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Effective Health Care

Bulletin for decision makers on the effectiveness of health service interventions

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Benign Prostatic Hyperplasia

Treatment for lower urinary tract symptoms in older men

- Enlargement of the prostate affects about one third of men over 50 and can cause distressing urinary symptoms.
- The progress of benign prostatic hyperplasia (BPH) is unpredictable, but only a minority of men deteriorate rapidly and some will improve spontaneously.
- Many men willingly tolerate mild symptoms of BPH. Care should be taken not to overtreat men who are not too bothered by their symptoms.
- For the majority of men whose symptoms are not unacceptably severe, the condition may be best managed by watchful waiting and simple lifestyle changes.
- The most effective treatment for severe symptoms is surgery, but about a quarter of men fail to benefit and some end up worse.
- The most common operation for BPH is transurethral resection of the prostate (TURP). Incision of the prostate (TUIP) is often just as effective, uses fewer resources and is less hazardous; however it is under-used.
- Drug therapy on average has a small effect on symptoms, but some men may experience significant benefit.
- Because each type of treatment involves a different balance of risks and benefits, patients should be encouraged to participate in making decisions about their management.

A. Background

Benign prostatic hyperplasia (BPH) is a non-malignant enlargement of the prostate, a wedge-shaped gland which surrounds the male urethra as it emerges from the bladder. This enlargement is a normal consequence of aging, but it may be associated with symptoms which, although rarely life-threatening, can be distressing.

Strictly speaking, BPH refers to changes in the composition of the prostate; but patients are principally concerned about urinary symptoms, while clinicians may focus on obstruction of urine flow. These are overlapping issues. For the purposes of this bulletin, BPH is taken to mean the clinical problem of "men presenting with lower urinary tract symptoms suggestive of bladder outlet obstruction".[1]

There is considerable uncertainty surrounding both the diagnosis and treatment of BPH. There is no pattern of symptoms peculiar to BPH, nor any clear-cut point at which there is consensus on need for intervention. Consequently, there is significant local variation in rates of treatment[2], controversy about whether BPH is over- or under-treated, and doubt about which treatment is appropriate in particular cases.

The range of treatments available include surgical resection or incision of the prostate, destruction of prostate tissue by local heating or other means, and drug therapy. Watchful waiting is also an important option. Each is associated with a different balance of benefits, costs, risks and uncertainty about long-term outcome.

B. Prevalence

Prostatic enlargement can be found in the majority of men over 60, and the prevalence of urinary symptoms increases with age. Estimates of numbers of sufferers vary according to the definition of the condition.

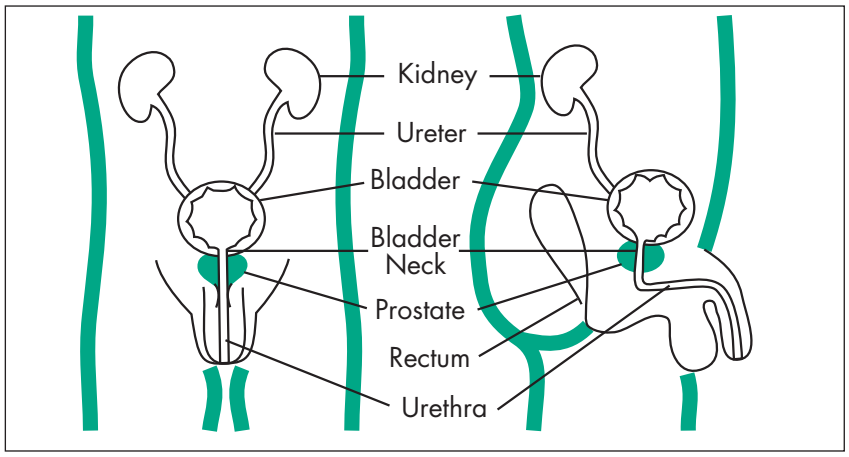

Fig. 1 Male urinary system and prostate.

Changes in the prostate suggestive of BPH have been found in up to 70% of 60 to 70-year old men.[3] Estimates of the prevalence of clinical BPH in this age-group range from 5 to 43%, and seem to depend largely on the way the problem is defined.[4-8]

Some believe that there is a large pool of unmet need for treatment of BPH.[6] However, the evidence for this point of view is equivocal. Patients with apparently similar symptoms vary considerably in the degree to which their condition bothers them,[9,10] and many are willing to tolerate urinary problems unless they become quite severe.[11] For example, in a study of men aged 55 and over in North-West Thames, it was found that under half of those with urinary symptoms had consulted their GPs.[12]

The total cost of BPH to the country (including NHS and indirect costs) has been estimated at between £62 and £91 million in 1990, depending on the assumptions used,[13] the largest component being in-patient hospital treatment.[14] One study estimated that costs associated with treatment of BPH in a typical district health authority serving 250,000 individuals would be about £325,000 per annum.[4]

C. Symptoms and natural history

The symptoms of BPH (sometimes called "prostatism") include hesitancy, dribbling, slow, erratic and frequent urination, inability to empty the bladder completely, frequent night-time urination, urgency and urge incontinence. Some sufferers experience acute urinary retention which must be relieved without delay, while chronic urinary retention may lead to kidney damage if left untreated.[15] BPH may be associated with recurrent urinary infection, bleeding and bladder stones, although it has not been clearly established that these are caused by BPH.[16]

Clinically diagnosed but untreated BPH shows a variable pattern of exacerbation and remission. In one study of 107 men followed up for 5 years, 15% felt that their symptoms had worsened, 9% underwent surgery, and 29% improved.[17] In another, 123 patients were followed for four to seven years; 10% developed acute retention and 48% had no urinary symptoms at their final follow-up. Acute retention at the beginning of the study period was not associated with worse

symptoms seven years later.[18] These figures are generally consistent with other studies.[16,19]

It is not possible to predict which patients will deteriorate if left untreated, and the issue is further complicated by the fact that the symptoms may have other causes, such as prostatic infarction, which may resolve spontaneously.[16] This uncertainty is a key issue affecting treatment choices.

D. Diagnosis and indications for treatment of BPH

Diagnosis and judgements about need for treatment may require both symptom assessment and objective measures of urinary function. Treatment is most effective for severely symptomatic patients, as measured on validated scales.

Perhaps the most difficult issue in this area is deciding who should be treated and when. A range of subjective and objective diagnostic measures have been developed.

D1. ***Symptom scales:*** Probably the most widely used measure of symptom severity is the American Urological Association (AUA) symptom index for BPH.[20,21] This is a questionnaire designed to be completed by the patient. Symptom scores range between 0 and 35, and are classified as "mild" (0-7), "moderate" (8-19), or "severe" (20-35).

Other questionnaires used in research studies include the Boyarsky Index[22-24] and the Madsen-Iversen score.[25] Both are completed by clinicians, and may not therefore capture the patient's perspective.

