

ORIGINAL ARTICLE

Guidelines for preventing urinary retention and bladder damage during hospital care

Rose-Marie Johansson, Bo-Eric Malmvall, Boel Andersson-Gäre, Bruno Larsson, Ingrid Erlandsson, Märta Sund-Levander, Gunhild Rensfelt, Sigvard Mölsted and Lennart Christensson

Aims and objectives. To develop evidence-based guidelines for adult patients in order to prevent urinary retention and to minimise bladder damage and urinary tract infection.

Background. Urinary retention causing bladder damage is a well known complication in patients during hospital care. The most common treatment for urinary retention is an indwelling urinary catheter, which causes 80% of hospital-acquired urinary tract infections. Appropriate use of bladder ultrasonography can reduce the rate of bladder damage as well as the need to use an indwelling urinary catheter. It can also lead to a decrease in the rate of urinary tract infections, a lower risk of spread of multiresistant Gram-negative bacteria, and lower hospital costs.

Design. An expert group was established, and a literature review was performed.

Methods. On the basis of literature findings and consensus in the expert group, guidelines for clinical situations were constructed.

Results. The main points of the guidelines are the following: identification of risk factors for urinary retention, managing patients at risk of urinary retention, strategies for patients with urinary retention and patient documentation and information.

Conclusion. Using literature review and consensus technique based on a multiprofessional group of experts, evidence-based guidelines have been developed. Although consensus was reached, there are parts of the guidelines where the knowledge is weak.

Relevance to clinical practice. These guidelines are designed to be easy to use in clinical work and could be an important step towards minimising bladder damage and hospital-acquired urinary tract infections and their serious consequences, such as bacteraemia and the spread of multidrug-resistant bacteria in hospitals.

Key words: bladder ultrasonography, guidelines, hospital-acquired urinary tract infections, patient safety, prevention, risk of urinary retention, urinary retention

Accepted for publication: 8 April 2012

Authors: *Rose-Marie Johansson*, RN, PhD Student, School of Health Sciences, Jönköping University, Jönköping; *Bo-Eric Malmvall*, MD, Professor, Division of Infectious Diseases, Department of Clinical and Experimental Medicine, Linköping University, Linköping and Futurum – The Academy of Healthcare, County Council, Jönköping; *Boel Andersson-Gäre*, MD, Professor, Futurum – The Academy of Healthcare, County Council and Jönköping Academy for Improvement of Health and Welfare, School of Health Sciences, Jönköping University; *Bruno Larsson*, MD, Urologist, Unit of Urology, County Hospital Ryhov, Jönköping; *Ingrid Erlandsson*, RN, Development Officer, Unit of Urology, County Council Ryhov,

Jönköping; *Märta Sund-Levander*, RN, RNT, PhD, Assistant Professor, Unit of Research and Development, Hoegland Hospital, Eksjö; *Gunhild Rensfelt*, RN, Infection Control Nurse, Infection Control, County Hospital Ryhov, Jönköping, *Sigvard Mölsted*, MD, Professor, Unit of R&D in Primary Care, Futurum, Jönköping, *Lennart Christensson*, RN, Associate Professor, School of Health Sciences, Jönköping University Jönköping, Sweden

Correspondence: Rose-Marie Johansson, PhD Student, The County Hospital Ryhov, House B5, 551 89 Jönköping, Sweden. Telephone: +46739137532.

E-mail: rose-marie.johansson@lj.se

Introduction

Urinary retention (UR) is a common complication in a large group of patients admitted to hospital care (Wu & Baguley 2005, Dreijer *et al.* 2011). The causes of UR can be categorised as obstructive, infectious, inflammatory, pharmacologic, neurological and other causes like postoperative complications, pregnancy-associated UR and trauma (Selius & Subedi 2008). UR may result in damage to the bladder (Mustonen *et al.* 1999), prolonged hospital stays (Shadle *et al.* 2009) and decreased quality of life (Thomas *et al.* 2005). The most commonly used treatment for UR, an indwelling urinary catheter (IUC), causes 80% of hospital-acquired urinary tract infections (Stamm 1991). The IUC is a reservoir for multi-drug-resistant bacteria (Tambyah & Maki 2000) and its overuse and misuse in hospital care are commonly reported (Saint *et al.* 2000, Gokula *et al.* 2004, Holroyd-Leduc *et al.* 2007). Catheter-related urinary tract infections increase morbidity, mortality (Holroyd-Leduc *et al.* 2007) and costs (Saint 2000, Tambyah *et al.* 2002, Defez *et al.* 2008).

As many as 65%–70% of catheter-related urinary tract infections can be prevented (Umscheid *et al.* 2011). The use of bladder ultrasonography (BUS) can reduce the rate of IUC use (Stevens 2005) and urinary tract infections (Lee *et al.* 2007, Palese *et al.* 2010) as well as costs (Frederickson *et al.* 2000, Palese *et al.* 2010). Evidence-based guidelines have been developed to minimise urinary catheter use (Tenke *et al.* 2008, Saint *et al.* 2009, Gould *et al.* 2010, Hooton *et al.* 2010). Although the prevention of UR is important (Tan *et al.* 2001, Zaki *et al.* 2004, Thomas *et al.* 2005, Baldini *et al.* 2009, Johansson & Christensson 2010) to date, there have been no guidelines offering prevention strategies (Kaplan *et al.* 2008).

