

## Nocturia in the Elderly

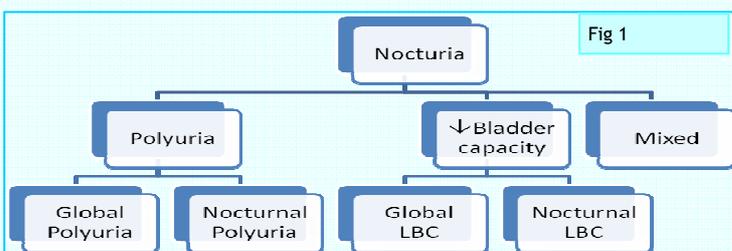
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“Nocturia” is defined by the International Continence Society Standardization of Terminology Report in 2010 as “the complaint that an individual has to wake at night one or more times to void”. Each void is preceded and followed by sleep. If the elderly wakes up at 4am to void but does not go to sleep afterwards, that void would not be counted as nocturia. The difference between “Nocturia” and “Enuresis” is that patient with “Nocturia” is awake during voiding at night while patient with “Enuresis” is sleeping during the void. An elderly who wakes with the need to void but is unable to reach the toilet before voiding is having “Nocturia + Urinary Incontinence” and not “Enuresis”.

The prevalence is around 20% in the young but increases to around 60-70% for those aged  $\geq 65$ . One episode of nocturia may not be so problematic but 2 or more episodes will be much more troublesome. The prevalence of nocturia  $\geq 2$  episodes at night is around 10-15% in the young and increases to around 50% in the elderly.

Nocturia is the main cause of disturbed sleep in the general population and can have a substantial adverse effect on the patient’s quality of life. Patients with nocturia have higher risk of falls and fractures and higher overall mortality.

In general, nocturia can be classified into 2 main groups (Fig.1): Polyuria and Low Bladder Capacity (LBC). Polyuria group can further be divided into Global Polyuria and Nocturnal Polyuria while LBC can also be subdivided into Global LBC and Nocturnal LBC. It is not uncommon that an elderly patient has mixed type where any combination of the above and even all 4 types occurring at the same time.



**Global Polyuria** is defined as 24 hour urine volume more than 40ml/kg. In the bladder diary, there will be increased frequency during both daytime and nighttime while the voided volume is near normal. Causes include uncontrolled diabetes mellitus, diabetes insipidus, renal insufficiency, hypercalcaemia, hypokalemia, psychogenic polydipsia, drug-induced (e.g. diuretics), tea, caffeine, alcohol drinking, etc. (Fig. 2)

### Causes of Global Polyuria:

- ⇒ Diabetes mellitus
- ⇒ Diabetes insipidus
- ⇒ CRF or renal insufficiency
- ⇒ HyperCa, HypoK
- ⇒ Psychogenic polydipsia
- ⇒ Drugs (e.g. diuretics)
- ⇒ Tea, Caffeine, Alcohol, soft drinks

**Nocturnal Polyuria** is defined as production of an abnormally large volume of urine during sleep. This can be expressed by the **Nocturnal Polyuria Index (NPI)** which is the proportion of nocturnal urine volume compared with 24 hour urine volume. The NPI is age-dependent. Nocturnal Polyuria is defined as NPI  $>33\%$  in the elderly (age  $>60$ ) and NPI  $>20\%$  in the young (age 21-35). The normal NPI will be 20-33% for those aged in between. The causes are listed in Fig. 3.

### Causes of Nocturnal Polyuria:

Fig 3 Causes of Nocturnal Polyuria

1. Peripheral edema with fluid re-distribution:
  - ⇒ CHF, CRF, Cirrhosis, Nephrotic syn.
  - ⇒ Autonomic system dysfunction
  - ⇒ Vasodilator drugs (e.g. Ca antagonists)
  - ⇒ Pregnancy
2. Circadian defect in secretion or action of ADH
  - ⇒ Primary (Idiopathic): aging, stroke, CNS disorders
  - ⇒ Secondary: Excessive evening intake of fluid, caffeine, alcohol
3. High Atrial Natriuretic Peptide Level during sleep
  - ⇒ Obstructive Sleep Apnea

**Global Low Bladder Capacity** is very common among the elderly. In the bladder diary, there will be increased frequency during both daytime and nighttime while the voided volume is well below normal. Patients may also have complains of urgency or urge incontinence. There is a long list of causes (Fig.4) where Detrusor Overactivity and Impaired Detrusor Contractility with high post-voided urine volume are most commonly found in the elderly.

