

# Practical approaches to diagnosis and management of nocturia

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**Nocturia is an under-reported and undertreated condition in primary care. In this article the authors provide GPs with practical recommendations and tools for the assessment, diagnosis and management of nocturia, using real clinical cases as examples. The recommendations are based on clinical evidence as well as the authors' personal experiences.**

Nocturia is defined by the International Continence Society (ICS) as 'the complaint that the individual has to wake at night one or more times to void [...] each void is preceded and followed by sleep,<sup>1,2</sup> and has a significant effect on quality of life.<sup>3-6</sup>

Many GPs believe that they rarely see this condition in their practice. There are many published guidelines on nocturia; however, most are of little practical relevance to GPs. Table 1 outlines a checklist to help assess presenting symptoms and their potential causes. Box 1 provides examples of typical

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| Signs and symptoms  | Tick |
|---|------|
| Waking up in the night to pass urine<br><i>Consider diagnosis of nocturnal polyuria</i>   |      |
| Leaking urine when laughing, coughing, sneezing, lifting something heavy<br><i>Symptoms suggestive of stress incontinence. Consider a stress test</i>   |      |
| Sudden and urgent need to urinate, sometimes associated with urgency incontinence, especially during the day<br><i>Symptoms suggestive of overactive bladder</i>  |      |
| Sensation that the bladder has not emptied fully<br><i>Symptoms suggestive of bladder obstruction (eg bladder outlet obstruction, benign prostatic hyperplasia), bladder dysfunction, urinary tract infection</i><br><i>Urinalysis to rule out urinary tract infection. Consider testing renal function (eGFR) and renal/bladder ultrasound</i>   |      |
| Difficulty starting or maintaining a steady stream<br><i>Suggestive of dysfunctional voiding, most commonly due to bladder outlet obstruction</i><br><i>Also consider bladder dysfunction, or mixed voiding and storage disease</i>   |      |
| Urinary frequency ( $\geq 8$ voids/day)<br><i>Consider a diagnosis of overactive bladder – usually associated with urgency of micturition</i>   |      |
| In female patients, consider causes of urinary symptoms being pre-menopausal, post-menopausal or due to hormone replacement therapy<br><i>Assess whether the patient is pre- or perimenopausal</i><br><i>Assess whether waking is due to the need to go to the toilet or due to hot flushes</i><br><i>Conduct hormonal tests, if needed</i><br><i>Ask if the patient suffers from vaginal dryness</i><br><i>Consider oestrogen deficiency</i>   |      |
| Presence of neck or back pain, or any limb weakness or sensory loss<br><i>Assess neurological and spinal signs and symptoms (possible red flag – may require urgent referral)</i>   |      |
| Patient on medication that may precipitate nocturia, such as calcium channel blockers, thiazides or GABA-ergic agents<br><i>Trial stopping the medication to see if it is causing or exacerbating the condition, if appropriate</i><br><i>Move diuretic doses to the mid-afternoon</i>  |      |
| Patient presenting with tiredness or a history of loud snoring or breathing which repeatedly stops and starts during sleep (to be corroborated by partner) <sup>7</sup><br><i>Consider sleep apnoea</i><br><i>Ask the partner (if possible)</i><br><i>Use the STOP-BANG questionnaire to assess for sleep apnoea</i><br><i>If STOP-BANG is positive, Epworth Sleepiness Scale questionnaire can be used to refine the diagnosis</i>   |      |
| Obese/overweight patients<br><i>Consider metabolic syndrome or prediabetes</i>  |      |
| History of enuresis<br><i>May be associated with chronic retention of urine – arrange bladder/renal ultrasound</i>  |      |
| Other medical conditions:<br><div> <ul style="list-style-type: none"> <li>– Heart disease</li> <li>– Hypertension</li> <li>– Arthritis</li> </ul> </div> <div> <ul style="list-style-type: none"> <li>– Asthma</li> <li>– Irritable bowel syndrome</li> <li>– Recurrent urinary tract infection</li> </ul> </div> <div> <ul style="list-style-type: none"> <li>– Benign prostatic hyperplasia</li> <li>– Prostatitis</li> <li>– Prostate cancer</li> </ul> </div> <div> <ul style="list-style-type: none"> <li>– Uterine prolapse</li> <li>– Hysterectomy</li> <li>– Anxiety and depression</li> </ul> </div> <i>Comorbidities that may be contributing to nocturia</i> |      |

Table 1. Checklist to consider in patients presenting with urinary symptoms

questions GPs can ask to help identify the cause of a patient's urinary symptoms. In order to be diagnosed with nocturia, the following conditions should be met:

- Two voids per night, leading to poor sleep quality (less than four hours sleep per night)
- Waking up to void the bladder.