We have previously identified bladder damage caused by UR and the misuse of IUC as severe quality issues at our hospitals (Johansson & Christensson 2010). We therefore decided to develop and introduce evidence-based guidelines aiming to prevent bladder damage and urinary tract infections. In this article, we present the guidelines and the process used to create them.

Methods

A group of seven experts, registered nurses and physicians, representing urology, infectious diseases, hospital hygiene and general practice was established, and a literature review was performed following five stages, discussed further below: (1) problem identification, (2) literature search, (3) data evaluation, (4) data analysis, and (5) presentation (Whittemore & Knafel 2005).

- 1 Which patients are at risk of UR? What is the definition of UR? How should patients at risk of UR and patients with established UR be treated? What does the proper use of urinary catheters entail?
- 2 The literature search was performed using the Pubmed, Cinahl and Cochrane databases. The phrase 'UR' was combined with each of the following words or phrases: prevention, nursing, programme, guidelines, risk factors, education, documentation, bladder scan, BUS, urinary catheters, postvoid residual urine, bladder function, voiding, voiding dysfunction, urinary tract infection and urinary elimination. Limitations in the search were as follows: the English language, publication during the period 1999–2009, and the words had to appear in titles and/or abstracts. A total of 1217 articles were identified, of which 1182 were excluded as irrelevant according to their titles or abstracts. The final guidelines are thus based on 35 articles.
- 3 The data from the literature search were evaluated and coded by the first author according to two criteria: methodological or theoretical rigour and data relevance on a two-point scale (high or low) (Whittemore & Knafel 2005). Criteria for having high methodological or theoretical rigour were that the article should be an original article, systematic review or meta-analysis and include a clear description of the method. According to methodological or theoretical rigour, 16 of the 35 articles were assessed as high (Benoist *et al.* 1999, Mustonen *et al.* 1999, Rosseland *et al.* 2002, Lau & Lam 2004, Schiotz & Tanbo 2006, Toyonaga *et al.* 2006, Griffiths & Fernandez 2007, Pratt *et al.* 2007, Luger *et al.* 2008, Onile *et al.* 2008, Chia *et al.* 2009, Ladak *et al.* 2009, Liang *et al.* 2009, Phipps *et al.* 2009, de Waal *et al.* 2009, Zaouter *et al.* 2009). Criteria for high data relevance were that the studies fulfil the aim of this study. According to data relevance, all 35 articles were assessed as high.
- 4 The data were placed in the following categories: being at risk of UR, what to do when patients are at risk of UR, treatment for UR, indications for urinary catheter, documentation in the records and information to patients.
- 5 The expert group met on six occasions and formulated guidelines based on the literature review. In categories in which the literature did not give an optimal answer, consensus was reached using a method inspired by the nominal group technique (Jones & Hunter 1995). Each expert explained their opinion, followed by a discussion in the whole group. Different suggestions were ranked based on clinical experiences. After discussion, consensus was reached.

Results

The guidelines are presented in five sections and Box 1.

To be at risk of UR

All adult patients arriving at the hospital should be assessed to determine whether they are at risk – divided into general or specific risk – for UR. General risk is usually present before the period of hospital care, and the goal is to detect UR as early as possible after admission and before serious bladder damage has appeared. The specific risk of UR is associated with a present disease or a treatment given during the hospital stay, and for these patients, the goal is no bladder damage.

The general risk factors are as follows: advanced age (Lamonerie *et al.* 2004, Shadle *et al.* 2009); history of previous prostate; bladder or voiding problems (Wu & Baguley 2005); urinary incontinence (Wu & Baguley 2005); urinary tract infection/prostatitis (Selius & Subedi 2008); profound cognitive impairment and/or confusion (Wu & Baguley 2005, de Waal *et al.* 2009); diabetes (Borrie *et al.* 2001, Wu & Baguley 2005); alcoholic neuropathy (Baldini *et al.* 2009); previous TIA/stroke/neurological disease (Wu & Baguley 2005); constipation (Borrie *et al.* 2001, Selius & Subedi 2008); abdominal pain (Selius & Subedi 2008) immobility (Wu & Baguley 2005); chronic pain; psychogenic emotional distress (Steggall 2007); and drugs (Selius & Subedi 2008), for example, anticholinergics or opioids (Wu & Baguley 2005). Specific risk factors are specified in Box 1.

What to do when the patient is at risk of urinary retention

Support all patients at risk of UR to achieve an optimal voiding situation (Pellatt 2007). When needed, patients should have assistance in visiting the toilet. If toilet visits are not possible for medical reasons, a bedside commode can be an adequate substitute. For patients with cognitive impairment, timed voiding, characterised by fixed time intervals between toileting, is recommended. Create a calm voiding situation, preserving maximum patient integrity. Offer women a comfortable sitting position with both feet on the floor, allowing the pelvic muscles to relax. For men, offer a standing or sitting position based on the patient's condition and choice.

When the patient is at general risk of UR, perform a postvoid BUS (Hahn & Ebersbach 2005, Wu & Baguley 2005) after an optimal voiding situation as soon as possible after arrival at hospital. If the postvoid residual urine (PVR) is below 200 ml, no more BUS is needed. According to consensus, PVR 200–399 ml is assessed to mean that the patient is at specific risk of UR.

