stimulate the pituitary gland to produce LH. GNRH antagonist injections result in a rapid reduction of serum testosterone without any initial flare (Dasgupta and Kirby, 2012). GNRH antagonists are only licensed for men with advanced prostate cancer; their disadvantage is injections need to be administered monthly. Side-effects include local injection site skin reactions and flu-like symptoms.

To improve quality of life, long-term hormone therapy may be given intermittently using PSA and symptoms as a guide for when to stop or start treatment. When men are off treatment, serum testosterone levels may rise, reducing side-effects and increasing wellbeing (NICE, 2014).

**Watchful waiting**

Like active surveillance, watchful waiting involves deferring treatment until necessary, although the aim is disease control rather than cure. It is recommended to men with prostate cancer that is unlikely to affect their life expectancy.

Treatment, usually hormone therapy, is started when they develop symptoms of disease progression.

**The nurse’s role**

Nurses are often the key workers for patients with prostate cancer, and are responsible for maintaining continuity of care (NICE, 2004). Key nursing roles are providing information and supporting men in making treatment decisions.

Patients often expect doctors to recommend a treatment and can find it distressing to have to make a choice, particularly as there is a great deal of uncertainty about disease progression (NICE, 2014). Using a decision aid, such as the Localised Prostate Cancer Decision Aid (NHS, 2012), can be help guide them through the process while ensuring their own beliefs and values are considered; for example, remaining potent might be a key factor.

Patients should be given as much or as little information as they want and nurses should be aware of needs that may vary with age, culture and sexual orientation.

After treatment, nurses need to assess patients for side-effects and offer formal assessment and treatment for troubling symptoms. Patients should be asked regularly whether their side-effects are troubling, as their views and quality of life may change over the years.

Treatments for prostate cancer affect masculinity, as side-effects include erectile dysfunction, testicular shrinkage, breast development and loss of strength. While some men joke about their feminisation, this may mask psychological distress. Nurses should be alert to cues and offer patients referral to professionals for help with psychosexual issues (NICE, 2014).

**Conclusion**

Advances in knowledge about prostate cancer and improvements in imaging techniques mean the patient diagnostic and treatment pathway changed recently (NICE, 2014). Nurses have an important role in this pathway to ensure patients make the right choices to maintain their quality of life. NT

**References**


National Collaborating Centre for Cancer (2014) Prostate Cancer Diagnosis and Treatment. tiniyurl.com/prostate-NCCC-2014


**TABLE 3. PROSTATE CANCER STAGING**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Tumours usually diagnosed incidentally, for example following TURP or TRUS following PSA testing, and are not detectable on DRE or ultrasound</td>
</tr>
<tr>
<td>T2</td>
<td>Tumour confined to prostate gland</td>
</tr>
<tr>
<td>T3</td>
<td>Tumour extending through prostate capsule (extension into seminal vesicles classified T3b)</td>
</tr>
<tr>
<td>T4</td>
<td>Tumour invades adjacent structures, for example bladder neck</td>
</tr>
</tbody>
</table>

**“Think, pause and learn how to use research evidence”**

Catherine Walshe p28

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