### INVESTIGATIONS IN PRIMARY CARE

Core and optional investigations are outlined in Box 2. The frequency-volume chart (FVC) is a key diagnostic and monitoring tool for identifying and

managing nocturia. It monitors the amount and type of fluid taken in. FVCs document the time of each void, voided volume per micturition, the time of going to bed with the intention of sleeping, and the time of waking up for each additional void, as well as the time for waking up with the intention of starting the day.

Nocturnal urine volume describes the amount of urine excreted during the night time, including the volume of the first morning void after waking because this

urine has been produced during the night time. FVC also records time to bed and time to first void, providing an indication of the quality of sleep.

Patients are advised to use the FVC at a time convenient for them, eg over a weekend. It is important to emphasise the importance of this tool to the patients for both assessing and monitoring their condition. Box 3 provides an interpretation of an FVC. Box 4 provides a summary of storage and voiding symptoms.

#### Box 1. Assessment questions

##### PROACTIVELY ASK THE PATIENT ABOUT NOCTURIA SYMPTOMS IF:

- The patient presents with concerns about prostate cancer/ wants a PSA
- The patient is concerned about being consistently tired
- The patient has had night-time falls (especially the elderly)
- The patient presents with or has a history of heart failure
- A female patient is menopausal

##### TYPICAL QUESTIONS:

- How many times do you get up at night, and what is the reason for each awakening?
- How much and what do you drink before bedtime?
- Is it a full bladder that wakes you, or do you wake up and then decide to go to the toilet?
- What is your usual wake-up time in the morning?
- Do you feel that your quality of sleep has been affected, ie are you getting at least four hours of uninterrupted sleep?
- What is the volume of urine you pass at night? (Advise the patient to use a jug for night voids in order to measure the volume.)

#### Box 2. Basic assessment checklist for nocturia in primary care<sup>7,8</sup>

##### CORE INVESTIGATIONS

- Patient history
  - Fluid consumption, alcohol and caffeine consumption, urinary symptoms (including voiding and frequency), sleeping habits, medical history
- Review current medication to identify drugs that may be contributing to the problem
  - eg calcium channel blockers such as amlodipine, nifedipine
- Physical examination
  - Blood pressure, checking for oedema of the lower extremities, checking genitalia for any abnormalities, abdominal examination including palpation of the bladder to rule out urinary retention
  - Determine if patient is overweight/obese – measure weight/body mass index/ waist circumference
  - Any leg swelling
- Urea and electrolytes blood test

##### OPTIONAL INVESTIGATIONS

- Digital rectal examination (DRE) in men in the context of urinary symptoms
- Pelvic examination
- Investigate any pelvic mass
- Examination of heart and lungs (assess for heart failure)
- Symptoms of obstructive sleep apnoea (consider Epworth Sleepiness Scale or STOP-BANG)
- PSA for prostate cancer (if clinically relevant) and estimation of prostate size

##### CORE TESTS INCLUDE:

- HbA1c
- Liver function tests
- Bone profile test (calcium levels)
- Frequency volume chart
- Dipstick test (with/without urine culture)
- Urine electrolyte test

##### OPTIONAL TESTS INCLUDE:

- Blood lipids
- Brain natriuretic peptide (BNP) test
- International Prostate Symptom Score (IPSS)



**Box 3. Frequency-volume chart (FVC) interpretation**

- Typical urinary frequency should be up to eight times per day, including one event per night
- Typical normal voided volume should be between 150–300ml per void
- Typical fluid intake per day should be 20ml/kg/day which is equivalent to <2 litres per person per day
- Suspect:
  - Polyuria: if increased frequency with normal volume<sup>1</sup>
  - Diabetes: if excessive fluid intake with frequent voids
  - Nocturnal polyuria: if high-frequency and high-volume urine output is excessive only at night (percentage of urine passed at night of the total is needed to diagnose nocturnal polyuria)
  - Overactive bladder (OAB): if frequent voids, variable volume and urgency
  - Bladder cancer/retention: if frequent, low-volume voids
  - Underactive bladder: low-frequency voids
  - Nocturnal OAB: if urgency to void at night time with low volume

Incomplete bladder emptying will not show on the FVC, but it may be worth asking the patient about this.

