Guidelines for preventing urinary retention and bladder damage during hospital care

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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

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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 multidrug-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 & Knafll 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. 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 & Knafll 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

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

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

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). Ostaszkwicz 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 (Ostaszkwicz 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 intrindividually 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

Conflict of interests
The authors declare that they have no conflict of interests.

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