**Nocturnal Low Bladder Capacity** is defined as abnormally low voided urine volume at night. **Nocturnal Bladder Capacity Index (NBCi)** is commonly used in studies for assessment of severity and response to treatment but may not be necessary for daily practice. Pure form is usually idiopathic or related to primary sleep disorders (Fig. 5).

The first step in managing patients with nocturia is proper assessment and accurate diagnosis. A proper 3-day Bladder Diary + Water Intake Chart will be most useful. Checking post-voided residual urine and routine blood & urine tests are usually performed to aid the diagnosis. However, assessment is much more complicated in the elderly as they usually have multiple causes for the nocturia and have multiple medical problems. Successful management may require multiple treatment strategies.

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Several general measures or advices are usually taught to patients. Patients are usually advised to reduce fluid intake 4-6 hours before sleep. Studies showed that such measure alone is not effective in treating nocturia. It will only improve in those patients who drink too much before sleep. On the other hand, for those patients already drink very little before sleep, there is a risk of developing or exacerbating dehydration-induced cerebral infarction at night though there is no concrete evidence. Avoiding caffeine, tea or alcohol intake before sleep is also commonly recommended.

Another general advice is exercise in the evening or at night. The pumping action of the muscles will return accumulated interstitial fluid to the blood vessels and that some excess water is also removed as sweat. Exercise is also effective in relieving stress, which can be related to sleep disorders. However, there is so far no RCT to prove it.

For those patients having evidence or risk of fluid retention, measures to reduce peripheral fluid retention or edema such as compression stockings, daytime nap of 30min with the leg elevated above heart level can be recommended. Again, there is no RCT to prove it so far.

There are several class of drugs commonly prescribed for treating nocturia. They are not without side effects and so need to be carefully selected to suit each individual patient's condition.

Desmopressin is a synthetic analogue of the normal human anti-diuretic hormone (ADH, vasopressin). It is a selective V2 receptor agonist which increases water re-absorption in the renal collecting ducts and the ascending limb of Henle's loop, reducing urine volume and increasing urine osmolality. The anti-diuretic effect is 3-10 folds greater than vasopressin but has minimal vasopressor (V1) activity. Meta-analysis showed that it is highly significant in reducing the number of nocturnal voids, nocturnal urine volume and increasing the duration of first sleep period while there is no statistically difference in the occurrence of adverse effects when comparing to placebo. However, the risk of hyponatremia is reported to be around 5-14%. The risk factors of developing hyponatremia include: elderly, concomitant diseases like heart problems, renal & liver disease, low basal serum sodium level and high baseline 24 hour urine output. There are 4 formulations. Injection type is never used for treating nocturia. Intranasal spray 1-2 spray nocte can be used but is uncommonly used. The oral tablet form has the lowest bioavailability, only ~8% of the oral dose is absorbed into the circulation. The commonest formulation used for treating nocturia is the sublingual "Melt" formulation which will dissolve in 3 seconds when placed under the tongue and does not require drinking water to take the drug. The usual dosage for adults is 60-120 microgram nocte.

Another commonly used drug is Diuretic. A dose of Frusemide 20-40mg 6 hour before sleep can be used for those patients with possibility of fluid retention state in the daytime. Studies showed significant reduction in nocturnal voiding, nocturnal urine volume and increased duration of first sleep period.

Imipramine and other tricyclic anti-depressants have several actions. Its peripheral anti-cholinergic activity has direct inhibitory action on the bladder smooth muscles to reduce unstable bladder contractions. It inhibits peripheral catecholamine re-uptake resulting in a sympathomimetic effect which further reduces unstable bladder contractions. It also has anti-diuretic action independent of ADH. It is reported that it is related to the  $\alpha$ -adrenergic receptor stimulating action in the proximal renal tubules and secondarily to increased distal tubular urea and water re-absorption. Studies showed effectiveness in the treatment of nocturnal enuresis. However, there is no RCT on treating nocturia. It will be useful if the patient has concomitant depression problem and its use is limited by the frequent side effects like arrhythmias, drowsiness and impaired attention & concentration.