When the patient is at specific risk, perform time-scheduled use of BUS or treatment with short-term IUC (see Box 1). In special cases of specific risk, for example, postoperative care,

when an optimal voiding situation cannot be offered, BUS can be used to assess urine volume without previous voiding. Stop examinations with BUS when specific risk is no longer present and two consecutive BUS show PVR lower than 200 ml.

Treatment for urinary retention

Urinary retention occurs when a patient is unable to pass urine and PVR is more than 400 ml. The bladder should be treated with drainage without delay (Mustonen *et al.* 1999, Selius & Subedi 2008) (see Box 1), followed by treatment for the underlying cause.

Indications for urinary catheter

Indications for IUC or suprapubic catheter are intensive care with continued measurement of diuresis, surgery more than two hour, surgery affecting bladder function, haematuria, UR with PVR more than 1000 ml and at end of life according to the patient's wishes. For patients in hospital care, the physician should make a decision on a daily basis if the IUC should be continued. IUC more than four weeks is never recommended as first-line treatment. Clean intermittent catheterisation (Selius & Subedi 2008) or suprapubic catheter is recommended for long-term treatment. Removal of IUC should be performed after midnight (Griffiths & Fernandez 2007); otherwise, in patients with IUC < 24 hours, it is suggested that the catheter be removed as early as possible (see Box 1) (Tenke *et al.* 2008).

Patient documentation and information

Patients' habits, individual wishes and need for toilet assistance should be documented to inform colleagues of how to offer the patient support to achieve an optimal voiding situation. BUS and the diagnosis of UR should be documented, and a statement should be included regarding whether the UR is a consequence of improper care or an inevitable complication. The need for catheterisation and the catheter insertion, as well as the care performed and the information given to the patient should be documented (Pratt *et al.* 2007, Yokoe *et al.* 2008, Kamdar *et al.* 2009). The patient should receive information about the optimal voiding situation, BUS, risk of UR and urinary tract infection, UR and urinary catheters (Pratt *et al.* 2007).

Discussion

These guidelines have been developed to handle clinical situations in which UR is a threat that may lead to bladder

Box 1 Guidelines for patients at specific risk of urinary retention and urinary retention

Specific UR risk factors	Measures
Acute disease, trauma or intoxication (1) with 'mild/moderate' general symptoms Severe pain (1, 2) Newly detected PVR > 200 ml Large amounts of intravenous fluid (2, 3)	Time-scheduled bladder ultrasonography (BUS) BUS after arrival < one hour If PVR is 0–99 ml next BUS < four hours If PVR is 100–199 ml next BUS < three hours If PVR is 200–299 ml next BUS < two hours If PVR is 300–399 ml next BUS < one hour After 10 pm: if PVR 250–399 ml, perform clean intermittent catheterisation and a new BUS the next morning at 6 am (exception: in patients newly undergone surgery, the BUS time schedule should be used) When there is no longer specific risk and two consecutive assessments show PVR < 200 ml, stop BUS
IUC newly removed (4)	If two consecutive BUS show PVR < 200 ml, stop BUS. If PVR is > 200 ml, time-scheduled BUS
Trauma/intoxication/acute disease with 'severe' general symptoms (5) Surgery with impact on bladder function Preoperative care (12) Postoperative care (13)	IUC or suprapubic catheter (6) – responsible physician ordination If possible, catheter duration < 24 hour (7, 3, 8, 9, 10, 11) BUS after voiding BUS (14) every hour until the patient wakes or is no longer under anaesthesia (15), then if two consecutive BUS show PVR < 200 ml, stop BUS. If PVR > 200 ml time-scheduled BUS.
Epidural analgesia < 24 hour (16, 17) Epidural analgesia > 24 hour (7) Surgery, estimated time < 2 hour Surgery, estimated time > 2 hour (19, 20, 21)	IUC (6, 18) or time-scheduled BUS Time-scheduled BUS BUS at end of surgery (15, 22) IUC – insertion immediately before surgery (21). Catheter must be removed as soon as possible, < 10 hours after surgery is finished
Child delivery (23) The risk increases at epidural anaesthesia, instrumental delivery and perineal rupture > two days PVR 200–400 ml	During labour: palpate bladder regularly Before start of instrumental delivery: clean intermittent catheterisation After delivery: BUS after voiding < 3 hours If PVR < 200 ml on two consecutive assessments, stop BUS. If PVR > 200 ml time-scheduled BUS Individual assessment and prescription by responsible physician Sampling (kidney function and urine culture) Further investigation, treatment and/or consultations
Urinary retention	Treatment
PVR > 400–999 ml PVR > 1000 ml > two days PVR 400–999 ml > four weeks UR	Clean intermittent catheterisation (24). BUS after two hours (the first catheterisation), then after time-scheduled BUS IUC or suprapubic catheter – four weeks with open drainage. Sampling (kidney function and urine culture) Clean intermittent catheterisation on time schedule, four to six times/24 hours (5). Sampling (kidney function and urine culture). Further investigation, treatment and/or consultation. Refer to a urologist or gynaecologist

BUS, bladder ultrasonography; IUC; indwelling urinary catheter; PVR, post-void residual urine; UR, urinary retention.

