An Evidence-Based Approach To Emergency Department Management Of Acute Urinary Retention

Abstract

Approximately 10% of men in their 70s and 33% of men in their 80s report at least 1 episode of acute urinary retention, and this urological emergency presents unique assessment and treatment challenges in the emergency department setting. Patients presenting with acute urinary retention are often in severe pain and require urgent diagnosis and prompt treatment. The differential diagnosis of acute urinary retention is vast, with some causes leading to permanent impairment if not dealt with in a timely manner. Quick recognition of the cause and timely bladder decompression are of utmost importance in preventing morbidity and relieving pain. This review analyzes the etiology, key historical and physical findings, differential diagnosis, and diagnostic studies for acute urinary retention in both men and women. Treatment algorithms for men and women, current controversies regarding urinary catheter usage, and recommendations on criteria for disposition are also presented.

Author: John R. Marshall, MD
Department of Emergency Medicine, Lincoln Medical and Mental Health Center, Bronx, NY

Author: Jordana Haber, MD
Department of Emergency Medicine, Maimonides Medical Center, Brooklyn, NY

Author: Elaine B. Josephson, MD, FACEP
Assistant Professor of Emergency Medicine in Clinical Medicine, Weill Cornell Medical College of Cornell University, New York, NY; Emergency Medicine Residency Program Director, Lincoln Medical and Mental Health Center, Bronx, NY

Peer Reviewers:
William J. Brady, MD
Professor of Emergency Medicine and Medicine, Chair, Medical Emergency Response Committee, Medical Director, Emergency Management, University of Virginia Medical Center, Charlottesville, VA

Joseph D. Toscano, MD
Chairman, Department of Emergency Medicine, San Ramon Regional Medical Center, San Ramon, CA

CME Objectives:
Upon completion of this article, you should be able to:
1. Describe the pathophysiology and complications of AUR.
2. Distinguish key physical examination findings, including red flags, that may help identify patients with AUR.
3. Interpret the treatment algorithms for AUR in men and women.

Prior to beginning this activity, see “Physician CME Information” on the back page.

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Emergency Medicine Residency, Icahn School of Medicine at Mount Sinai, New York, NY

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Dhanadol Rojanasartkul, MD
Attending Physician, Emergency Medicine, King Chulalongkorn Memorial Hospital, Thai Red Cross, Thailand; Faculty of Medicine, Chulalongkorn University, Thailand

Susanne Peeters, MD
Emergency Medicine Residency Director, Haga Hospital, The Hague, The Netherlands
Case Presentations

It’s a typically busy morning in your community ED. The average wait time to be seen is 1 hour when a 66-year-old man with hypertension and high cholesterol states that he has been unable to urinate for a few days and now has suprapubic pain and constipation. He denies fever and chills. He also notes that, in the past, he was diagnosed with benign prostatic hypertrophy and has required Foley placement. It seems simple enough, and you anticipate he will be out as soon as the Foley and leg bag are in place. You wonder if a rectal exam is needed and how fast his bladder can be emptied...

It’s 2:00 PM and you are about to finally grab some lunch, but in comes a 72-year-old man with a history of large cell lymphoma for the past 15 years. He complains of dribbling urinary frequency, which has worsened over 1 day after being prescribed an antibiotic by his doctor for a UTI. The nurse asks him to walk to another stretcher, and as he gets up, he stumbles and catches himself with his hands. As you prepare to do the bladder ultrasound, you wonder why he stumbled...

It’s finally 6:30 PM, with just 30 minutes until relief arrives. You are spending the last half hour of your shift tying up the loose ends with your current patients when a 46-year-old febrile woman with a history of active intravenous drug abuse and HIV comes in. She is in excruciating discomfort and tells you that she has not urinated in 2 days. You wonder if that is possible, and why...

Introduction

Acute urinary retention (AUR) is commonly seen in the emergency department (ED), most often in older men with benign prostatic hypertrophy (BPH).3 AUR is defined as the inability to pass urine voluntarily, and the distended bladder causes extreme discomfort, often requiring immediate attention and intervention. There are many concerning and potentially dangerous causes of AUR, and the onus is on the emergency clinician to consider these etiologies and eliminate them before assuming that it is caused by a benign process. Urgent treatment in the ED is of utmost importance for acute pain management, to prevent insult to the kidneys, and to address the underlying causes of AUR (such as cauda equina syndrome, stroke, tumors, etc).