For patients with low bladder capacity due to overactive bladder, anti-muscarinic drugs (e.g. Oxybutynin, Tolterodine, Solifenacin and Trospium) can be used to reduce unstable bladder contractions. Patients with impaired detrusor contractility will be treated with cholinergic agents like Distigmine Bromide. Patients with bladder outlet obstruction due to prostatic diseases can be treated with  $\alpha$ -blockers and/or 5 $\alpha$ -reductase inhibitors.

In summary, the initial approach to a patient complaining of nocturia involves classifying the type of nocturia problem. Elderly usually has mixed type of problems and has multiple associated medical diseases and successful treatment usually involve multiple treatment strategies.

#### Causes of Global LBC:

Fig.4 Causes of Global Low Bladder Capacity

- A. Space occupying lesion inside bladder:
  - ⇒ Bladder tumors - 1° or 2°.
  - ⇒ Large bladder stone.
- B. External compression
  - ⇒ Pregnancy
  - ⇒ Pelvic tumour (1° or 2°)
  - ⇒ Faecal impaction
- C. Less distensible bladder wall
  - ⇒ Ageing effect: slight decrease bladder capacity with increasing age.
  - ⇒ Bladder wall lesions: Bladder tumors.
  - ⇒ Low compliance bladder
    - Hypertrophied bladder, chronic outflow obstruction, T.B., post-irradiation, interstitial cystitis, etc.
  - ⇒ Unstable bladder contractions
    - Detrusor Overactivity (Idiopathic, Neurogenic)
    - Inflammation
      - ◇ UTI, interstitial cystitis, prostatitis, atrophic vaginitis & urethritis, post-irradiation cystitis, etc.
    - Irritating Masses
      - ◇ Bladder stone, CA bladder, BPH, CA prostate, foreign bodies.
    - Drugs with cholinergic effects, stimulant laxatives, etc.
    - Caffeine (coffee, cola, tea, chocolate).
    - Too concentrated urine due to too little fluid intake.
- D. Reduced bladder size
  - ⇒ Partial or total cystectomy
- E. Functional low bladder capacity due to high post-voided residual volume (PVR)
  - ⇒ Bladder outlet obstruction
    - BPH, CA prostate, urethral stricture, CA urethra
    - Detrusor-sphincter-dyssynergia
  - ⇒ Detrusor Underactivity (impaired detrusor contractility)
    - Nerve injury: birth trauma, rectal operation, cauda equina, DM autonomic neuropathy, etc.
    - Drugs with anti-cholinergic S/E: narcotics, cough medicine, Parkinsonism drugs, anti-psychotics, anti-depressants, etc.
- F. Psychogenic
  - ⇒ Anxiety, Obsessive behavior, etc.
  - ⇒ Adaptive behavior to prevent urinary incontinence.

#### Causes of Nocturnal LBC:

1. Idiopathic nocturnal detrusor overactivity
2. Primary Sleep Disorders
  - ⇒ Insomnia
  - ⇒ Obstructive & central sleep apnea syndrome
  - ⇒ Periodic Limb Movement Disorder
  - ⇒ Restless Leg Syndrome
  - ⇒ Parasomnias
  - ⇒ Sleep disorders related to medical diseases
    - e.g. COPD, cardiac diseases, etc.
  - ⇒ Sleep disorders related to neurological diseases
    - e.g. Alzheimer's, Parkinson's diseases, nocturnal epileptic seizures, etc.

Fig. 5 Causes of Nocturnal Low Bladder Capacity

# Clean Intermittent Catheterization — By Self or By Carer

By Lam Mo Ching, NO Continence Advisor, FYKH

## Introduction:

Clean Intermittent self-catheterization is to introduce a catheter into the bladder to drain urine, the catheter is removed afterward and the patient is catheter-free between catheterization. Patients can retain independence and improve their quality of life since the patient is in control of their bladder. The frequency depends on patients' individual need, fluid intake, bladder capacity and life style. The most possible time is on patients' waking up and just before going to bed and every 3-4 hours during the day.

