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The Standardisation of Terminology in Nocturia: Report from the Standardisation Sub-committee of the International Continence Society

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1. INTRODUCTION

Nocturia is the complaint that the individual has to wake at night one or more times to void. (International Continence Society Definition from ICS Standardisation of Terminology Report 2002).

Nocturia is a condition that has only recently begun to be recognised as a clinical entity in its own right rather than a symptom of some other disorder, or classed as one of many lower urinary tract symptoms. Studies that have investigated nocturia have varied in their definitions of the condition and its surrounding terminology, and these discrepancies have been highlighted in the literature [Robertson, 2000; Weiss & Blaivas, 2000; van Kerrebroeck & Weiss, 1999]. However it is defined, prevalence studies show that nocturia is reported to be a very common condition, affecting particularly older age groups [Chute, 1993; Malmsten, 1997; Swithinbank, 1998].

Four per cent of children aged 7-15 years were reported to experience habitual nocturia [Mattson, 1994], whereas the prevalence has been reported to be 58% and 66% in women and men of 50-59 years, and 72% and 91% in women and men over 80 years [Middlekoop, 1996]. It is evident that nocturia may not only present to the urologist, but that the gynaecologist, geriatrician, neurologist, sleep expert, endocrinologist and general practitioner will all be consulted by patients with this problem. Each specialty is likely to approach their patients from a different perspective, and it is important that some of the basic terms surrounding nocturia have specific definitions so that each individual physician is referring to the same condition and managing it appropriately.

In order to further the discussion on nocturia and in particular, how it should be defined and investigated, a series of meetings were held to facilitate discussion and to reach consensus on definitions [Mattiasson, 1999]. These discussions were finalised in March 2000, and are presented here as an aid to primary and secondary care clinicians involved in assessing and treating patients who suffer from nocturia, and to aim towards standardisation in future clinical study design.

These are the first recommendations for the diagnosis of nocturia. Most of the terms used are listed in Table I, along with their existing or newly agreed definitions. When considering 'normal' measurements, an average 70 kg individual who sleeps 8 hours a night is the basis for these values, and ranges are generally considered to be within 2 standard deviations of

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TABLE I. Definitions of Terms Associated with Nocturia and Derived from the Frequency Volume Chart

Terms	Definition
Nocturia	Is the number of voids recorded during a nights sleep: each void is preceded and followed by sleep
Nocturnal urine volume	Total volume of urine passed during the night including the first morning void (see definition)[a]
Rate of nocturnal urine production	Nocturnal urine volume/time asleep (i.e. night). Measured in ml/min[a]
Nocturnal polyuria	Nocturnal urine volume >20-30% of total24h urine volume (age dependent)[a]
24 hour voided volume	Total volume of urine voided during a 24 hour period (1st void to be discarded; 24 hours begins at the time of the next void)
Polyuria	24 hour voided volume in excess of 2800 ml (in 70kg person, i.e. >40ml/kg)
Night[b]	The period of time between going to bed with the intention of sleeping and waking with the intention of arising
Night-time frequency[b]	Is the number of voids recorded from the time the individual goes to bed with the intention of going to sleep, to the time the individual wakes with the intention of rising[a]
First morning void	The first void after waking with the intention of rising
Maximum voided volume	The largest single voided volums measured in a 24 hour period[a]

[a]In the new ICS terminology report these are signs as their derivation is from the frequency volume chart. Symptoms are defined as complaints.
[b]These terms from the definition of nocutira but may be useful in research studies, for example in urine production rate, related to posture.

this. It must be noted that, while these guidelines aim to provide help with diagnosis, each physician must be prepared to use their clinical judgement in individual cases, as the boundaries of the categories presented are not fixed, and a person's nocturia may have mixed aetiology.