Symptom severity does not appear to determine general practitioners' decisions on referral.[8] Nevertheless, a consistent finding of trials of interventions for BPH is that the most severely symptomatic individuals tend to experience the greatest improvement.[10,26]

It should be noted that the AUA symptom index is not a specific indicator of the presence of BPH. When this questionnaire was completed by elderly women, it was found that their responses and scores were indistinguishable from those of a sample of men of similar age.[27]

D2. ***Objective measures:*** Peak urinary flow rate (Qmax) may be the best non-invasive indicator of bladder outlet obstruction, which many urologists consider to be a crucial indication for surgery.[28] Despite this, fewer than half of the patients who undergo surgery in the UK have their flow rates measured.[29] There is uncertainty about what rates of flow indicate obstruction. Some urologists use a 15 ml/second cut-off,[30] however, a study of over 2,000 men revealed that most men over 60 fall below this level.[31] Another study of asymptomatic elderly men found that all those aged over 80 had maximum flow rates below 9 ml/second.[32]

Estimation of the volume of residual urine is useful for assessing the degree of obstruction and risk of kidney damage.[28] This was measured in only 51.5% of patients prior to surgery.[29]

Routine digital examination of the prostate is necessary to rule out other conditions. However prostate size should not guide the decision on whether to treat since size is not correlated with symptom severity, degree of obstruction, or treatment outcome.[33] If surgery is required, prostate size can influence the choice of method.

Upper urinary tract imaging is not likely to be necessary unless there is particular cause for concern such as haematuria or evidence of renal insufficiency.[34] Pressure flow measures are also inappropriate for routine assessment, although they may be appropriate for men with unusual symptom patterns or neurological disease.

E. Treatment

Treatment options for BPH include two main types of drug and a growing range of surgical and other non-medical interventions. Because there are no clear-cut clinical grounds in most cases on which a choice can be based, active participation by patients in the decision-making process should be encouraged.

Decision-making on need for treatment

E1. ***Shared decision making:*** No specific level of symptoms is agreed by experts to be an absolute indication for any particular treatment for BPH on clinical grounds.[35] Because of the complex nature of the problem, and the range of possible treatments and their effects, it is increasingly accepted that patients should participate in decisions about treatment.[36-38]

A video-based Shared Decision Making Programme has been developed in the US[39] and piloted in Britain.[40] Better informed patients are less likely to opt for surgery,[41] and use of the video has reduced surgery rates in US Health Maintenance Organisations by up to 50%.[42] However, because the symptoms of patients who undergo surgery in Britain tend to be more severe,[43] it is unlikely that surgery rates would fall as much if a similar programme were introduced here.

E2. *Information currently available to patients:* 61% of

surgeons surveyed by the National Prostatectomy Audit gave patients printed material about operations, although this was probably not in a structured shared decision-making context.[44] Patients expressed strong desire for accurate information, but reported that the factsheets were often in direct conflict with their experience. 88% of factsheets discussed surgery as though it was inevitable and always effective. All of them understated post-operative problems: only one mentioned the possibility of death, 44% suggested there would be no change in sexual potency, and none warned about probable changes in sexual sensation.[44]

F. Non-invasive management

Symptoms of BPH are subject to high rates of spontaneous remission and marked placebo effects. Many men are not distressed by their symptoms and the majority of men with moderate symptoms are adequately managed by simple lifestyle changes and watchful waiting. Drug treatment can produce modest improvements in symptoms in some men.

F1. ***Watchful waiting and lifestyle advice:*** Many men are willing to tolerate symptoms when fully informed about the natural history of BPH and the risks and benefits of treatment options.[12,40] Watchful waiting may therefore be appropriate when symptoms do not cause unacceptable distress.[33] Lifestyle advice - on, for example, reducing intake of drinks containing caffeine - and training in bladder control may help to reduce symptoms and avoid or delay need for further treatment.[45] Information for patients about self-help for urinary problems is available in some clinics and from the Continence Foundation.[46]

A randomised controlled trial in the U.S. compared watchful waiting (including lifestyle advice) with prostatectomy for men with moderate symptoms.[47] 17% of the 276 patients assigned to watchful waiting were classified as treatment failures (a failure rate of 6 per 100 man-years) and 24%, including a third of the "failures", underwent surgery during the study period. After three years, men who had not undergone surgery reported more bother from urinary difficulties and more interference with activities of daily living; however, their mean symptom scores had fallen 5.5 points from a baseline value of 14.6 to 9.1 (on the Madsen-Iversen scale, maximum value 27). There were no significant differences between the groups in mortality rate, general well-being, sexual performance, or social activities.

Drug treatment

F2. Two different types of drug are licensed for BPH in the UK: alpha-blockers, which relax muscles in the bladder neck and prostate,[48] and a 5-alpha reductase inhibitor, finasteride, which reduces the level of dihydrotestosterone, a hormone implicated in prostatic enlargement.[49] Whilst alpha-blockers are well established, mainly in the treatment of hypertension, finasteride has been available only since 1992. However finasteride prescribing has risen dramatically, far outstripping alpha-blocker products marketed for BPH.[50]

F3. ***Alpha-blockers:*** Four alpha-blocking drugs, alfuzosin (Xatral), indoramin (Doralese), prazosin (Hypovase BPH), and terazosin (Hytrin BPH) are licensed for treatment of BPH.[51] The results of randomized controlled trials (RCTs) comparing these drugs with placebo are summarised in Table 1. Studies with less than a total of 60 patients have been excluded because they are too small to give reliable results and may be more subject to publication bias. Most of these trials are methodologically flawed (see Table 1), but some, notably the studies of terazosin by Brawer et al.[52] and Lepor et al.[53] show convincing, if modest, benefits in a proportion of men.

There is no evidence that any particular alpha-blocker is superior; all seem to produce small improvements in symptom scores (2 to 3 points on the Boyarsky scale) and objective measures. These benefits develop rapidly once the appropriate dose-level has been reached, and may be maintained for at least three years in those men who continue to take the drug.[54] However, this might be an over-estimate of effect, because those who benefitted from the drug are less likely to drop out over time.

Adverse effects of alpha-blockers are usually minor, although dizziness and tiredness may be sufficiently severe for therapy to be stopped. These drugs may be particularly suitable for hypertensive men since they can reduce blood pressure.[54]

F4. ***Finasteride:*** Finasteride causes the prostate to shrink. There have been three large-scale multi-centre trials of finasteride (Table 2). In the two-year Scandinavian study of 707 patients with moderate symptoms of BPH,[55] 5mg of finasteride daily led to statistically significant reductions in symptoms. This effect took some months to develop, but it was sustained over the period of the study. At baseline, both drug and placebo groups scored around 13 on the Madsen-Iversen scale; after two years, the mean score for the finasteride treated group had fallen to 11, while the placebo group mean score had returned to baseline after an initial improvement. Other measures also suggested gradual

Table 1 Randomised placebo-controlled trials of alpha-blockers used to treat BPH*