1. Steggall (2007), 2. Toyonaga *et al.* (2006), 3. Baldini *et al.* (2009), 4. Philips (2000), 5. Gould *et al.* (2010), 6. Phipps *et al.* (2009), 7. Tenke *et al.* (2008), 8. Onile *et al.* (2008), 9. Liang *et al.* (2009), 10. Benoist *et al.* (1999), 11. Schiotz and Tanbo (2006), 12. Joelsson-Alm *et al.* (2009), 13. Shadle *et al.* (2009), 14. Rosseland *et al.* (2002), 15. Luger *et al.* (2008), 16. Chia *et al.* (2009), 17. Zaouter *et al.* (2009), 18. Ladak *et al.* (2009), 19. Lamonerie *et al.* (2004), 20. Kumar and Prasanna (2004), 21. David and Vrabas (2000), 22. Hooton *et al.* (2010), 23. Ismail and Emery (2008), 24. Lau and Lam (2004).

damage. To our knowledge, these are the first guidelines for systematically assessing adult patients at risk of UR in hospital care. Furthermore, the guidelines include proper care for UR and strict indications for the use of a urinary catheter.

Identifying risks and avoiding problems during a patient's hospital stay are important issues for nurses, who should play an active role in screening patients who are at risk (Ringdal *et al.* 2003, Steggall 2007). Evidence-based nursing actions may decrease complications of UR in older patients (Resnick *et al.* 1996, Pavlin *et al.* 1999), reduce costs and provide higher patient satisfaction (Frederickson *et al.* 2000, Teng *et al.* 2005). Ostaszkiwicz *et al.* (2008) developed guidelines for the identification of risk for UR in older patients, stating that multiple factors need to be considered when interpreting PVR (Ostaszkiwicz *et al.* 2008). Several studies show that assessing urinary volume using BUS is an important component of nursing in rehabilitation care (Wu & Baguley 2005), geriatric rehabilitation (Borrie *et al.* 2001), neurological care (Tan 2006), neurosurgical care (Lee *et al.* 2007), medical-surgical care (Cutright 2011), pre-operative care (Joelsson-Alm *et al.* 2012) and postoperative care (Luger *et al.* 2008, Baldini *et al.* 2009, Palese *et al.* 2010, Hansen *et al.* 2011). A study evaluating the process and outcome of implementing these guidelines is on-going.

In these guidelines, the risk factors for UR are divided into general and specific, as they require different types of measures. UR caused by specific risks is mostly an avoidable complication, and early detection of UR caused by a general risk factor may prevent morbidity and mortality.

Urinary function can be affected by a range of medical problems, but toileting behaviours are rarely defined or discussed in the literature. Bladder elimination is a private function, but independence in this function can be affected by physical or mental disability. We have assumed, after studying normal voiding (Taylor & Kuchel 2006, Pellatt 2007, Steggall 2007, Naish 2008, Baldini *et al.* 2009) that it is important that nursing staff systematically support patients to create an optimal voiding situation to prevent UR. For women, Wang and Palmer (2010) pointed out that voiding place, time, position and style are important (Wang & Palmer 2010). We believe that the same factors are important for men. In any case in which the patient's mobility is compromised, a moving and handling risk assessment must be carried out to determine the most appropriate method of assisting a patient to the toilet (Heath 2009). There is a need for further research about how to handle risk of UR and how to support patients to achieve optimal voiding.

In the guidelines, BUS is recommended for the evaluation of PVR in patients at risk of UR. BUS is a non-invasive alternative to urethral catheterisation for the determination

of bladder urine volume and is easy to use, reliable, accurate and sensitive (Rosseland *et al.* 2002, Teng *et al.* 2005) as well as cost-effective (Frederickson *et al.* 2000, Philips 2000). Standardised criteria for PVR have not yet been established; the definition of UR in these guidelines, after consensus decision, is PVR more than 400 ml. This level was selected on the basis of the normal adult bladder volume, 400–600 ml (Lamonerie *et al.* 2004, Baldini *et al.* 2009) and is regarded as low enough without risk of permanent bladder damage. In the literature, the amount of PVR defining UR varies between 150 and 600 ml (Grosshans *et al.* 1993, Smith & Albazzaz 1996, Pavlin *et al.* 1999, Mulroy *et al.* 2002, Keita *et al.* 2005, Wu & Baguley 2005). In the guidelines, patients with a PVR of 200–400 ml constitute a particular group as they are not regarded as experiencing UR but have a PVR above the accepted level of <200 ml and thus need particular attention, including an individual decision regarding follow-up and treatment. There may be an intraindividual variability in PVR, even within a 24-hour period, and this motivates time-scheduled BUS during two days. Time-scheduled BUS is also important because the duration of bladder extension increases the risk of bladder damage (Mustonen *et al.* 1999, 2001, Pavlin *et al.* 1999).

Recommended treatment for UR with PVR below 999 ml is clean intermittent catheterisation, as IUC is associated with an increased risk of severe infections and death (Holroyd-Leduc *et al.* 2007). The duration of catheter treatment is the most important risk factor for the development of urinary tract infection (Stamm 1991, Nicolle 2008). It is important to minimise IUC use in those at higher risk of catheter-related urinary tract infections such as women, the older and patients with impaired immunity (Gould *et al.* 2010). In all cases with an indication for prolonged catheter treatment, clean intermittent catheterisation and suprapubic catheters must be considered and should only be used based on strict indication, and the duration must be as short as possible (Inelmen *et al.* 2007, Pratt *et al.* 2007). The physician is responsible for the decision of which type of urinary catheter to use. Insertion and care for urinary catheters must be performed according to national or hospital regulations (Yokoe *et al.* 2008, Hooton *et al.* 2010).