**SUMMARY**

- Watch out for small/medium/large volumes compared with normal voiding volumes
- A minimum of two days of the FVC chart should be completed, but ideally three days are needed
- Advise the patient that the urine should be a pale yellow colour

**Box 4. Voiding and storage symptoms<sup>9</sup>****VOIDING SYMPTOMS**

- Weak or intermittent urinary stream
- Straining
- Hesitancy
- Terminal dribbling
- Incomplete emptying

**STORAGE SYMPTOMS**

- Urgency
- Frequency
- Urgency incontinence
- Nocturia

**TREATMENT****Lifestyle modifications**

Management of nocturia consists of a combination of lifestyle factors and drug treatment. Improving lifestyle factors is a first step towards management of the disorder. Lifestyle modifications that have been known to improve the symptoms of nocturia include:

- Avoidance of alcoholic or caffeinated, carbonated and sweetened beverages in the evening
- Reduced fluid intake four hours before bedtime

- Emptying bladder before going to bed
  - Changing the administration of diuretics (if taken) to mid-late afternoon rather than in the morning
  - Moderate physical exercise and pelvic floor exercises or bladder training, if indicated
  - Healthy diet and weight loss if overweight.
- Three months is a reasonable length of time for improving lifestyle factors and assessing whether these impact symptoms of nocturia

**Pharmacological approaches**

Treatment with pharmacological medicine depends on the underlying cause

of nocturia. Pharmacological agents include diuretics, antidiuretic agents (desmopressin), antimuscarinic agents, and alpha-adrenergic blockers.<sup>10</sup>

**Alpha blockers**

- NICE guidance recommends adding antimuscarinics with alpha-adrenergic blockers for men who still have storage symptoms after treatment with an alpha blocker alone.<sup>9</sup>

**Antimuscarinics**

- Antimuscarinics are given for the management of symptoms of overactive bladder (OAB).<sup>9</sup> The number of nocturnal voids has been shown to decrease to a greater extent with combination treatment of an antimuscarinic agent and mirabegron (a  $\beta_3$ -adrenoceptor agonist) versus alpha-adrenergic blocker/antimuscarinic monotherapy, while overall tolerability remains similar.<sup>11</sup>

**Diuretic agents**

- Diuretics are considered when there are more voids at night versus daytime.<sup>12</sup>
- Monitor treatment response to prevent adverse events, electrolyte imbalances and decline in renal function.<sup>13</sup>

**Antidiuretic agents**

- Desmopressin can be used for patients with nocturia due to nocturnal polyuria.<sup>14–17</sup>

**Surgical options<sup>9,10</sup>**

- Bladder outlet obstruction-reducing procedures may improve nocturia in some patients with voiding lower urinary tract symptoms (LUTS) and bladder outlet obstruction who fail medical therapy and who are good surgical candidates.
- Surgery for the relief of bladder outlet obstruction is not indicated for the management of patients whose primary complaint is nocturia.

**Expected outcomes of management**

- Expected outcomes should include: Elimination or decrease in episodes of nocturia to  $\geq 1$  episode per night

- Improved quality of sleep – at least four hours of sleep per night

### CONCLUSIONS

Nocturia is a multifactorial disorder related to other comorbidities and not necessarily related to the bladder or prostate. Nocturia leads to impaired quality of life, and its management should be based on a holistic approach that targets the underlying causes.

The FVC is an essential evaluation tool that can facilitate accurate identification of the potential causes of nocturia in an individual patient. Behavioural treatments and lifestyle interventions should be tried. If these fail, pharmacological agents can be used.

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## Case study – overactive bladder

### Presentation

A 52-year-old female presented with two years worsening urinary symptoms, daytime frequency and urgency, occasional urgency incontinence, and two to three episodes of nocturia per night. She wakes with urgent desire to void at times. There are no UTIs, and no haematuria. She is perimenopausal, and reported drinking four to five mugs of tea per day, plus one coffee.