Trial	Dose	Duration	Patients	Main outcome measures	Main results	Comments
Jardin, 1991 (105)	Alfuzosin 7.5 mg; after 14 days, some increased to 10 mg 'depending on response'.	6 months	Alfuzosin n=251, placebo n=267; men age 41-86, Boyarsky score >6, no severe concomitant illness or drug therapy likely to affect results.	Peak & mean flow rates, residual urine (n=189), Boyarsky score, effects on specific symptoms, overall therapeutic effect as judged by investigator & patient	Increase in peak flow not significant compared with placebo; difference in mean flow rate significant (treatment group 0.9ml, placebo 0.6 ml). Residual urine in treatment group decreased from 80ml to 49ml, placebo 88ml to 80ml (p=0.017) Overall therapeutic effect judged good by investigators for 61% of patients, by patients for 50%; 42% of investigators and 40% of patients judged placebo good. Significant treatment benefit (p<0.05) for nocturia, day-time frequency, hesitancy, urgency, 'quality of stream'.	Investigators not blind & 31% withdrawal rate, so judgements of therapeutic benefit probably exaggerated, although objective measures less likely to be affected. Overall incidence of adverse effects similar in both groups.
Chow, 1990 (106)	Indoramin 20mg *nocte* (n=43) or 20mg *bid* (n=38)	8 weeks	Indoramin 20mg n=39, 40mg n=37, placebo n=34. Men age 46-84, with no major concurrent disease.	Peak urinary flow, voiding time, voiding volume, reported symptomatic improvement.	Symptom improvement reported in 78% of patients in 40 mg group, 64% in 20 mg group, 53% in placebo group. Peak flow rates increased 4.90ml (CI: 2.56, 7.22) in 40 mg group, 2.79ml. (0.53, 5.05) in 20mg group, .75ml (CI: -0.67, 4.17) in placebo group.	Comparisons were between baseline & 8 week figures within treatment groups, not between treatment & placebo. Groups differed at outset, so benefit not reliably attributable to treatment.
Sertcelik, 1990 (107)	Prazosin 2mg bid after 2 weeks on lower dose	4 weeks	Drug n=40, placebo n=40; men, 44-76, who had not had prostatic surgery & did not take drugs likely to affect results.	Prostatic weight, peak flow rate, residual urine, diaries of diurnal & nocturnal frequency, urgency & 'obstructive symptoms'.	Flow rate increase 5ml in treatment group, 2ml in placebo group (p<.001). 25% reduction in daily frequency in treatment group, 7.5% in placebo group. Treatment judged effective for 95% of patients in drug group, 40% in placebo group. Residual urine decreased 30ml in placebo group, 15ml in treatment group.	Investigators not blind, so benefits probably exaggerated. Baseline voiding frequency in treatment group higher than placebo, so improvement may not be due to treatment. Effectiveness, frequency & flow rate benefits inconsistent with data on residual urine. 21% dropout rate, no intention to treat analysis.
Steven, 1993 (108)	Prazosin 2mg *bid*; after 8 days of gradually increasing dose	12 weeks treatment, 12 weeks placebo, in randomly allocated order.	82 GP patients, age >50, with moderate symptoms; each acted as his own placebo control in crossover design.	Symptom scores at baseline, 4 , 8 & 12 weeks. Analogue rating scale for patients' overall assessment of symptoms, from 'no problems' (0) to 'total blockage' (100)	Symptom scores: reduction in treatment group compared with placebo at 12 weeks -0.8 points (CI: -2.2, 0.6) - not significant. Benefits of treatment, compared with placebo on analogue scale at 12 weeks: -5.4 units (CI: -0.7, -10.1). Adverse effects: 205 reported by 75 patients in prazosin phase, 152 by 64 patients in placebo phase.; none serious or long-lasting.	This was a double-blind crossover trial, therefore likely to produce relatively reliable results. Benefits not dramatic, more marked for obstructive than irritative symptoms. Placebo effects much smaller than in most BPH studies.
Chapple, 1992 (109)	Prazosin 2mg *bid* after 8 days of gradually increasing dose	12 weeks	93 men at 2 hospital centres, with severe symptoms awaiting surgery. At end of study, prazosin n=34, placebo n=41.	Diary card record of urination, symptom evaluation by clinicians, flow rates, voiding pressure, voided and residual volumes.	No significant difference between groups in frequency of urination, nocturia, urgency, hesitancy, voided volume, residual volume. Investigators' overall evaluation of efficacy: 56% of prazosin group improved, vs. 21% of placebo; p=0.02. Drug rated tolerable (risks not significant) by 68% in prazosin group, 55% in placebo group; p=0.05. Voiding pressure change: significant difference (p=0.02). Flow rate change: prazosin 1.1 ml/sec, placebo -1.0 ml/sec (p=0.01).	This double-blind trial shows some benefit linked with treatment, but 19% withdrawal rate combined with lack of intention-to-treat analysis reduces reliability of results.
Brawer, 1993 (52)	Terazosin, 1-10mg, titrated to patient's response after 4 week placebo lead-in	24 weeks	Terazosin n=81, placebo n=79. Men age >45, scoring 1 point or more on at least 2 items of Boyarsky symptom scale, no "absolute indications for prostatectomy", detrusor instability, or significant cardio-pulmonary disease.	Boyarsky symptom scores (scale max.: 27), "global assessment scores" assigned by interviewers, urine flow.	Decrease in symptom score for drug group (baseline mean 11) significantly greater than placebo from first assessment at week 2. Beneficial effect maintained, increasing to week 20. Treatment led to fall in score 3.4 points greater than placebo (CI: -4.6, -2.2). Peak flow rate increase 1.4 ml. greater than placebo (p<0.05). Investigator's global assessment better for drug group (p<0.05). 12 men in drug group & 7 in placebo group dropped out because of adverse events (mainly dizziness). Blood pressure fell only in patients with untreated hypertension in drug group. Lower rate of urinary tract infection in drug group.	This randomized double-blind trial shows definite benefit of terazosin treatment. Adverse reactions to terazosin make it unsuitable for some patients, but response (beneficial or adverse) is likely to become apparent within 2 weeks of starting therapy.
Lepor, 1992 (53)	Terazosin 2, 5 or 10mg daily	12 weeks	Terazosin 2mg: n=74; 5mg n=72; 10mg n=70; placebo n=69. Men age 44-77, not taking drugs likely to interfere with study, no serious heart or kidney disease or diabetes, no recent urinary tract infection.	Boyarsky symptom score, urinary flow rates, symptom diary, patient self-assessment.	Improvements in total symptom score (baseline mean, 10), compared with placebo: 2mg: -1.0 (p=.097); 5 mg, -1.3 (p=.042), 10 mg, -2.3 (p<.001). Effects apparent & maintained from week 4. Peak flow rates, change compared with placebo: 2mg 1.1 ml/sec, 5mg 0.6ml/sec, 10mg 1.9ml/sec: significant for 10mg group only (p=.009). Changes in voided volume not significant.	This multi-centre double-blind trial with intention-to-treat analysis shows dose-dependent beneficial effects of terazosin on symptoms and flow rates. Adverse effects were not significantly different from placebo.

Table 1 (continued)

Trial	Dose	Duration	Patients	Main outcome measures	Main results	Comments
Di Silverio, 1992 (110)	Terazosin, 2, 5 or 10mg, dosage increased over 4 weeks	4 weeks placebo lead-in, 4 weeks increasing doses for higher dose groups, 4 weeks with all dose levels.	Terazosin 2mg n=34, 5mg n=36, 10mg n=32, placebo n=35. Normotensive men, not taking antihypertensive drugs.	Flow rates, residual urine, symptom scores.	Peak flow rates increased 34% in terazosin groups, 17% in placebo group, but difference not statistically significant. Mean flow rate increase for 10mg group significantly greater than placebo. No significant difference between groups in volume of residual urine or symptom scores.	Significant difference between results obtained by different investigators (p=0.01) but little evidence of drug effect: few other comparisons significant.
Lloyd, 1992 (111)	Terazosin, 2, 5 or 10mg, dosage increased over 4 weeks	4 weeks placebo lead-in, 4 weeks with increasing doses for higher dose groups, 4 weeks with all dose levels.	Terazosin 2mg n=19, 5mg n=19, 10mg n=22, placebo n=20. Normotensive men, mean age 65.7, free from urinary & renal problems other than BPH, not taking drugs likely to affect action of terazosin.	Symptom scores, flow rates, voided volume & residual urine, symptom diaries.	No significant changes in any group when compared with placebo. Peak flow rate change in terazosin 2mg group 1.3 ml/sec, 5mg 2.1mg/sec, 10mg 2.8 ml/sec, placebo 2.5ml/sec. Other changes similarly unimpressive. Greatest apparent drug effect on obstructive symptoms: -3.8 (CI: -5.6, -2.0) in 2mg group, -3.4 (CI: -5.0, -1.8) in 5mg group, -3.9 (CI: -5.3, -2.5) in 10mg group, -1.7 (CI: -3.3, -0.1) in placebo group.	Small numbers mean effects do not achieve statistical significance.