It is important to educate and involve patients about the risks, strategies and treatment in this area as well as how they can participate in preventing UR and urinary tract infection (Pratt *et al.* 2007). Proper documentation in patients records is also important (Gould *et al.* 2010). For patients at risk of UR, all involved staff must know when and how to perform BUS and the diagnostic criteria for UR. Treatment with a urinary catheter and its duration should be the physician's decision, clearly documented in the patient's records (Pratt *et al.* 2007).

Through integrative review with a broad approach using published papers with diverse methodologies, we have attempted to current knowledge. Well-performed integrative reviews present the state of the science and have direct applicability to practise and policy (Tavares de Souza *et al.* 2010). This literature review revealed a substantial lack of knowledge about risk factors associated with UR and of how to manage patients with UR or at risk of UR and the expert group had to reach consensus decisions.

The nominal group technique is a method for reaching consensus decisions in a transparent and structured way. It can provide important information through agreement among experts (Raine *et al.* 2004). There are situations in which evidence is either unavailable or unclear, or results between studies are different (Cross 2005). In this study, the expert group reached consensus regarding all parts of the guidelines. The existence of a consensus does not mean that the 'correct' answer has been found but rather that we have summarised the current best answers, which were assumed to be relevant.

Conclusion

Using literature review and consensus technique based on a multiprofessional group of experts, evidence-based guidelines

have been developed. Although consensus was reached, there are parts where the knowledge is weak. To evaluate the power of these guidelines, intervention studies are needed.

Relevance to clinical practice

These guidelines are designed to be easy to use in clinical work. As many patients are at risk of UR, it is important to detect it at an early stage as well as prevent it to avoid problems with bladder damage and the need for ICU treatment. The use of the guidelines could be an important step towards the prevention of hospital-acquired urinary tract infections and their serious consequences, such as bacteraemia and the spread of multidrug-resistant bacteria in hospitals.

Contributions

Study design: R-MJ, B-EM, BA-G, SM, BL, IE, MS-L, GR, LC; data analysis: R-MJ, B-EM, BA-G, LC and manuscript preparation: R-MJ, B-EM, BA-G, LC.

Conflict of interests

The authors declare that they have no conflict of interests.

References

- Baldini G, Bagry H, Aprikian A & Carli F (2009) Postoperative urinary retention: anesthetic and perioperative considerations. *Anesthesiology* **110**, 1139–1157.
- Benoist S, Panis Y, Denet C, Mauvais F, Mariani P & Valleur P (1999) Optimal duration of urinary drainage after rectal resection: a randomized controlled trial. *Surgery* **125**, 135–141.
- Borrie MJ, Campbell K, Arcese ZA, Bray J, Hart P, Labate T & Hesch P (2001) Urinary retention in patients in a geriatric rehabilitation unit: prevalence, risk factors, and validity of bladder scan evaluation. *Rehabilitation Nursing* **26**, 187–191.
- Chia YY, Wei RJ, Chang HC & Liu K (2009) Optimal duration of urinary catheterization after thoracotomy in patients under postoperative patient-controlled epidural analgesia. *Acta Anaesthesiologica Taiwanica* **47**, 173–179.
- Cross H (2005) Consensus methods: a bridge between clinical reasoning and clinical research? *International Journal of Leprosy and Other Mycobacterial Diseases* **73**, 28–32.
- Cutright J (2011) The effect of the bladder scanner policy on the number of urinary catheters inserted. *Journal of Wound, Ostomy, and Continence Nursing* **38**, 71–76.
- David T & Vrabas M (2000) Perioperative lowerurinary tract infections and deep sepsis in patients undergoing total joint arthroplasty. *Journal of the American Academy of Orthopaedic Surgeons* **8**, 66–74.
- Defez C, Fabbro-Peray P, Cazaban M, Boudemaghe T, Sotto A & Daures JP (2008) Additional direct medical costs of nosocomial infections: an estimation from a cohort of patients in a French university hospital. *Journal of Hospital Infection* **68**, 130–136.
- Dreijer B, Moller MH & Bartholdy J (2011) Post-operative urinary retention in a general surgical population. *European Journal of Anaesthesiology* **28**, 190–194.
- Frederickson M, Neitzel JJ, Miller EH, Reuter S, Graner T & Heller J (2000) The implementation of bedside bladder ultrasound technology: effects on patient and cost postoperative outcomes in tertiary care. *Orthopaedic Nursing* **19**, 79–87.
- Gokula RR, Hickner JA & Smith MA (2004) Inappropriate use of urinary catheters in elderly patients at a mid-western community teaching hospital. *American Journal of Infection Control* **32**, 196–199.
- Gould CV, Umscheid CA, Agarwal RK, Kuntz G & Pegues DA (2010) Guideline for prevention of catheter-associated urinary tract infections 2009. *Infection Control and Hospital Epidemiology* **31**, 319–326.
- Griffiths R & Fernandez R (2007) Strategies for the removal of short-term indwelling urethral catheters in adults. *Cochrane Database Systematic Review*, Issue 2, Art. No.: CD004011.