2. CLINICAL ASSESSMENT

The assessment of nocturia can be described by a simple algorithm, which is outlined in Fig. 1. This considers the possibility that the patient may present to the physician specifically because of nocturia, or may present with another condition, whilst also suffering from nocturia. It is possible that a physician will be able to determine nocturia as one cause of distress if the correct questions are asked, which enables further investigation as to the course of nocturia. Of course, there will be a proportion of the population with nocturia, who are not bothered by their condition and who do not present to a clinician at all. However, by definition, these individuals should still be classified as having nocturia. Initial screening can lead to lifestyle advice or to further investigations, which will enable the aetiology to be determined and an appropriate management strategy developed.

2.1 Nocturia

Nocturia is waking at night to void. This applies to any number of voids at any time during the night, as long as the person is awake before voiding. When voiding occurs during sleep, this is nocturnal enuresis. Both conditions can be referred to as night-time voiding, although the distinction between the two is clearly determined by the state of wakefulness.

The first morning void is not included as a night-time void since this is a natural expulsion of the urine produced during the night. In addition, although many people may consider one nighttime void to be normal, they are still considered to have nocturia. For some individuals, the trigger for waking may not be a desire to void, yet voiding is perceived to be necessary once awake; however, these individuals are still considered to have nocturia. Those (e.g., the infirm or frail elderly) who wake with the need to void, but are unable to reach the bathroom before voiding, have a mixture of nocturia and incontinence, not nocturnal enuresis. Patients experiencing nocturia may or may not be bothered by this condition and it is the level of bothersomeness that will determine their help-seeking behaviour.

2.2 Night

Night-time is the period of time between going to bed with the intention of sleeping and waking with the intention of arising. It must be noted that this varies with age, and elderly people often spend longer periods of time in bed than younger people. It is important that the sleeping time is considered, not the actual time in bed.

Shift workers may have a variation in their night-time, and the same definition exists for them. The same is true for people who split their sleeping time into two or more periods during the day. Jet-lag and varied shift patterns may disrupt the natural circadian rhythm and this can lead to poor sleeping patterns, disrupted sleep and nocturia.

2.3 Screen

An initial screen should include a detailed history, including questions relevant to voiding behaviour, medical and neurological abnormalities and sleep disturbance, as well as information on relevant surgery or previous urinary infections. A simple urine test, such as dipstick or urinalysis,