* Studies with less than 60 patients in total are excluded.

deterioration in the placebo group over the course of the study, in contrast to a small but consistent improvement in the finasteride group. The only adverse effect attributable to finasteride was sexual dysfunction, which affected 19% of patients in the treatment group and 10% in the placebo group.

Both the other major trials of finasteride[56,57] lasted one year, with 3-year open-label (non-blinded) extensions. These studies showed improvements of 1 to 2 points on a modified Boyarsky scale compared with placebo, which is consistent with the Scandinavian data. About half the men in these studies continued to use finasteride after the first, double-blind year, and again the benefits, although slight, were maintained.[58] However, this result might over-estimate the long-term effect of finasteride because of the biased self-selection of individuals who responded well to the drug and remained in the treatment arm.

F5. ***Natural remedies and other agents:*** Although a variety of natural remedies are used to treat BPH, there is no convincing evidence of efficacy for most of them.[59] However, in double-blind RCTs, both Cernilton, a pollen extract, and Cubicin, derived from pumpkin seeds, produced statistically significant reductions in subjective symptoms and residual urine.[60,61] Neither product was reported to cause any side-effects. These trials involved small numbers of patients and should be repeated on a larger scale (see J2).

Of other substances which have been tested in RCTs, neither Senenoa repens (Permixon),[62] which inhibits oestrogen receptors in prostatic tissue,[63] tadenan,[64] probucol,[65] raveron,[66] nor candicidin[67,68] produced statistically significant effects on symptoms, flow rates or residual urine.

F6. *Identifying patients who benefit from drug treatment:* Because of the large placebo effect[69] and the variable natural history of BPH, there is uncertainty about whether a drug is beneficial or not in an individual patient. This is important in clinical decision making. It may be possible to answer the question with an N-of-1 RCT, where a single patient is randomly given active drug or placebo over successive treatment periods.[70] While this type of trial would be appropriate for alpha-blockers, the effects of which become apparent quite quickly, it would be less suitable for finasteride.

G. Invasive Treatments

Surgery is beneficial for the majority of patients with moderate or severe symptoms. Incision of the prostate (TUIP) is as effective for many patients and less hazardous and costly than resection (TURP), and it should be used more frequently. New technologies, in particular laser treatment, are slightly less effective than TURP, but also less hazardous. They have not been compared with TUIP. The medium-term effectiveness of microwave therapy remains in doubt.

There are doubts about the effectiveness of balloon dilation and stents have not been rigorously evaluated.

G1. ***Surgery:*** There are two types of surgical treatment for BPH. The first, prostatectomy, involves removal (resection) or destruction of the inner tissue of the gland, usually via the urethra. When this operation is

Table 2 Randomised placebo-controlled trials of finasteride

Trial	Dose	Duration	Patients	Main outcome measures	Main results	Comments
Andersen, 1995 (55)	5mg daily	2 years	Finasteride n=347, placebo n=346 Men <80 yrs, moderate symptoms, not more than 2 severe symptoms, enlarged prostate, flow rate 5-15 ml/sec, no significant abnormalities or serious pathology.	Symptom score (Madsen-Iversen) flow rates, prostate volume.	Improvement in symptom scores in finasteride group significantly greater than placebo from 8 months. 2- point improvement at 24 months (baseline 13), with divergence between groups tending to increase. Placebo group symptoms returned to baseline after 20 months after initial improvement. Change from month 12 to 24 significant. Maximum flow rates improved in finasteride group to month 8, improvements sustained thereafter; placebo returned to baseline. Prostate volume in finasteride group decreased by 20% & decrease maintained; in placebo group, prostate volume increased 11% by end of 2nd year. Similar numbers (18%) withdrew from each group. 9% higher incidence of sexual dysfunction in finasteride group.	This is the first double-blind placebo-controlled trial evaluating effects of any medical therapy for BPH over 2 years. The results suggest that finasteride treatment has a small but sustained beneficial effect on symptoms and is acceptable to the majority of patients.
Gormley, 1992 (56)	1mg & 5mg daily	12 months after 2 week placebo lead-in.	Finasteride 5mg n=297, 1mg n=298, placebo n=300. Men 40-83 yrs, symptoms of obstruction, enlarged prostate, peak flow <15ml/sec.	Flow rates, symptom scores on 36-point scale (modified Boyarsky), prostatic volume.	After 12 months, total symptom scores had fallen 1 point (2%) in placebo group, 2 points (9%) in 1mg finasteride group, 3 points (21%) in 5mg group. Significant difference ($p<0.05$) between 5mg and placebo. Urinary flow increased 0.2ml/sec in placebo group, 1.4ml/sec in 1mg finasteride group, 1.6ml/sec in 5mg group. Prostatic volume fell 1.2ml in placebo group, 11.8ml in 1mg group, 11.1ml in 5mg group ($p<0.01$ for comparisons between drug groups and placebo). Frequency of adverse effects similar in all groups, but higher incidence of depressed libido, impotence and ejaculatory problems with finasteride treatment.	Large numbers in study allow relatively small changes to be statistically significant. Drug effects developed gradually over 12 months. 12% withdrawal rate, similar in all 3 groups.
Finasteride Study Group, 1993 (57)	1mg & 5mg daily	12 months	Finasteride 5mg n=246, 1mg n=249, placebo n=255. Men 40-80yrs, good physical & mental health, symptoms of obstruction, prostate >30cm^2, peak flow <15ml/sec.	Flow rates, symptom scores on 36-point scale (modified Boyarsky), troublesomeness ratings (22 point scale), prostatic volume.	Symptom scores in finasteride 5mg group fell from 18.6 to 15.3; in placebo group from 18.2 to 16.2; difference significant after 8 months. Finasteride 1mg group symptom scores not significantly different from placebo. Urological status, as assessed by investigators, was significantly better in both finasteride groups than placebo at 6-12 months ($p<0.015$). Troublesomeness of symptoms significantly reduced in 5mg group only from 8 months. Flow rates: both finasteride groups significantly improved, compared with placebo, at 12 months ($p<.025$). Prostate volume decreased 23.6% in 1mg group, 22.4% in 5mg group, 5% placebo at 12 months ($p<0.001$). Incidence of impotence: finasteride 5mg, 4.9%, 1mg 4.0%, placebo 0.4%; $p<0.005$). No other adverse experiences varied significantly between groups.	Study design and results very similar to Gormley et al, above. Fall in symptom score in finasteride 5mg group of 0.9 points more than placebo on 45 point scale after 1 year statistically significant ($p<0.005$) although very small compared with differences achieved by sugery.
Stoner, 1992	Study 1: 5, 10, 20, 40 & 80mg; Study 2: 0.2mg, 0.5mg, 1mg, 5mg, 40mg.	Study 1: 12 weeks, plus 12 drug-free weeks; study 2: 24 weeks.	Study 1: placebo n=14, 5mg n=10, 10mg n=15, 20mg n=16, 40mg n=14, 80mg n=11. Study 2: placebo n=25, 0.2mg n=18, 0.5mg n=15, 1mg n=17, 5mg n=15, 40mg n=13. Men 40-80 yrs, symptoms of obstruction, prostate >30cm^2, no clinical abnormality	Study 1: prostate volume. Study 2: symptom scores, peak flow rates, hormone profile. Both studies: adverse events.	Study 1 result: significant decrease in mean prostate volume in 1, 5 & 40mg groups versus placebo. Study 2: Significant increase in flow rates in treatment groups versus placebo, from week 7. Mean difference between pooled higher dose groups & placebo 3.7ml/sec ($p=0.03$). Symptom scores: no significant difference between 0.2 & 0.5mg treatment groups and placebo, significant improvement in 1 & 5mg groups ($p<0.05$). Significant decrease in dihydrotestosterone in all treatment groups; hormone levels and prostate volume returned to baseline at end of drug-free period. Adverse events: 13 'serious' on finasteride, 1 on placebo, 1 possibly drug-related.	These studies suggest that finasteride is moderately effective in relieving symptoms of BPH at doses of 1mg and above. The drug appears to reduce prostate volume while treatment continues, through reversible reduction of dihydrotestosterone.