- Grosshans C, Passadori Y & Peter B (1993) Urinary retention in the elderly: a study of 100 hospitalized patients. *Journal of the American Geriatrics Society* **41**, 633–638.
- Hahn K & Ebersbach G (2005) Sonographic assessment of urinary retention in multiple system atrophy and idiopathic Parkinson's disease. *Movement Disorders* **20**, 1499–1502.
- Hansen BS, Soreide E, Warland AM & Nilsen OB (2011) Risk factors of postoperative urinary retention in hospitalised patients. *Acta Anaesthesiologica Scandinavica* **1**, 1–4.
- Heath H (2009) The nurses role in helping older people to use the toilet. *Nursing Standard* **24**, 43–47.
- Holroyd-Leduc JM, Sen S, Bertenthal D, Sands LP, Palmer RM, Kresevic DM, Covinsky KE & Seth Landefeld C (2007) The relationship of indwelling urinary catheters to death, length of hospital stay, functional decline, and nursing home admission in hospitalized older medical patients. *Journal of the American Geriatrics Society* **55**, 227–233.
- Hooton TM, Bradley SF, Cardenas DD, Colgan R, Geerlings SE, Rice JC, Saint S, Schaeffer AJ, Tambayh PA, Tenke P & Nicolle LE (2010) Diagnosis, prevention, and treatment of catheter-associated urinary tract infection in adults: 2009 International Clinical Practice Guidelines from the Infectious Diseases Society of America. *Clinical Infectious Diseases* **50**, 625–663.
- Inelmen EM, Sergi G & Enzi G (2007) When are indwelling urinary catheters appropriate in elderly patients? *Geriatrics* **62**, 18–22.
- Ismail SI & Emery SJ (2008) The prevalence of silent postpartum retention of urine in a heterogeneous cohort. *Journal of Obstetrics and Gynaecology* **28**, 504–507.
- Joelsson-Alm E, Nyman CR, Lindholm C, Ulfvarson J & Svensen C (2009) Perioperative bladder distension: a prospective study. *Scandinavian Journal of Urology and Nephrology* **43**, 58–62.
- Joelsson-Alm E, Ulfvarson J, Nyman CR, Divander M-B & Svensen C (2012) Preoperative ultrasound monitoring can reduce postoperative bladder distension: a randomized study. *Scandinavian Journal of Urology and Nephrology* **46**, 84–90.
- Johansson RM & Christensson L (2010) Urinary retention in older patients in connection with hip fracture surgery. *Journal of Clinical Nursing* **19**, 2110–2116.
- Jones J & Hunter D (1995) Consensus methods for medical and health services research. *British Medical Journal* **311**, 299–302.
- Kamdar A, Yahya A & Thangaraj L (2009) Retrospective observational study of the incidence of short-term indwelling urinary catheters in elderly patients with neck of femur fractures. *Geriatrics and Gerontology International* **9**, 131–134.
- Kaplan SA, Wein AJ, Staskin DR, Roehrborn CG & Steers WD (2008) Urinary retention and post-void residual urine in men: separating truth from tradition. *Journal of Urology* **180**, 47–54.
- Keita H, Diouf E, Tubach F, Brouwer T, Dahmani S, Mantz J & Desmonts JM (2005) Predictive factors of early postoperative urinary retention in the postanesthesia care unit. *Anesthesia and Analgesia* **101**, 592–596, table of contents.
- Kumar R & Prasanna A (2004) Post operative analgesia with continuous epidural infusion. *Middle East Journal of Anesthesiology* **17**, 899–912.
- Ladak SS, Katznelson R, Muscat M, Sawhney M, Beattie WS & O'Leary G (2009) Incidence of urinary retention in patients with thoracic patient-controlled epidural analgesia (TPCEA) undergoing thoracotomy. *Pain Management Nursing* **10**, 94–98.
- Lamonerie L, Marret E, Deleuze A, Lambert N, Dupont M & Bonnet F (2004) Prevalence of postoperative bladder distension and urinary retention detected by ultrasound measurement. *British Journal of Anaesthesia* **92**, 544–546.
- Lau H & Lam B (2004) Management of postoperative urinary retention: a randomized trial of in-out versus overnight catheterization. *ANZ Journal of Surgery* **74**, 658–661.
- Lee YY, Tsay WL, Lou MF & Dai YT (2007) The effectiveness of implementing a bladder ultrasound programme in neurosurgical units. *Journal of Advanced Nursing* **57**, 192–200.
- Liang CC, Lee CL, Chang TC, Chang YL, Wang CJ & Soong YK (2009) Postoperative urinary outcomes in catheterized and non-catheterized patients undergoing laparoscopic-assisted vaginal hysterectomy – a randomized controlled trial. *International Urogynecology Journal and Pelvic Floor Dysfunction* **20**, 295–300.
- Luger TJ, Garoscio I, Rehder P, Oberlادتatter J & Voelckel W (2008) Management of temporary urinary retention after arthroscopic knee surgery in low-dose spinal anesthesia: development of a simple algorithm. *Archives of Orthopaedic and Trauma Surgery* **128**, 607–612.
- Mulroy MF, Salinas FV, Larkin KL & Polissar NL (2002) Ambulatory surgery patients may be discharged before voiding after short-acting spinal and epidural anesthesia. *Anesthesiology* **97**, 315–319.
- Mustonen S, Ala-Houhala I & Tammela TL (1999) Proteinuria and renal function during and after acute urinary retention. *Journal of Urology* **161**, 1781–1784, discussion 1784–1785.
- Mustonen S, Ala-Houhala IO & Tammela TL (2001) Long-term renal dysfunction in patients with acute urinary retention. *Scandinavian Journal of Urology and Nephrology* **35**, 44–48.
- Naish W (2008) An overview of female voiding dysfunction. *Nursing Standard* **22**, 49–57; quiz 58, 60.
- Nicolle LE (2008) The prevention of hospital-acquired urinary tract infection. *Clinical Infectious Diseases* **46**, 251–253.
- Onile TG, Kuti O, Orji EO & Ogunniyi SO (2008) A prospective randomized clinical trial of urethral catheter removal following elective cesarean delivery. *International Journal of Gynaecology and Obstetrics* **102**, 267–270.
- Ostaszkiwicz J, O'Connell B & Ski C (2008) Peer reviewed – A guideline for the nursing assessment and management of urinary retention in elderly hospitalised patients. *Australian and New Zealand Continence Journal* **14**, 76–83.
- Palese A, Buchini S, Deroma L & Barbone F (2010) The effectiveness of the ultrasound bladder scanner in reducing urinary tract infections: a meta-analysis. *Journal of Clinical Nursing* **19**, 2970–2979.
- Pavlin DJ, Pavlin EG, Fitzgibbon DR, Koerschgen ME & Plitt TM (1999)