### Medical History

Otherwise fit and well – no significant past medical history

### Physical Examination

- Abdominal examination normal
- Vaginal examination – mild to moderate atrophic changes
- Urinalysis normal

### Diagnosis

Overactive bladder

### Management

- Advised on fluid management – minimise caffeine intake, aim for 1.5–2L 24 hour total intake, minimise fluid intake in the four hours before bed
- Topical vaginal oestrogen twice weekly
- Verbal and written information regarding simple bladder training measures

### Follow-up

- Reviewed at six weeks – some improvement but bothersome symptoms remain
- Trial of an anti-muscarinic recommended – aim to try discontinuing this after other measures have had a chance to work

## Case study – nocturnal polyuria and overactive bladder

### Presentation

A 62-year-old man presented with increasing LUTS that were beginning to cause bother. He reported hesitancy, moderate stream, frequency (especially after drinking coffee), nocturia four times per night, plus a sensation of incomplete emptying on occasion. Symptoms also include a tendency for a little urge incontinence if emptying is delayed, encouraging the patient to pass urine frequently during the day. Loss of sleep is causing the most bother. IPSS score 26, QOL 4.

### Medical History

- Sedentary occupation
- Non-smoker and moderate alcohol intake
- No significant past history other than a chest infection the previous year
- Erectile function satisfactory
- Family history of diabetes in mother
- Father had cardiac problems in his 60s

- No sleep apnoea or peripheral oedema reported

### Physical examination and tests

- Overweight: waist circumference 102cm, BMI 30
- BP 148/88, heart normal
- No palpable bladder, penis and testes normal
- Prostate slightly enlarged, smooth and non-tender
- PSA 1.2ng/ml to rule out prostate cancer
- Renal function normal
- HbA1c normal
- Cardiovascular system normal
- Urine dipstick negative
- Bladder diary over three days confirms nocturnal polyuria. 30% of 24-hour urine passed during the night during three or four voids

### Diagnosis

Nocturnal polyuria and overactive bladder

**Management**

- Advice on lifestyle, weight loss and exercise, bladder retraining exercises, and reduction in fluid intake during second half of the day
- Desmopressin 50 micrograms at night – urine and electrolytes checked four days later and at one month
- Plan to add anti-muscarinic if bladder retraining, weight loss and exercise, including pelvic floor exercises, not effective

**Follow-up**

- Symptoms improved at three months

- Urea and electrolytes normal
- IPSS 15, QOL 3
- Had lost weight and was less bothered by symptoms – nocturia down to once at night
- Has done well with lifestyle changes and worked hard at them
- BP 138/74
- Waist 100cm
- Treatment continued with desmopressin, advised to focus on lifestyle changes

**Case study – benign prostatic hyperplasia (BPH; enlarged prostate)****Presentation**

A 62-year-old male presented with two to three years increasing daytime urinary frequency, up to eight times a day, and nocturia two to three times a night. He also reported post-micturition dribbling and poor urinary stream in terms of flow rate and spray. It was the mess caused by the latter symptoms which prompted his wife to push him to see his GP. There was no history of visible haematuria, dysuria or urge incontinence.

**Medical History**

- Type 2 diabetes well controlled on metformin 500mg three times a day
- Hypertension controlled on losartan 100mg and amlodipine 5mg daily
- Mild hyperlipidaemia – on atorvastatin 10mg nocte

**Physical Examination**

- BP 138/84
- BMI 32.3
- No palpable bladder, urine staining noted on underwear
- DRE revealed a smooth enlarged prostate estimated at 30–40g

**Diagnosis**

A presumptive diagnosis of BPH was made pending further investigations

**Management**

- Lifestyle advice given, as much to help his diabetes and BP as anything else
- Urine dipstick test normal

- Blood was sent for renal function (normal) and, after appropriate counselling, PSA (3.8)
- Asked to fill in a three-day frequency volume chart, which showed a reasonable fluid intake and confirmed stated small volume frequency and nocturia
- Tamsulosin MR 400mcg daily
- Improvement in symptoms reported after one week, with a reduction in frequency to five times a day and a reduction in nocturia to one to two times a night, which the patient found acceptable.

**Follow-up**

Symptoms remained stable for approximately two years. The patient then returned to see his GP with a recurrence of the same initial symptoms, possibly worse. Examination revealed further enlargement of his prostate (40g+) which remained smooth. His PSA had risen to 4.7.

The patient was referred for an ultrasound scan, which showed normal kidneys and ureters, but a trabeculated bladder wall and an enlarged prostate of 50g. He voided 257ml of urine, leaving a residual volume of 122ml.

He was commenced on finasteride 5mg, in addition to his tamsulosin, with a warning that it may have an adverse effect on sexual activity.