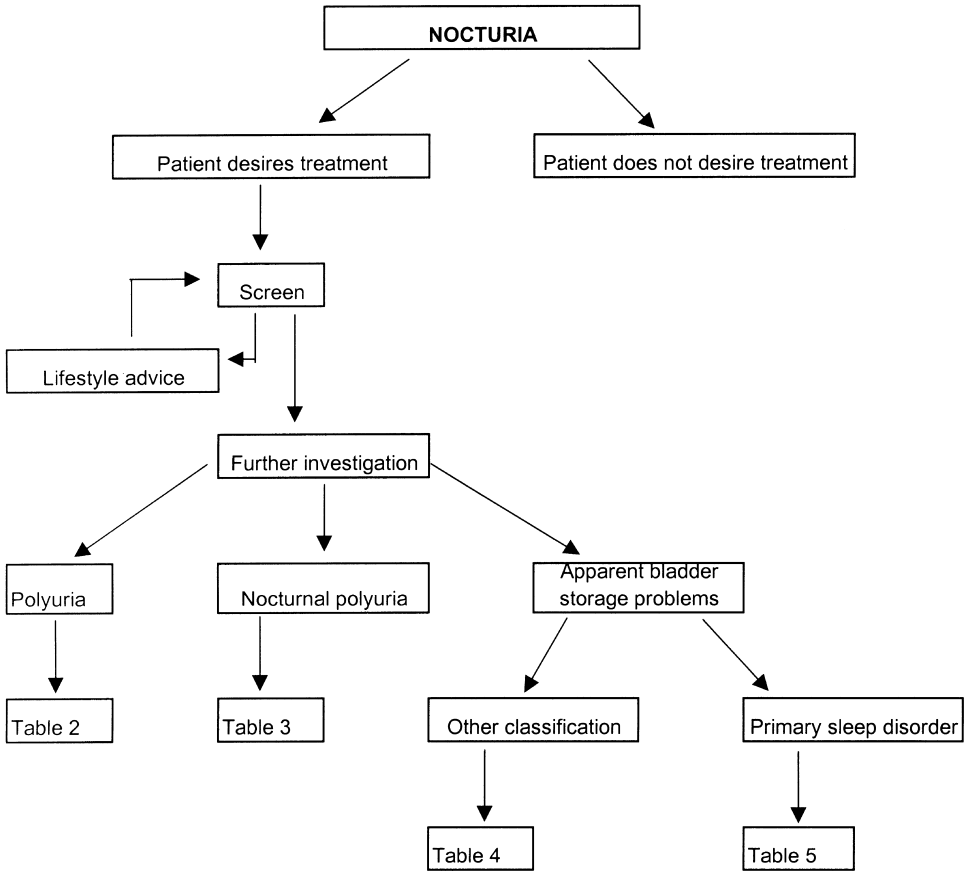

Fig. 1. Patients without any bother may present with a different conditions, when nocturia is indentified.

should be performed to exclude any relevant pathology. A physical examination should also be performed.

2.4 Advice

General lifestyle advice, such as reducing caffeine and alcohol intake, and limiting excessive liquid/food volume intake prior to bedtime can, in some cases, be sufficient to elicit a satisfactory response. However, care should be taken not to impose a general fluid restriction as this could have serious consequences in patients with undiagnosed diabetes insipidus. Patients should be encouraged to return to their doctor for further evaluation if they are not content with the results following their initial advice.

2.5 Further Evaluation

This should begin by asking the patient to keep a frequency/volume chart. The chart should also include a record of the volume and type of fluid ingested as well as the volume and time of each voided urine for 24 to 72 hours. It also should include the time of retiring to bed, time of rising and subjective evaluation of whether each night measured was good, bad or normal in terms of their usual sleeping pattern. In research studies, the impact on quality of life should also be measured using questionnaires such as ICS male [Donovan et al., 1996] or the DAN-PSS in men: [Hald et al., 1991] and the BFLUTS in women [Jackson et al., 1996], which allow the assessment of the occurrence of nocturia and the degree of problem or bother that it causes. No specific measure has yet been devised to evaluate the full impact of nocturia on aspects of everyday life, although one is currently under development.

If a sleep disorder is suspected, a nocturnal polysomnograph should be considered. Examples of sleep disorders with a potential relation to nocturia are presented in Table 5. The pathophysiological causes of these disorders are not fully clarified and may be due to polyuria (e.g., obstructive sleep apnoea syndrome) or arousals with voiding (e.g., insomnia) [Thorpy, 1990].

2.6 Polyuria

A patient with urine output exceeding 40 ml/kg bodyweight during a 24 hour period should be considered to be suffering from polyuria. This should be investigated further to determine if the polyuria is due to a solute diuresis (e.g. diabetes mellitus) or diabetes insipidus and, if it is the latter, which type of diabetes insipidus is present (Table II). These distinctions can be made by measuring the glucose, specific gravity and osmolality of a 24 hour urine collection, followed by a

TABLE II. Causes of Polyuria

- Diabetes mellitus
  - Insulin dependent (Type I)
  - Insulin independent (Type II)
- Diabetes insipidus
  - Pituitary
  - Renal
  - Gestational
  - Primary polydipsia (Psychogenic, dipsogenic or iatrogenic)

variety of more specialized tests best undertaken by the appropriate subspecialist [Robertson, 1995].