- Management of bladderfunction after outpatient surgery. *Anesthesiology* **91**, 42–50.
- Pellatt GC (2007) Anatomy and physiology of urinary elimination. Part 1. *British Journal of Nursing* **16**, 406–410.
- Philips JK (2000) Integrating bladder ultrasound into a urinary tract infection-reduction project. *American Journal of Nursing* **100**, 3–12.
- Phipps S, Lim Y, McClinton S, Barry C, Rane A & N'Dow J (2009) Short term urinary catheter policies following urogenital surgery in adults. *Cochrane Database Systematic Review*, Issue 2, Art. No.: CD004374.
- Pratt RJ, Pellowe CM, Wilson JA, Loveday HP, Harper PJ, Jones SR, McDougall C & Wilcox MH (2007) Epic2: national evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. *Journal of Hospital Infection* **65**(Suppl. 1), S1–S64.
- Raine R, Sanderson C, Hutchings A, Carter S, Larkin K & Black N (2004) An experimental study of determinants of group judgments in clinical guideline development. *Lancet* **364**, 429–437.
- Resnick B, Slocum D, Ra L & Moffett P (1996) Geriatric rehabilitation: nursing interventions and outcomes focusing on urinary function and knowledge of medications. *Rehabilitation Nursing* **21**, 142–147.
- Ringdal M, Borg B & Hellstrom AL (2003) A survey on incidence and factors that may influence first postoperative urination. *Urologic Nursing* **23**, 341–346, 354.
- Rosseland LA, Stubhaug A & Breivik H (2002) Detecting postoperative urinary retention with an ultrasound scanner. *Acta Anaesthesiologica Scandinavica* **46**, 279–282.
- Saint S (2000) Clinical and economic consequences of nosocomial catheter-related bacteriuria. *American Journal of Infection Control* **28**, 68–75.
- Saint S, Wiese J, Amory JK, Bernstein ML, Patel UD, Zemencuk JK, Bernstein SJ, Lipsky BA & Hofer TP (2000) Are physicians aware of which of their patients have indwelling urinary catheters? *American Journal of Medicine* **109**, 476–480.
- Saint S, Olmsted RN, Fakh MG, Kowalski CP, Watson SR, Sales AE & Krein SL (2009) Translating health care-associated urinary tract infection prevention research into practice via the bladder bundle. *Joint Commission Journal on Quality and Patient Safety* **35**, 449–455.
- Schiotz HA & Tanbo TG (2006) Postoperative voiding, bacteriuria and urinary tract infection with Foley catheterization after gynecological surgery. *Acta Obstetrica et Gynecologica Scandinavica* **85**, 476–481.
- Selius BA & Subedi R (2008) Urinary retention in adults: diagnosis and initial management. *American Family Physician* **77**, 643–650.
- Shadle B, Barbaro C, Waxman K, Connor S & Von Dollen K (2009) Predictors of postoperative urinary retention. *American Surgeon* **75**, 922–924.
- Smith NK & Albazzaz MK (1996) A prospective study of urinary retention and risk of death after proximal femoral fracture. *Age and Ageing* **25**, 150–154.
- Stamm WE (1991) Catheter-associated urinary tract infections: epidemiology, pathogenesis, and prevention. *American Journal of Medicine* **91**, 65S–71S.
- Steggall MJ (2007) Acute urinary retention: causes, clinical features and patient care. *Nursing Standard* **21**, 42–46.
- Stevens E (2005) Bladder ultrasound: avoiding unnecessary catheterizations. *MedSurg Nursing* **14**, 249–253.
- Tambyah PA & Maki DG (2000) Catheter-associated urinary tract infection is rarely symptomatic: a prospective study of 1,497 catheterized patients. *Archives of Internal Medicine* **160**, 678–682.
- Tambyah PA, Knasinski V & Maki DG (2002) The direct costs of nosocomial catheter-associated urinary tract infection in the era of managed care. *Infection Control and Hospital Epidemiology* **23**, 27–31.
- Tan SB (2006) Review: determining the volume of urine by portable ultrasonography for the neurological patients. *Singapore Nursing Journal* **33**, 7.
- Tan TL, Lieu PK & Ding YY (2001) Urinary retention in hospitalised older women. *Annals of the Academy of Medicine, Singapore* **30**, 588–592.
- Tavares de Souza M, Dias de Silva M & de Carvalho R (2010) Integrative review: what is it? How to do it? *Einstein* **8**, 102–106.
- Taylor JA 3rd & Kuchel GA (2006) Detrusor underactivity: clinical features and pathogenesis of an underdiagnosed geriatric condition. *Journal of the American Geriatrics Society* **54**, 1920–1932.
- Teng CH, Huang YH, Kuo BJ & Bih LI (2005) Application of portable ultrasound scanners in the measurement of post-void residual urine. *Journal of Nursing Research* **13**, 216–224.
- Tenke P, Kovacs B, Bjerklund Johansen TE, Matsumoto T, Tambyah PA & Naber KG (2008) European and Asian guidelines on management and prevention of catheter-associated urinary tract infections. *International Journal of Antimicrobial Agents* **31**(Suppl. 1), S68–S78.
- Thomas K, Oades G, Taylor-Hay C & Kirby RS (2005) Acute urinary retention: what is the impact on patients' quality of life? *BJU International* **95**, 72–76.
- Toyonaga T, Matsushima M, Sogawa N, Jiang SF, Matsumura N, Shimojima Y, Tanaka Y, Suzuki K, Masuda J & Tanaka M (2006) Postoperative urinary retention after surgery for benign anorectal disease: potential risk factors and strategy for prevention. *International Journal of Colorectal Disease* **21**, 676–682.
- Umscheid CA, Mitchell MD, Agarwal R, Williams K & Brennan P (2011) Estimating the proportion of healthcare-associated infections that are reasonably preventable and the related mortality and costs. *Infection Control and Hospital Epidemiology* **32**, 101–114.
- de Waal KH, Tinselboer BM, Evenhuis HM & Penning C (2009) Unnoticed post-void residual urine volume in people with moderate to severe intellectual disabilities: prevalence and risk factors. *Journal of Intellectual Disability Research* **53**, 772–779.
- Wang K & Palmer MH (2010) Women's toileting behaviour related to urinary elimination: concept analysis. *Journal of Advanced Nursing* **66**, 1874–1884.
- Whittemore R & Knafl K (2005) The integrative review: updated methodology. *Journal of Advanced Nursing* **52**, 546–553.
- Wu J & Baguley IJ (2005) Urinary retention in a general rehabilitation unit: prevalence, clinical outcome, and the role of screening. *Archives of Physical Medicine and Rehabilitation* **86**, 1772–1777.
- Yokoe DS, Mermel LA, Anderson DJ, Arias KM, Burstin H, Calfee DP, Coffin SE,