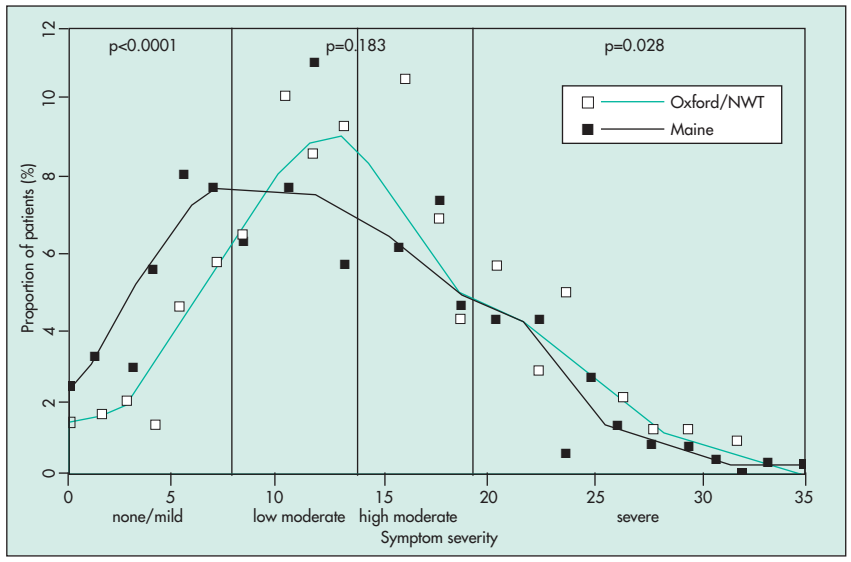

Fig. 2 Smoothed symptom severity in men undergoing treatment in Maine USA and Oxford/North West Thames UK.[43]

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carried out by electro-cautery, it is known as transurethral resection of the prostate (TURP), but it can also be carried out using heat generated by laser or microwaves. When access via the urethra is difficult or inappropriate, the operation is carried out through an incision in the abdomen; this is open prostatectomy. The second type of operation - transurethral incision of the prostate (TUIP) or bladder neck incision (BNI) - involves one or two incisions in the prostate to relieve constriction. This is considered unsuitable for men with particularly large glands.

G2. ***Surgery rates:*** About 45% of patients with diagnosed BPH in the UK are treated surgically.[71] Of these, 90.9% underwent TURP, 1.6% open prostatectomy, 5.7% BNI/TUIP, and 0.2% laser or microwave prostatectomy in 1992.[29]

Approximately 55,000 prostatectomies are carried out by the NHS in England each year,[72] and 9,400 in private hospitals.[73] The age-standardised prostatectomy rate in England and Wales, at 9 per 10,000 per annum, is similar to Norway and Australia, but 30% of the US rate,[74] where a significantly higher proportion of operations are carried out on men with mild symptoms.[43] (Fig. 2) There are large local variations in prostatectomy rates between districts (Fig. 3), with age-adjusted rates for TURP ranging from 1.5 to 26.7 per 10,000 per annum.[72]

G3. ***Transurethral resection of the prostate (TURP):*** In Britain, the majority of operations take between 26 and 55 minutes, and the median length of stay in hospital is 5 days.[29]

The effectiveness of TURP was compared with watchful waiting in a US multicentre RCT.[47] (See F1, above.) Of 280 men assigned to surgery, 249 underwent TURP and were followed up for an average of 2.8 years. At baseline, the mean symptom score in this group was 14.6 on the Madsen-Iversen scale range from 0 to 27; 3 years after surgery, this score had fallen to 4.9.

The probability of benefit varied with initial symptom severity. 91% of patients who were "substantially bothered" reported improvement, compared with 62% of those who were less bothered initially. 8% were classed as failures. 9% had complications during the first month but there were no deaths associated with surgery. Within 3 years, 3.6% of men required surgery for contracture of the bladder neck, 3.6% suffered urethral stricture, and 3.2% underwent a second TURP, half because of malignancy.

This study confirms the effectiveness of TURP, particularly for men who are substantially bothered by their symptoms; however, surgery is likely to produce placebo effects which have not been assessed.

The UK National Prostatectomy Audit[29] also found that men with severe symptoms are most likely to benefit. For 7.3%, pre-operative symptoms were mild (AUA scores of 7 or less), 37.2% moderate (8-19), and 55.5% severe. After surgery, 78% of men with severe symptoms were considerably improved, in contrast to 38% of those whose initial symptoms were mild or moderate: they ended up worse. Overall, at least a quarter of men fail to improve symptomatically after TURP.[75] These results are less positive than the 88% improvement rate derived from a synthesis of U.S. case series by the Agency for Health Care

Table 3 Probability of undergoing a second prostatectomy within 8 years of transurethral resection (TURP) or open prostatectomy

		TURP		Open Prostatectomy	
Study	**Location**	**Number of men**	**Rate (%)**	**Number of men**	**Rate (%)**
Roos, 1989[83]	Denmark	27911	12	8782	4.5
	Manitoba, USA	8995	15.5	3095	4.2
	Oxfordshire, UK	2171	12.0	3113	1.8
Sidney, 1992[113]	USA	7771	7.6	448	2.1

Data from retrospective studies.

