# PREVALENCE, INCIDENCE AND ASSOCIATED FACTORS OF
# NOCTURIA ON THE WARD

Veerle Decalf[1], Ronny Pieters[2], Karel Everaert[2], Mirko Petrovic[3], Wendy Bower[4]

[1]Department of Medical Sciences, Ghent University, Ghent, Belgium

[2]Department of Urology, Ghent University Hospital, Ghent, Belgium

[3]Department of Geriatrics, Ghent University Hospital, Ghent, Belgium

[4]Department of Rehabilitation Services, The Royal Melbourne Hosital, Melbourne, Victoria, Australia

GHENT
UNIVERSITY

UZ
Universitair Ziekenhuis Gent

NOPIA
NOCTURNAL POLYURIA

## Introduction and summary

Nocturia is a common symptom of systemic disease and very prevalent in older community-dwelling adults. Up to 80% of nocturia is associated with increased diuresis during the night. This is likely to be due to solute excretion, free water excretion, cardiovascular illness, lower limb oedema or an acute medical condition. Medical wards manage co-morbidities of nocturia, but there is a paucity of information on prevalence, incidence and severity of nocturia and associated factors in hospitalised patients.

While managing nocturia is based on an approach that targets the underlying causes, general lifestyle changes can help managing the symptoms of nocturia as well. Such lifestyle changes include maintaining a good sleep routine, dietary modification (diet, fluid intake and caffeine), smoking cessation and reducing peripheral oedema. However during hospitalization, lifestyle habits are disturbed, perfusions and medication are given, patients are less mobile, etc.

Assessing nocturia in acutely hospitalised (older) people is not the current practice and ward-based care plans are not tailored to this symptom. Nevertheless, nocturia is a known risk factor for in-hospital falls.

The study of the prevalence, incidence and severity of nocturia and factors related to nocturia on the ward is important to public health for assessing the burden of nocturia in hospitalized patients. This study will also provide a basis for the Nocturia On the Ward project where the final aim is to embed a new care pathway into daily practice for hospitalized patients who suffer from nocturia.

## Summary

### Research aims

The aim of this study is to describe the incidence and prevalence of nocturia on aged care hospital wards. A secondary aim is to identify associations between nocturia whilst hospitalized and variables related to admission, medical history, sleep, mobility, independence, medication use and habitual behaviours.

### Study hypothesis

1.  Hospitalized older people suffer more from nocturia on a hospital ward than at home.
2.  Factors as sleeping and drinking habits, balance, mobility, needing help to use the toilet, transfer and walk, medication (incl. perfusion), peripheral oedema, environment, worries about sickness and treatment are associated with the incidence of nocturia on the ward.

### Outcome measures

Presence of nocturia before admission to the hospital, nocturia during hospitalization, variables associated with nocturia measured on questionnaires developed for this research using validated items.

### Research design

Prospective cross-sectional study in acutely hospitalized older people

# Objectives

## Overall goal

The objective of this study is twofold:

    **a.** To describe the incidence and prevalence of nocturia on aged care hospital wards.

    **b.** To identify significant associations between nocturia whilst hospitalised and variables related to admission, medical history, sleep, mobility, independence, medication use and habitual behaviours.

## Specific objectives

    **a.** What is the incidence and prevalence of nocturia in patients on aged care hospital wards?

        Hypothesis: Hospitalized older people suffer more from nocturia on a hospital ward than at home.

    **b.** Which variables are associated with nocturia whilst hospitalised?

        Hypothesis: Factors as sleeping and drinking habits, balance, mobility, needing help to use the toilet, transfer and walk, medication (incl. perfusion), peripheral oedema, environment, worries about sickness and treatment are associated with the incidence of nocturia on the ward.

## Literature review

One of the recommendations from the 6th International Consultation on Incontinence was that further research be performed on the mechanisms, prevalence, incidence, and remission rates of lower urinary tract symptoms in acutely hospitalised older people (Abrams et al 2017 pg 461). It was further stated that each of the known causes should be identified.

In hospital, the lower urinary tract symptoms of urinary urgency, incontinence, frequency and nocturia, have been identified as risk factors for falls among older adults (Hui-Chi 2004; Nakagawa 2008 and 2010; Vaughan 2010; Brown 2009; Abreu 2015; Hitcho 2004).  Nocturia, waking at least once from sleep because of the urge to void, increases in prevalence with age. In individuals over 70 years of age, up to 93% of men and 77% of women will toilet once per night and 60% will experience nocturia twice or more (Bosch 2010). The symptom was previously considered a hallmark of overactive bladder, but has recently been attributed to an interaction of causes, often outside the urinary tract system.  Voiding at night is a common symptom of systemic disease, for example nocturia is seen with poorly controlled diabetes, impaired circulation, congestive heart failure, metabolic syndrome, anxiety and autonomic dysfunction, airway occlusion during sleep and renal and malignant disease (Nakagawa 2010; Bing 2008).  One of the main drivers of the need to void is an increase in diuresis at night. This can reflect a disorder of solute or free water excretion, systemic illness, injury-related oedema or result from medical management of an acute condition.