After two to three months, the patient noticed an improvement in his LUTS, which has been sustained to date. His PSA had fallen to 3.1 after six months on finasteride and continues to fluctuate between 3 and 4. His current LUTS are acceptable. He is aware that the next step may involve surgery or laser treatment.

**Case study – menopausal overactive bladder****Presentation**

A 52-year-old woman presented with frequency and urgency of urine during the day and nocturia four to five times a night. She reported having had symptoms for two years, but they had worsened in the last year. She also suffers flushing

and thinks this may wake her at night; she tends to void as she is awake. She works as a secretary and feels so tired that she is just not coping; she is worried that she is not doing her job properly. She reported that she keeps forgetting things, but is not sure whether this is because she is tired

or menopausal. Her libido is low, but again she thinks this is because she is tired. She also has vaginal dryness but uses lubricant, which helps.

### Medical history

- Two children aged 28 and 26, born normal vaginal delivery – no complications
- Vaginal hysterectomy at 47-years-old (ovaries preserved) due to menorrhagia and fibroids (was anaemic) – felt better post-operation
- Otherwise fit and well
- Non smoker, drinks alcohol socially
- Enjoys walking

### Physical examination

- Abdomen normal
- Vaginal examination – atrophic, small cystocele but no rectocele
- Pelvic floor moderate strength and no leak on coughing x 6
- BP 130/70, HR 80 b/min and regular
- Had blood tests two months ago for tiredness – all normal
- No known drug allergies, but allergic to plaster

### Diagnosis

Menopausal overactive bladder

### Management

The patient was asked about the most bothersome symptom and whether she had thought about trying anything. She had tried phyto-oestrogen tablets OTC for six months, but these had not helped.

HRT and risks versus benefits were discussed. The patient was worried about reports in the media and about heart attacks. It was explained that the reports were based on older studies with

combined HRT, that she could have oestrogen only (as she had no uterus), and that there was only a slightly increased risk of breast cancer. Topical versus oral versus patch HRT was discussed. The patient had no family history of breast cancer or DVT.

Frequency-volume chart (FVC): the patient has a sensible fluid intake, but drinks six cups of coffee and two cups of tea per day – frequency and urgency are worse in the day. Cutting down caffeine intake was discussed. The patient is happy to do this and will consider fruit tea, de-caffeinated tea /coffee, or water.

Nocturia: 150–200mls, and the patient feels that it is hot flushes waking her up rather than bladder symptoms. She reported having to throw the bed covers off due to feeling hot, but then feeling cold and needing to void. She also has a drink as she is thirsty.

The patient would like to try oral HRT, as she thinks that if she can control the flushes, she may not wake up so much, and she needs a better night's sleep. She is not keen on trying patches as she has an allergy to plaster; also, she has been told by friends that the patches fall off when they get hot.

Low-dose oestrogen 1mg prescribed. The patient will adjust fluid intake as discussed.

### Follow-up

Repeat FVC at four to six weeks. Adjusting fluid intake has helped with daytime symptoms (if urgency had persisted, an anticholinergic could have been considered, but it is not necessary in this case).

The patient understands that it is still early days with regard to the HRT, but thinks that her flushes are already less, and she is now only getting up twice during the night. HRT will be reviewed at three months, at which point it can either increase or stay the same.

## Case study – heart failure

### Presentation

A 71-year-old businessman presented reporting that he was finding it difficult to sleep at night. On further questioning, he reported waking three to four times at night with the need to pass urine. He passes 'good' volumes and has a good flow with no other voiding symptoms. He occasionally has some urgency, but no episodes of urge incontinence. He is a smoker and drinks four cups of coffee day.

### Medical History

Diabetes (type 2), angina

### Physical Examination

- Overweight
- Well kempt

- Clear lung fields and normal heart sounds
- Abdominal examination normal, although large body habitus
- Some bilateral leg swelling but good pulses throughout
- Digital rectal examination – moderately enlarged benign prostate
- Blood pressure 158/94, pulse irregular

### Diagnosis

Heart failure

### Management

- Lifestyle advice – smoking cessation, exercise, reduce caffeine intake
- Blood pressure management
- ECG

- Chest X-ray
- ECHO cardiography
- Blood tests: FBC, HbA1c, urine and electrolytes, liver and thyroid function, fasting lipids (consider brain natriuretic peptide)
- Frequency volume chart

#### Follow-up

- Review after ECHO and bloods
- Discuss fluid intake depending on frequency volume chart findings
- Consider small dose diuretic early in the day if appropriate

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