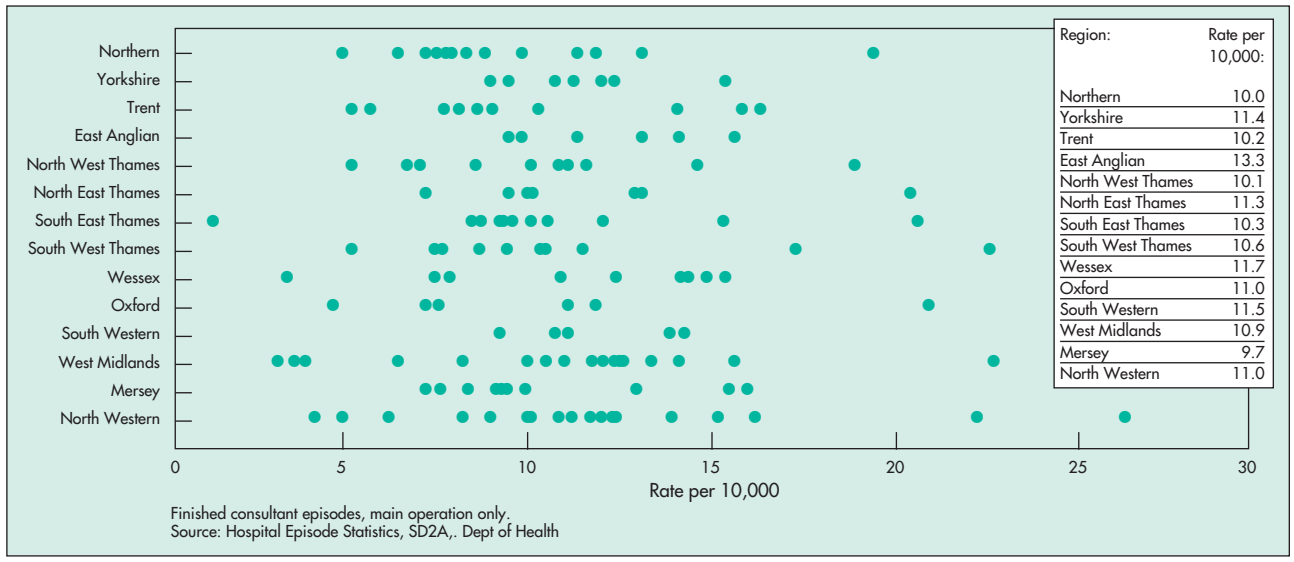

Fig. 3 Age standardised rate per 10,000 for TURP (OPCS4R code M65) by region and district, 1993-94.

Policy and Research (AHCPR).[33] However, in the US studies, 'improvement' was rarely clearly defined, and varied between studies.

Measures of urinary function show that maximum flow rates (Qmax) are usually increased three months after surgery by at least 50%, and residual urine is reduced by 60-80%.[33]

With the exception of impotence, incontinence and strictures, most adverse effects are short-term. Weighted average incidence rates of complications of TURP calculated by the AHCPR[33] are 15.5% for urinary tract infections, 12.5% for blood loss sufficient to require transfusion, 1% for epididymitis, 3.7% for urethral and bladder neck strictures, 13.6% for impotence, and 1% for total incontinence. Adverse reactions to anaesthesia are not reported.

The above hazards are common to all prostatic surgical procedures, but one peculiar to TURP is TUR syndrome, a life-threatening fluid and electrolyte imbalance linked with the irrigation fluid used after surgery; reported incidence levels can reach 8%. The overall mean reported probability of surgical complications is 15%.[33]

Evidence from a U.S. RCT[47] suggests that TURP does not cause impotence or incontinence; sexual performance, general well-being, and social activities were unaffected by surgery. However, the National Prostatectomy Audit[76] of routine care in the UK found that 6.6% of men free from incontinence before prostatectomy develop incontinence severe enough to cause a problem, while a further 6.3% with slight, non-problematic incontinence initially have severe incontinence afterwards. 21% of men have increased difficulties with erection after surgery, while for 8%, erection problems are reduced. TURP causes dry, or retrograde, ejaculation in 73.4% of patients.[33]

Mortality rates for patients undergoing TURP for BPH in hospitals in the Northern Region were found to be 0.3% at 30 days and 1.7% at 90 days.[77] There are marked inter-site variations, with significantly fewer deaths and complications in hospitals where more than 100 patients were treated over the 8-month period of the audit. However, because the risk of death is highly dependent on age and severity of co-morbidity,[78] these variations are difficult to interpret. 90-day mortality after TURP in the US is similar to the British rate, at 1.5% (90% CI: 0.5, 3.3%).[33]

Re-operation rates after TURP increase progressively with time (Table 3). About 9% of men undergo a second operation within 5 years.[79]

G4. ***Open prostatectomy:*** Open prostatectomy is used for particularly large glands (over 70-80g.[80-82]) and for patients with hip problems which prevent correct positioning for TURP. The median hospitalisation time in 1992 was 9 days.[29]

Open prostatectomy leads to slightly higher rates of improvement than TURP and re-operation rates are consistently lower (Table 3). In Oxfordshire, 1.8% of men underwent re-operation within 8 years of open prostatectomy, compared with 12.0% after TURP.[83] However, complications are more common. One RCT reported markedly higher levels of infections and blood transfusions after open prostatectomy than TURP.[84] The AHCPR figure[33] for the median probability of surgical complications is 21%. 0.5% of men are reported to

Table 4 Randomized controlled trials comparing TURP (resection) with TUIP (incision)

Trial	Patients	Follow-up	Main outcome measures	Main results	Comments
Riehmann 1995 (86)	TURP n=56, TUIP n=61; prostates <20gm, no suspicion of malignancy, no previous prostatic surgery.	Mean, 34 months; diminishing numbers with increasing time, but 17 patients followed 6 years.	Symptom scores (Madsen-Iversen); peak flow rates; blood loss; duration of surgery, catheterization & hospital-ization; sexual functioning.	Symptom scores: baseline 16, both groups; falling to minimum at 1 year, TURP 4, TUIP 4.5. Thereafter, gradual increase to 10, years 4-6. No differences between treatment groups significant. Qmax: baseline, TURP 9.7, TUIP 7.8; thereafter, to 6 years, TURP approx. 19, TUIP approx. 15. Subjective assessment of outcome: satisfaction rate declined to 60%, both groups, at 3 years, then rose to 80% in TUIP group at 6 years. Additional treatment for obstruction: 16% in TURP group, 23% in TUIP group; difference not significant. Operating time: TURP 50 min, TUIP 20 min. Blood loss: TURP 150 ml, TUIP 25ml. Hospitalization: TURP 4 days, TUIP 3 days; catheter time: TURP 2 days, TUIP 1 day. 1 death due to surgery in TURP group, none in TUIP group. Retrograde ejaculation: 68% after TURP, 35% after TUIP (p=0.02).	TUIP is as effective as TURP, and its equivalence in terms of effectiveness is maintained over the 6 year period of this study. Although peak flow rates are slightly higher after TURP, this is not clinically significant, as flow after TUIP remains relatively high for this age-group. Overall, TUIP is clearly superior to TURP for this group of patients, with equal benefit but lower levels of adverse effects and cost.
Soonawalla 1992 (87)	TURP n=110, TUIP n=110; men, 45-87 yrs; prostates <30gm, no suspicion of malignancy.	All patients 3 months; 1 year, n=137; 2 years, n=47.	Patient satisfaction; flow rates; residual urine; blood transfusion; duration of surgery & hospitalization.	Satisfaction (excellent or fair): 3 months & 2 years: TURP, 90%, TUIP, 95.5%. Peak flow rates: TURP, baseline 8.0, 3months 20.1, 2 years 19.9; TUIP, baseline 7.9, 3 months 19.4, 2 years 18.9. "High residue": TURP, baseline 73%, 3months 6.2%; TUIP, baseline 74%, 3 months 7.3%. Transfusion: 38 (35%) in TURP group, none in TUIP group. Mean duration of surgery: TURP 59 min, TUIP 20 min. Mean hospitalization: TURP 7.1 days, TUIP 6.0 days. More peri-operative complications after TURP, including 6.4% TUR syndrome.	2 year data for satisfaction & residual urine unreliable: no change in figures with falling patient numbers. Nevertheless, data suggest that TURP & TUIP are equally effective, and that their equivalence is maintained. No late recurrance of obstruction, but 3 in TUIP group later underwent TURP, & 2 in TURP group had repeat resection.
Nielsen, 1988 (88)	TURP n=25, TUIP n=24; men >60 yr, consecutive patients with obstruction due to BPH. 49% in acute retention.	1 year	Successful/ unsuccessful (incontinence &/or increased frequency of urination), urinary culture, flow rates.	At 1 year, 18 of 23 TURPs judged successful, 18 of 22 TUIPs. 3 patients in TUIP group suffered post-operative retention & underwent TURP; all had prostates >30g. Another, also with prostate >30g, was judged unsatisfactory at 1 year. Flow rates after TURP significantly higher than after TUIP at 2 months, difference not significant at 1 year (TURP, 12 ml/sec; TUIP 9ml/sec). No difference between groups in positive urinary culture at 1 year. 4 in TURP group developed strictures, 1 incontinent. Significantly less bleeding & shorter operation times in TUIP group.	88% of patients in TUIP (described as TUT) group had estimated prostate weight >30g, usually considered too large for this operation. Poor measures of patient satisfaction make results imprecise. TUIP appears safer and quicker than TURP, possibly slightly less effective in terms of flow rates.