Unmanaged nocturia has significant morbidity and is associated with impaired general health (Chung 2014). In fact, individuals with more than 2 nocturia episodes per night have double the risk of early death and over 4 times the risk of cardiovascular / cerebrovascular morbidity (Nakagawa 2010; Kupelian 2012; Rosen 2013).  Patients with nocturia have a markedly increased risk of injurious falls compared to people who sleep through the night (odds ratio of 2.2 for any fracture and 1.4 for hip fracture) (Damian 2013).  In residential care falling is related to attempts to toilet independently (Damian 2013).

Falls whilst in hospital have been shown to occur more between the hours of 2 and 4am than at any other time interval (6 Pack study 2014).  In aged care wards, fall rates are 9 per 1000 bed days (Cumming 2008) and 2-12 for the same period in general hospital wards (Quigley

2009). In the rehabilitation context, 46% of stroke patients are likely to fall (Forster and Young 1995). Whilst serious injuries from in-hospital falls occur in only a small percentage of cases, patients who fall are more likely to have a longer hospital stay and display reduced confidence and functional ability on discharge. Overall, medical costs and hospitalization days are increased up to threefold for patients with nocturia even after adjustment for age, sex and known diseases or risk factors (Nakagawa 2009).

In primary care nocturia is often under-reported, possibly because patients with nocturia present with complex medical issues.  This is likely to also be the case on our aged care and rehabilitation wards. Nocturia is significantly associated with poor health but unlikely to have caused the hospital admission. The number of times a hospitalized patient experiences nocturia may fluctuate night to night because of their illness and be quite different to their pre-admission pattern (van Doorn 2011).  Toileting programs in an acute setting require a staff to patient ratio of 1:5 (Abrams 2017). During the night there are less toileting opportunities, especially for individuals who are care-dependent or have limited mobility. Night time use of pads for containment of urine is often instituted for patients with nocturia, even when they are not incontinent.  This is common practice after a fall in hospital, especially when staffing levels are insufficient to assist with toileting (Sacco-Peterson 2004). Indiscriminate use of pads is not therapeutic management of nocturia.

Recently Targeting Aetiology of Nocturia Guides Outcomes (TANGO) was developed, a multidisciplinary screening metric to capture of multiple and co-existing variables underlying nocturia (Bower 2017). The tool has been subject to psychometric analysis and proven to have robust qualities (Rose 2017).  TANGO can be used to screen for nocturia in the aged care and rehabilitation ward environment.

In literature there is a paucity of information about the prevalence, incidence or severity of nocturia in older hospitalised patients.

## Relevance to urology nursing

The role of (urology) nurses involves clinical nursing practice, patient education and prevention. Health promotion by urology nurses about nocturia can lead to positive health outcomes including patients' and colleagues' knowledge of nocturia and self-management in older hospitalized patients.

Nocturia is a symptom which is treated in the medical discipline urology and urology nurses have multidisciplinary knowledge and experience of health promotion in urology nursing. For that reason, urology nurses have to be involved in the research and development of a ward-based intervention plan for nocturia.

# Methodology

## Study Design

We will undertake a prospective cross-sectional study to collect data on a small part of hospitalized older patients to get information about incidence and prevalence of nocturia and associated variables.

We will collect data every three weeks (turnover of almost all patients on the geriatric ward) and study multiple outcomes. We will do descriptive analyses and generate hypothesis about factors that probably are related to the incidence of nocturia while hospitalized.

Limitations of this study design are that the answers of the patients depend on their memory (recall bias) and the associations identified are difficult to interpret.

## Study procedures

Local ethics committee approval will be obtained for this study as well as informed consent from all individual participants included in this study.

Confidential interviews will be undertaken in consecutive hospitalised patients on or after Day 2 following admission to aged care wards. Patients will be recruited by a urology nurse, trained in obtaining informed consent as well as in conducting questionnaires. The nurses of the ward, delivering integrated care, will be asked whether the eligible older patients meet the inclusion criteria and whether it is appropriate for a study nurse to visit the patient while in a stable condition (e.g. no study visit after disclosing unfavourable information to the patient, before invasive procedures).

We will use an interview mode of questionnaire administration: close ended questions to collect data.

The questionnaire has yet to be developed and will contain demographic information questions as well as the Targeting Aetiology of Nocturia Guides Outcomes in Dutch (TANGO-D) and validated questions about e.g. sleep habits, mobility, medication.