2.7 Nocturnal Polyuria

Nocturnal polyuria [Asplund, 1995; Carter, 1992] is defined as the production of an abnormally large volume of urine during sleep. The measurement should include all the urine produced after going to bed and the first void after arising. It can be expressed in several different ways [Robertson, 1999]. If the 24 hour urine volume is normal, the output during sleep can be expressed as a percentage of the total. This value varies considerably from person to person and normally increases with age. Healthy young adults from 21 to 35 years of age excrete around $14 \pm 4\%$ or their total urine between the hours of 11 p.m. and 7 a.m. (95% CI = 10-19%) [Robertson et al., 1999), whereas older people excrete an average of $34 \pm 15\%$ (95% CI = 30-36%) [Rembratt et al, 2000; Kirkland et al, 1983]. Thus, nocturnal polyuria may be defined as an output greater than of 20% of the daily total in the young and 33% [Carter, 1992] in the elderly with the value for middle age probably falling somewhere between these two extremes. Exceptions to this rule are patients with diabetes insipidus, and those whose sleeping patte-ns vary greatly from the normal eight-hour night-time pattern. There are many causes of nocturnal polyuria that should be considered when carrying out further investigations (Table III).

2.8 Bladder Storage Problems

Patients with nocturia, who do not have either polyuria or nocturnal polyuria according to the above criteria, will most likely have a reduced voided volumes or a sleep disorder. The former can be determined from the frequency volume chart by comparing the night-time voided volume with the maximal bladder capacity that occurs at any time, however a definite range of normal or abnormal volumes is currently lacking, and it is for the physician to evaluate their patients based on the frequency volume charts and their clinical judgement. Some mathematical indices have been suggested in the literature to describe this situation; measurements of the nocturia index (mean measured nocturnal urine volume/functional bladder capacity*) and nocturnal polyuria index (mean measured nocturnal urine volume/24h voided volume) may be very useful in a clinical trial situation, although an explanation of these is beyond the scope of this document and can be found in other publications [Weiss et al, 1998; Weiss & Blaivas, 2000; van Kerrebroeck & Weiss, 1999]. For patients exhibiting signs of bladder storage problems, further urological investigation should be carried out to determine the classification of the problem (Table IV).

Some patients will have been categorised as having bladder storage problems, which is borne out by their frequency volume chart, yet their real problem is one of sleep disturbance. Patients who are constantly waking at night due to other reasons may feel the need to void at each waking stage, and void a small volume. This might appear to the physician to be a problem with bladder storage, especially if the patient is unaware of the sleep problem. Further investigation in a sleep laboratory may be necessary to determine the cause of nocturia in these patients (Table V).

TABLE III. Causes of Nocturnal Polyuria

- Water diuresis
  - Circadian defect in secretion or action of antidiuretic hormone
    - Primary (Idiopathic)
    - Secondary (Excessive evening intake of fluid, caffeine, alcohol)
- Solute/water diuresis
  - ○ Congestive heart failure
  - ○ Autonomic dysfunction
  - ○ Sleep apnoca syndrome
  - ○ Renal insufficiency
  - ○ Oestrogen deficiency

TABLE IV. Causes of Problems Related to Bladder Storage

- Reduced functional bladder capacity (e.g., significant post void residual)
- Reduced nocturnal bladder capacity
- Detrusor overactivity
  - ○ neurogenic (e.g., multiple sclerosis)
  - ○ non-neurogenic
- Bladder hypersensitivity
- Bladder outlet obstruction with post void residual urine
- Urogenital ageing

TABLE V. Sleep Disorders Potentially Related to Nocturia

- Insomnia
- Obstructive and central apnoea syndrome
- Periodic legs syndrome
- Restless legs syndrome
- Parasomnias
- Sleep disorders related to medical discases, e.g., chronic obstructive lung disease, cardiac diseases etc.
- Sleep disorders related to neurological diseases, e.g., Alzheimer's, Alzheimer's, Parkinson's and nocturnal epileptic seizures

*The term functional bladder capacity, deduced from frequency volume chats, has been superceded by "voided volume" in the lates ICS Terminology Report.

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