become totally incontinent after surgery, and reported impotence rates vary from 32.3% for perineal prostatectomy to 16.2% for retropubic prostatectomy. Retrograde ejaculation is common, affecting 70% of patients in the one RCT which reported on this problem.[85]

The 90 day mortality rate calculated by AHCPR was 2.4% (90% CI: 1.0, 4.6%).[33] However, a large retrospective comparison of open prostatectomy and TURP[85] suggested that open prostatectomy was associated with lower long-term mortality. Data from Denmark (n=36,703), Oxfordshire (n=5,284) and Manitoba, Canada (n=12,090) showed that TURP carried a relative risk of death within 8 years of 1.45 (95% CI, 1.15-1.83). Although a subsequent observational study suggested that differences in the severity of co-morbidity accounted for the apparent superiority of open prostatectomy,[78] this study was too small to be definitive.

G5. ***Transurethral incision of the prostate (TUIP):*** TUIP is only considered suitable for men with glands of 30g or less,[33] but this includes at least half of those who currently undergo TURP. The median length of hospital stay is 4 days.[29]

RCTs comparing TUIP with TURP[86-88] are summarized in Table 4. All suggest that the two procedures can be equally effective, showing a 12-point reduction in the Madsen-Iversen symptom score. National Prostatectomy Audit figures also show no significant differences between TUIP and TURP in post-operative symptom severity.[76] Re-treatment rates after TUIP seem to be similar to those for TURP.[79]

TUIP is a quicker operation which causes less tissue damage than other forms of prostate surgery, so adverse effects are less serious. Mortality rates, estimated at 0.7% (90% CI: 0.2, 1.5%),[33] about half the equivalent figure for TURP; however, this is difficult to interpret because it does not take case-mix or surgeon into account.

G6. ***Laser prostatectomy:*** The popularity of laser therapy is growing rapidly among urologists. There are two main techniques: TULIP (transurethral ultrasound-guided laser prostatectomy) and ELAP/ VLAP (visual laser prostatectomy).

Table 5 Randomised controlled trials comparing TURP with laser prostatectomy

Trial	Comparison	Patients	Follow-up	Main outcome measures	Main results	Comments
Anson, 1995 (90)	TURP vs. endoscopic laser ablation of the prostate - ELAP	TURP n=75; laser n=76. Age >50 yrs, no suspicion of prostate cancer, no anticoagulant medication.	1 year	AUA symptom scores (35 point scale), peak flow rate (Qmax), residual urine, adverse effects.	Symptom score fell from 18.2 to 5.1 (CI: 3.8, 6.4) in TURP group, 18.1 to 7.7 (CI: 6.3, 9.1)in laser group; Qmax rose from 10 to 21.8ml/sec (CI: 18.5, 25.1) in TURP group, 9.5 to 15.4 (CI: 13.6, 17.2) in laser group; residual urine fell from 62 to 46 ml in TURP group, 70 to 69ml in laser group. 5 treatment failures in laser group. Dysuria: 15% in TURP group at 4 weeks, 41% in laser group; at 3 months, 1% in TURP group, 15% in laser group. Catheterization: 2.7 days after TURP, 12.2 days after laser. Significantly more infections after laser treatment. 16% transfusions after TURP, none after laser. 1 death in each group.	TURP is significantly more effective than laser treatment, but laser causes fewer peri-operative problems. High levels of dysuria and longer catheterization in laser group raise concerns about patient acceptability.
Cowles, 1995 (91)	TURP vs. visual laser ablation of the prostate - VLAP	TURP n=59, VLAP n=56, men >50 yrs, not in retention, no medical condition that would affect suitability for either procedure.	1 year	AUA symptom scores, peak flow rate, residual urine, quality of life.	Fall in symptom scores from baseline at 1 year: TURP 13.3, laser 9.0 ($p<0.04$). Increase in peak flow: TURP 9.5, laser 6.9ml/sec ($p=0.27$). Fall in residual urine: TURP 139ml, laser 55ml ($p<0.01$). Quality of life: 93% patients improved after TURP, 78% after laser. Serious complications: TURP 21, laser 6 ($p<0.01$). Non-serious complications: TURP 17, laser 29 ($p<0.01$).	TURP and VLAP are not equivalent; laser treatment is safer, but TURP is more effective. Complication rate for TURP (36% of patients) high; authors comment "One suspects that the rates quoted in the literature may, in fact, be too low."
Schulze, 1994 (92)	TURP vs. trans-urethral ultra-sound guided laser- induced prostatectomy - TULIP	40 men, <75 yrs, prostate volume 25-75ml, symptom scores (Boyarsky) >15, Qmax <15 ml/sec. 13 of each group in acute retention prior to surgery.	6 months	Boyarsky symptom score, peak flow rate, residual urine, blood loss, hospital stay.	At six months, symptom score fell to 1.8 in TURP group, 3.0 in laser group; Qmax rose to 24.4 in TURP group, 18.5 in laser group; residual urine fell to 12.1ml. in TURP group, 42.5 in laser group. Mean estimated blood loss in TURP group 515ml, vs. 51ml. in laser group; post operative hospital stay 6.7 days for TURP group, 2.6 days for laser group. After laser treatment, patients catheterized for 34 days on average (range 9-66). Improvement after laser treatment developed gradually over 3 months.	Similar benefits for the two procedures after 6 months. Although laser therapy involves shorter hospitalization and less blood loss, this is balanced by longer catheterization and long delay before patients experience benefits.

Tissue sloughs off gradually after treatment, leading to improvement after about six weeks. Most patients require one or two days in hospital.[89]

RCTs comparing laser prostatectomy with TURP are summarized in Table 5.[90-92] They suggest that laser treatment reduces symptoms by about 10 units on the 35-point AUA scale, compared with 13 units for TURP. Laser treatment seems to be slightly less effective than TURP, but the difference in clinical outcome may be balanced by its apparent safety advantages. Laser prostatectomy causes much less bleeding and fewer peri-operative problems. In one study, for example, complications affected TURP patients three times as often as laser patients.[91] Reported adverse effects include impotence (4%), urethral stricture (5%), incontinence (3.8%) and retrograde ejaculation (5.4%).[93]

As with most new surgical technologies, surgeons require appropriate training in the safe and effective use of lasers.