## Study population

### Inclusion criteria

Admitted to aged care ward (assumed age ≥75 years) since at least 2 days

### Exclusion criteria

End of life care; terminal malignancies; indwelling catheter; urostomy; end stage kidney disease; diabetes insipidus; previous pelvic radiotherapy; confusion; dementia requiring assistance

### Outcome measures

Presence of nocturia before admission to the hospital, nocturia during hospitalization, variables associated with nocturia measured on questionnaires developed for this research using validated items.

### Sample size

In prevalence studies it is appropriate to have a precision of 5% (expected prevalence of disease is between 10% and 90%). The prevalence of nocturia in older people (>75 years) is about 60%.

Sample size calculation with a precision of 5%, an estimated prevalence of 60% and 95% confidence intervals results in an estimated sample size of 369 participants.

Due to resource limitation (need to interview each participant on an individual base) we want to use a larger precision of 10%. The sample size calculation with the same parameters and a precision of 10% reduces the estimated sample size to 96 participants (Naing 2006). Oversampling of the sample size because of non-responders or missing data seems not necessary because we will use an interview mode.

## Statistical analysis

SPSS Statistics v24.0 will be used for data analysis. Missing values in questionnaires will not be replaced. Results will be reported in counts and percentages. Statistical significance will be defined as a p-value<0.05.

Prevalence and incidence of nocturia on the ward is calculated by measuring the presence of nocturia in the sample of the study population before and during hospitalization. Prevalence is the percentage of the number of patients with nocturia divided by the number of all participants and multiplied by 100%. Incidence proportion is the number of patients who developed nocturia during hospitalization divided by the number all participants and multiplied by 100%.

Binary logistic regression will be used to predict the odds of having nocturia based on the values of the independent variables (nocturia before hospitalization, sleeping habits, mobility, medication, etc.).

# Feasibility

## Timetable

| | 2018 | | | 2019 | | |
|---|---|---|---|---|---|---|
| | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 |
| Develop items for survey | ▓ | | | | | |
| Review and revise items with experts' panel | ▓ | ▓ | | | | |
| Pre-test items with sample of study population | | ▓ | | | | |
| Recruit 96 participants and administer survey | | ▓ | ▓ | ▓ | ▓ | |
| Analyse data | | | | | ▓ | |
| Preparation of manuscript and submission to peer-reviewed journal | | | | | ▓ | ▓ |

## Budget

| | | |
|---|---|---|
| Salary experienced urology nurse[1] (MSc)[2] | 160 hours * 23 euro/h | 3680 euro |
| Salary experienced urology nurse[1] (BSc)[3] | 192 hours * 16 euro/h | 3072 euro |
| Statistical assistance | 8 hours * 75 euro/h | 600 euro |
| Total costs (without overhead) | | 7352 euro |
| Overhead 17 % | | 1250 euro |
| Estimated costs | | 8602 euro |

[1] The development of the questionnaires and the Interviews must be taken by experienced urology nurses since they have the knowledge of the impact of nocturia on patients and of the functioning on the ward. Patients who want to elaborate on the questionnaire are best supported by urology nurses, who can best describe LUTS in layman language.

The EAUN budget will be used to pay salaries of urology nurses. Extra funding can be covered by the NOW project, but we think the urology nursing participation is primordially.

[2] Development, revision and pre-test survey and publication results in peer-reviewed journal

[3] Recruitment and interview of 96 participants (based on experience of time needed for interviewing frail older people)

## Conclusions/Relevance

Nocturia in acutely hospitalised (older) people is not assessed and ward-based care plans are not tailored. Although nocturia is a known risk factor for in-hospital falls, care plans omit nocturia management. This study will provide the basis for the NOW project where the final aim is to embed a new care pathway for hospitalized patients who have nocturia. It is very important to involve urology nurses in the development of care pathways for hospitalized patients with nocturia.

# References

Abrams P, Cardozo L, Wagg A and Wein A. Incontinence 6th Edition 2017. 6th International Consultation on Incontinence, Tokyo 2016. ICUD-ICS.

Abreu HC, Reiners AA, Azevedo RC, Silva AM, Abreu D, Oliveira A. Incidence and predicting factors of falls of older inpatients. Rev Saude Publica, 2015. 49:37.

Bing MH, Moller LA, Jennum P, Mortensen S, Lose G. Nocturia and associated morbidity in a Danish population of men and women aged 60-80 years. BJU Int. 2008 Sep; 102(7):808-14; discussion 814-5.

Bosch JL, Weiss JP. The prevalence and causes of nocturia. J Urol. 2010 Aug; 184(2):440-6.