## Indications:

- Chronic retention of urine
- Neurogenic bladder: spinal bifida, multiple sclerosis, Parkinson's disease
- Detrusor Hyporeflexia/ Areflexia (Hypo-contractile/Atonic bladder)
- Overflow incontinence: e.g. BPH
- Detrusor-sphincter dyssynergia

## Advantages:

- Maintain bladder functional capacity and urethral sphincter integrity
- Prevent reflux of urine into the upper urinary tract
- Lower incidence of urinary tract infection compared with indwelling catheter.
- Relieve symptoms of incomplete bladder emptying i.e. frequent small amount of urine, urgency, urge incontinence, nocturia, etc.

## Disadvantages:

- Patients need to have reasonable degree of manual dexterity.
- Female patients need to be mobile enough to gain access to the urethra.

## Suitable clients:

- Retention of Urine/ incomplete bladder emptying
- Sufficient larger bladder capacity and a continent sphincter
- Intact urethra: free from stricture
- Accept physically and mentally
- Reasonable degree of manual dexterity
- Female client can position to attain reasonable access to the urethra.
- Motivated and able to learn the technique
- A willing carer to perform only if agreeable to both

## Types of catheter



Nelaton



Lofric



Speedicath  
Compact  
Male



Speedicath



Speedicath Control



Speedicath Compact



Speedicath Complete

## Size of catheter:

Adult : 10-12 Fr (Female) 10-14 Fr (Male) 14-18 Fr (urethral dilatation)

Catheter tip should be very smooth and carries drainage eyes

## Equipment:

- ⇒ Suitable size of catheter
- ⇒ Water soluble lubricant: KY Jelly
- ⇒ A container
- ⇒ Wet wipe / wet cotton wool ball
- ⇒ Liquid soap
- ⇒ Hand towel
- ⇒ Litter bag

## Teaching the skill:

- ⇒ Explanation on simple basic **anatomy** of the lower urinary tract and the length of the urethra is important
- ⇒ **Hand washing** technique: soap and water before performing the self-catheterization
- ⇒ **Genital area** must be washed and cleaned at least twice a day preferably before procedure
- ⇒ **Catheter insertion**

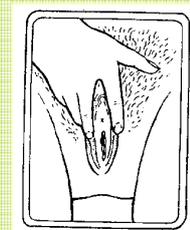
- To teach the **male** to facilitate insertion:

- ◇ hold the penis at an angle 60 degree to horizontal during catheter insertion



- To teach the **female**:

- ◇ suitable position with the aids of mirror with adequate lighting
- ◇ locate the urethral orifice and genital region
- ◇ locate the urethral and meatus by sensatio



### Urine can be drained directly into the toilet bowl



Using a toilet.