There have been no reports on patient acceptability, but the need for catheterization for up to 34 days,[92] high prevalence of persistent local irritation and dysuria,[89] and delay of several months before full benefits develop, are disadvantages. No published RCT has compared different laser systems, and long-term effects are not known.

G7. *Hyperthermia, thermotherapy and thermal ablation:* In these types of therapy, localised heat is generated in the prostate by microwaves, producing temperatures ranging from 42-44°C for hyperthermia to 60-75°C for thermal ablation.[94]

There have been a number of published and unpublished trials comparing microwave thermotherapy (TUMT) with sham treatment, most of which suggest that TUMT produces benefits in excess of placebo.[95] However, the results appear to vary widely between studies. One recent double-blind randomized study[96] of 145 men compared the effects of hyperthermia at 45°C delivered by one of two routes (transurethral or transrectal) with a 37°C control. After one year, there was no evidence that the treatment had any effect on objective measures, and while transurethral microwave treatment seemed more effective than its corresponding sham, the data suggest that this sham group may have been exceptional. Transrectal microwave treatment was clearly ineffective. The authors concluded that hyperthermia was not an effective treatment for BPH.

TUNA (transurethral needle ablation) uses radiofrequency energy to destroy prostate tissue.[97] It is reported to be well tolerated without anaesthesia but its effectiveness is unknown.

G8. ***High intensity ultrasound:*** This uses a transrectal probe to produce prostatic lesions. Early results from small trials suggest that it is well tolerated and reduces symptoms;[98] however, most patients suffer from transient retention and long-term effects are unknown. This therapy is still experimental.

G9. ***Balloon dilation:*** Balloon dilation, the least invasive of the non-medical therapies, involves insertion of a balloon into the prostate via the urethra. Two small RCTs have been published. In one,[99] 31 men were randomised to balloon dilation or cytoscopy (a diagnostic procedure). There was no significant difference between the groups in post-treatment symptom levels, and the authors concluded that benefits of balloon dilation are "primarily placebo related". In another trial,[100] 51 men were randomised to balloon dilation or TURP. After a year, 74% of the dilation group and 78% of TURP patients considered themselves "improved", but flow rates in the dilation group returned to pre-treatment levels. Morbidity and complication levels were similar in the two groups. It is not clear that balloon dilation offers any lasting benefit.

G10. ***Stents:*** Stents are flexible prostheses inserted into the urethra to hold it open. There have been no RCTs to assess their role in the treatment of BPH. Observational studies report a fairly high success rate, but problems include displacement, calcification, infection, incontinence and discomfort.[33,101]

H. Costs and cost-effectiveness of treatment

H1. ***Costs:*** Watchful waiting is likely to be the least cost option for men with mild or moderate symptoms. They are likely to require no more than periodic checks by their GPs and may benefit from lifestyle advice and bladder training. Up to half may find that the problem resolves spontaneously.

Drug therapy costs around £325 per man-year for finasteride, £347 for terazosin, and £60 for prazosin (which is out of patent).[51]

Costs of surgical procedures depend crucially on the length of hospital stay, theatre time, complications and retreatment rates. Open prostatectomy has been estimated to cost 85% more than TURP.[102] Against this must be balanced lower re-treatment rates after open prostatectomy. TUIP, which seems as effective as TURP with shorter theatre and hospitalization time and a lower complication rate, appears to be the most cost-effective surgical operation.

H2. ***Cost-effectiveness of medical and surgical treatments:*** Cost-utility and cost-effectiveness analyses comparing TURP, finasteride and watchful waiting have recently been published by the Canadian Coordinating Office for Health Technology Assessment.[103] This considered direct costs to the health care system, and assessed benefits in terms of quality adjusted life years (QALYs), using AHCPR figures for the effectiveness of each type of treatment.

In summary, the results suggest the following:

- Watchful waiting offers patients with moderate symptoms more QALYs at lower cost than TURP.
- Finasteride is more costly than TURP if the patient's lifespan is over 14 years.
- For patients with severe symptoms, TURP is likely to offer more QALYs at less cost than finasteride. This is particularly true when the lifespan is over 14 years.
- If the patient's life-span is under 3 years, finasteride may be the most cost-effective treatment.

The analysis indicates that for moderate symptoms, watchful waiting followed by TURP if symptoms become less tolerable is a better option than TURP first. However, surgery offers clear benefits for patients with severe symptoms.

This analysis, although helpful, was dependent on its assumptions about the relative effectiveness of treatment options, and it did not include other options such as TUIP, laser treatment, and alpha-blocking drugs. Also, it did not allow for the fact that older, sicker patients are likely to gain the fewest QALYs from TURP because of higher post-operative morbidity and mortality rates.

A comparison of the cost-effectiveness of laser treatment (VLAP) and TURP carried out in Australia[104] suggested that VLAP was more expensive than TURP, although the difference was not great. The results of this study, which involved 71 patients randomized to TURP or VLAP, suggested that the outcomes of the two procedures were equivalent, and therefore cost-effectiveness depended on the relative costs of treatment and post-discharge care. The figures generated revealed particular sensitivity to the cost of the laser fibre, which might change with

time and changing techniques.

I. Policy recommendations

I1. Watchful waiting seems to be the safest and most cost-effective treatment option for men with mild or moderate symptoms. Its use should be encouraged through educational interventions aimed at GPs, specialist urologists, and patients.

I2. For up to half of patients for whom surgery is currently deemed appropriate, TUIP is likely to be as effective as TURP. It is associated with fewer complications and uses fewer resources. Urologists should be encouraged to consider TUIP as the operation of choice for most men.

I3. The routine use of new invasive methods of treatment such as laser prostatectomy, thermal ablation, cannot be justified except in the context of large randomised controlled trials designed to assess long-term costs, effectiveness, and patient acceptability. The purchase of such equipment may not be a rational use of resources until better evidence is available.

I4. The routine use of upper urinary tract imaging in the diagnosis of BPH does not appear justified and should be critically monitored.

I5. Recent media attention to prostate problems may encourage more men with urinary symptoms to consult GPs. As a result, men with less severe symptoms may be more likely to be offered treatment, probably drug therapy.

I6. Clear and accurate information about the nature, risks and benefits of different types of treatment for BPH should be made available to patients so that they can take an active part in decision-making.[114]

I7. The effectiveness of balloon dilation is doubtful, it is invasive and therefore not free from hazards and its use may not be justified.

I8. Drug therapy, although less effective than surgery, may be appropriate for some men, including those who do not wish to take the risk of surgery. However, the role of drugs in routine care has yet to be fully determined.

J. Research recommendations

The NHS Health Technology Assessment programme have identified this area of research as a priority.

J1. Information is required on the long-term effects, cost-effectiveness and patient acceptability of new methods of treatment for lower urinary tract symptoms. Laser treatment, thermal ablation, and TUNA should be assessed in large-scale randomised controlled trials with long-term follow-up.

J2. There is a need for large-scale RCTs, stratified by symptom severity, to compare surgery with drug therapy and watchful waiting and to compare different types of non-surgical therapy including promising natural therapies.

J3. Research is required to establish whether incision of the prostate (TUIP) could be carried out safely on a day-care basis.

J4. Research is needed to assess the effectiveness of management of urinary problems by lifestyle modification and bladder training.

J5. Research is required into facilitation of structured participation by patients in decision making, for example with an interactive computer based system appropriate to the British context.

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