Bower WF, Rose GE, Ervin CF, Whishaw DM, Goldin J, Khan F. TANGO - a screening tool to identify comorbidities on the causal pathway of Nocturia. Brit J Urol Int. 2017 Jun; 119(6):933-941

Brown JS, Vittinghoff E, Wyman JF, Stone KL, Nevitt MC, Ensrud KE, Grady D. Urinary incontinence: does it increase risk for falls and fractures? Study of Osteoporotic Fractures Research Group. J Am Geriatr Soc, 2000. 48(7): 721-5.

Chung MS, Chuang YC, Lee JJ, Lee WC, Chancellor MB, Liu RT. Prevalence and associated risk factors of nocturia and subsequent mortality in 1,301 patients with type 2 diabetes. Int Urol Nephrol. 2014 Jul; 46(7):1269-75.

Cumming RG, Sherrington C, Lord SR, Simpson JM, Vogler C, Cameron ID, Naganathan V. Cluster randomised trial of a targeted multifactorial intervention to prevent falls among older people in hospital. BMJ. 2008, 336(7647), 758-760.

Damián J, Pastor-Barriuso R, Valderrama-Gama E, de Pedro-Cuesta J. Factors associated with falls among older adults living in institutions. BMC Geriatr. 2013; 13 (Jan):6.

Forster A, Young J. Incidence and consequences of falls due to stroke: a systematic inquiry. BMJ 311.6997 (1995): 83-86.

Hitcho EB, Krauss MJ, Birge S, Claiborne-Dunagan W, Fischer I, Johnson S et al. Characteristics and circumstances of falls in a hospital setting: A prospective analysis. J Gen Int Med, 2004. 19(7):732-739.

Hui-Chi H.  A checklist for assessing the risk of falls among the elderly. Journal of Nursing Research. 2004. 12(2): 131-142.

Kupelian V. Nocturia, sleep disturbance and the metabolic syndrome. J Urol. 2012 Dec;188 (6):2041-2.

Naing, L, Winn, T en Rusli, B N. Practical issues in calculating the sample size for prevalence studies. Archives of orofacial sciences, 2006, Vol. 1, pp. 9-14.

Nakagawa H, Ikeda Y, Kaiho Y, Matsushita M, Hozawa A, Ohmori-Matsuda K, Tsuji I, Arai. Impact of nocturia on medical care use and its costs in an elderly population: 30 month prospective observation of national health insurance beneficiaries in Japan. Proceedings of International Continence Society 2009, No.280.

Nakagawa H, Ikeda Y, Nui K, Ohmori-Matsuda K, Nakaya N, Imanishi R, Nagatomi, Tsuji I, Arai Y. Does nocturia increase fall-related fractures and mortality in a community dwelling elderly population aged 70 years and over? Results of a 3 year prospective cohort study in Japan. Neuro Urol, 2008. 27(7): p. 674 - 675.

Nakagawa H, Niu K, Hozawa A, Ikeda Y, Kaiho Y, Ohmori-Matsuda K, Nakaya N, Kuriyama S, Ebihara S, Nagatomi R, Tsuji I, Arai Y. Impact of nocturia on bone fracture and mortality in older individuals: a Japanese longitudinal cohort study. The Journal of Urology, 2010. 184(4): 1413-8.

Quigley PA, Hahm B, Collazo S, Gibson W, Janzen S, Powell-Cope G, Rice F, Sarduy I, Tyndall K, and White SV. Reducing Serious Injury From Falls in Two Veterans' Hospital Medical-Surgical Units. Journal of Nursing Care Quality 24, no. 1 (2009): 33-41.

Rose GE, Bower WF, Ervin CF, Whishaw DM, Khan F. Reliability Testing of the TANGO Short-Form. Australia and New Zealand Continence Journal. 2017, 23(3): 68-74.

Rosen RC, Holm-Larsen T, Kupelian V, Wein AJ. Consequences of nocturia. Postgrad Med. 2013 Jul;125(4):38-46.

Sacco-Peterson M, Borell L. Struggles for autonomy in self-care: the impact of the physical and socio-cultural environment in a long-term care setting. Scand J Caring Sci, 2004. 18(4): p. 376-86.

van Doorn B, Blanker MH, Kok ET, Westers P, Bosch JL. Once nocturia, always nocturia? Natural history of nocturia in older men based on frequency-volume charts: the Krimpen study. J Urol. 2011 Nov; 186(5):1956-61.

Vaughan CP, Brown CJ, Goode PS, Burgio KL, Allman RM, Johnson TM 2nd. The association of nocturia with incident falls in an elderly community-dwelling cohort. Int J Clin Pract, 2010 64(5): p. 577-583.

## Conflicts of interest