### Clean Intermittent Catheterization by caregiver (Female)

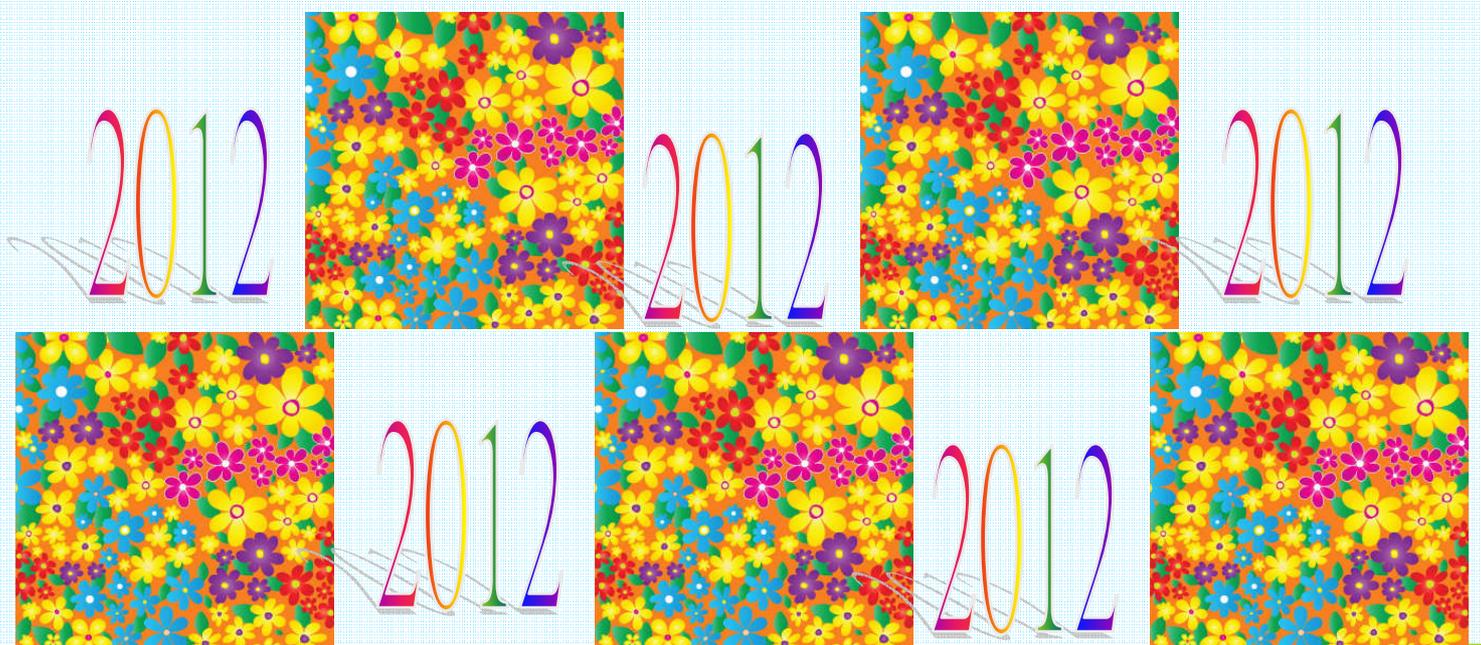
- ⇒ May use of disposable gloves
- ⇒ Position patient in a supine position. Flex the knees of the female
- ⇒ Lubricate about 5 cm from the tip
- ⇒ Clean the private area from top to downward & inside outward using a clean swab/wet wipe each time
- ⇒ Part the labia first using left hand
- ⇒ Clean the urethra with right hand
- ⇒ Keep left hand in position and gently insert the lubricated catheter with right hand into the urethra orifice
- ⇒ Measure and record

### Inserting the catheter :

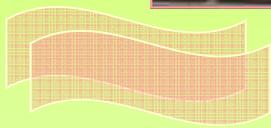
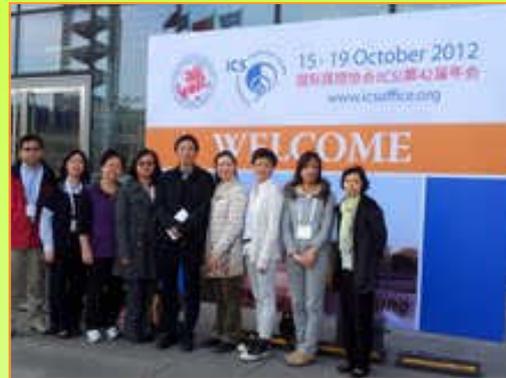
- ⇒ For Female : 5-7.5 cm is to be inserted
- ⇒ For Male : about 15 cm to 20 cm
- Pass the catheter through the urethra into the bladder slowly until urine is seen flowing out, then insert 1 more cm and left in position until the flow of urine stop draining out, then hold the catheter and slowly withdraw the catheter

### Other advice:

- ⇒ Teach clients to try to pass urine before emptying the bladder. Clients who can void urine by themselves may reduce the frequency and lengthen the interval gradually
- ⇒ Adequate fluid intake but avoid fluid intake 2 hours before bedtime
- ⇒ Avoid constipation
- ⇒ If inability to insert the catheter : try to relax and attempt the technique again then seek medical assistance if repeat attempt fails
- ⇒ If inability to remove the catheter after emptying the bladder: may be due to bladder spasm, try to relax for a few minutes and try again then seek medical assistance if repeat attempt fails.
- ⇒ Make sure that the bladder is completely emptied by rotating the catheter and changing position
- ⇒ Immediate catheterization before sleep
- ⇒ Evaluate patient's/ carer's technique
- ⇒ Plan the schedule of catheterization
- ⇒ Teach to record the fluid intake, urine voiding and catheterization volume
- ⇒ Reinforce the personal perineal hygiene care
- ⇒ Monitor the complications e.g.UTI, Haematuria, Urethral trauma, urethritis, urethral stricture, false passage, renal and bladder stone and epididymo-orchitis
- ⇒ Long-term antibiotic prophylaxis is not recommended



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