Dubberke ER, Fraser V, Gerding DN, Griffin FA, Gross P, Kaye KS, Klompas M, Lo E, Marschall J, Nicolle L, Pegues DA, Perl TM, Podgorny K, Saint S, Salgado CD, Weinstein RA, Wise R & Classen D (2008) A compendium of strategies to prevent healthcare-associated infections in acute care hospitals.

Infection Control and Hospital Epidemiology 29(Suppl. 1), S12–S21.
Zaki MM, Pandit M & Jackson S (2004) National survey for intrapartum and postpartum bladder care: assessing the need for guidelines. *British Journal of Obstetrics and Gynaecology* 111, 874–876.

Zaouter C, Kaneva P & Carli F (2009) Less urinary tract infection by earlier removal of bladder catheter in surgical patients receiving thoracic epidural analgesia. *Regional Anesthesia and Pain Medicine* 34, 542–548.

The Journal of Clinical Nursing (JCN) is an international, peer reviewed journal that aims to promote a high standard of clinically related scholarship which supports the practice and discipline of nursing.

For further information and full author guidelines, please visit JCN on the Wiley Online Library website: <http://wileyonlinelibrary.com/journal/jocn>

Reasons to submit your paper to JCN:

High-impact forum: one of the world's most cited nursing journals, with an impact factor of 1.118 – ranked 30/95 (Nursing (Social Science)) and 34/97 Nursing (Science) in the 2011 Journal Citation Reports® (Thomson Reuters, 2011)

One of the most read nursing journals in the world: over 1.9 million full text accesses in 2011 and accessible in over 8000 libraries worldwide (including over 3500 in developing countries with free or low cost access).

Early View: fully citable online publication ahead of inclusion in an issue.

Fast and easy online submission: online submission at <http://mc.manuscriptcentral.com/jcnur>.

Positive publishing experience: rapid double-blind peer review with constructive feedback.

Online Open: the option to make your article freely and openly accessible to non-subscribers upon publication in Wiley Online Library, as well as the option to deposit the article in your preferred archive.