In women, the most common causes of AUR are bladder masses, gynecologic surgery, and pelvic prolapse.2,3 Unlike the abundance of clinical studies on older men with BPH-related AUR, women have typically been excluded from AUR studies, and little published data are found in the literature addressing women with this condition. An article by Preminger et al in 1983 emphasized the importance of assessing for organic illness for women with AUR.4 The relatively low incidence of women with AUR in the ED combined with the paucity of published evidence often leads to inconsistent and suboptimal recognition and management of female patients.

This issue of Emergency Medicine Practice presents a systematic review of the latest evidence regarding the pathophysiology, diagnosis, and treatment of AUR, with a focus on controversies and advances in care.

Critical Appraisal Of The Literature

An initial search utilizing the PubMed® database from 1960 to 2013 was performed using the search term management of acute urinary retention, with a total of 385 results produced. Full texts for 122 articles were reviewed, of which 69 are cited in this review. Two Federal Aviation Administration (FAA) guideline appendices studying the treatment of AUR in airplane flight as well as a website on flight safety were also reviewed. In addition, the Cochrane Database of Systematic Reviews was searched with regard to the treatment of AUR. In 1994, A BPH guideline panel published recommendations for the diagnosis and treatment of BPH, and in 2004 the American Urological Association published more up-to-date guidelines in light of new evidence-based clinical trials.6 A thorough literature review revealed that the major focus of AUR research involves the treatment of BPH. With the exception of general review articles and case reports, there is little published original research that focuses specifically on the treatment of AUR in women, and this remains an area in need of further research.

Epidemiology

A cohort study of 2115 men aged 40 to 79 years reported the incidence of AUR to be between 2.2 and 6.8 per 1000 men per year (95% confidence interval [CI], 5.2-8.9),7 with a 10-year cumulative risk of 4% to 73% (meaning that the risk is cumulative and increases with advancing age).8 A man’s risk of urinary retention is directly correlated to his age, urinary symptom severity, prostate volume, and urinary flow rate.8 It is estimated that 1 in 10 men aged in their 70s will experience an episode of AUR, increasing to 1 in 3 men aged in their 80s. There is a 20% recurrence rate within 6 months after an episode of urinary retention in patients with AUR due to BPH and 4% recurrence in those with AUR due to other causes.9 Female AUR is relatively uncommon, with much variation regarding incidence and little published data addressing occurrence rates. AUR in women is estimated to account for only 3 out of 100,000 cases of AUR each year;2 with an incidence estimated at around 0.07 per 1000 females.10

In certain populations, AUR may be an indicator of potential morbidity and mortality. One systematic review of 176,046 men aged > 45 years with a first
Pathophysiology

The voiding process (micturition) involves the integration of high cortical sympathetic, parasympathetic, and somatic functions. Normal voiding requires a coordinated contraction of bladder smooth muscle (detrusor muscle) with the simultaneous lowering of resistance at the level of the sphincter smooth muscle and striated muscle and the absence of anatomic obstruction. Urinary retention thus results from an increased resistance to flow via mechanical or dynamic means, diminished neurogenic control of detrusor muscle contractility, and the subsequent decompensating of voiding function.

Sympathetic innervation originating from the T10 to L2 spinal cord is responsible for the control of lower urinary tract and urine storage function. Somatic innervation via the pudendal nerve (S2, S3, and S4) maintains sensory input and pelvic muscle tone. As the sensory impulse of bladder distention is transmitted to cortical centers, these areas of the brain smoothly coordinate voluntary urination. Holding urine requires both relaxation of the detrusor muscle through parasympathetic inhibition and beta-adrenergic stimulation and contraction of the bladder neck and internal sphincter through alpha-adrenergic stimulation. Conversely, urination occurs via contraction of the bladder detrusor muscle via cholinergic muscarinic receptors and relaxation of both the internal sphincter of the bladder neck and the urethral sphincter through alpha-adrenergic inhibition.

The cortical control of voiding involves the connection between the frontal cortex and the septal-preoptic region of the hypothalamus as well as the connections between the paracentral lobe and the brainstem. The process involves inhibition of somatic neural efferent activity to the striated sphincter, inhibition of spinal sympathetic reflexes (outlet relaxation, both internal and external sphincters), and facilitation of efferent parasympathetic pelvic nerves for detrusor muscle contraction.

Any factors that interfere with the neurologic control of the voiding process can result in voiding dysfunction. Urinary retention is defined as the inability to void voluntarily in spite of a full, distended bladder. As bladder outlet obstruction (by any means) progressively increases, the urine stream decreases in size and strength despite forceful and prolonged detrusor contraction. Over long periods of time, this mechanism results in deconditioning, which leads to diminished detrusor muscle contractility and a larger amount of residual urine volume. For an illustration of the neuronal control of micturition, see Figure 1 (page 4).

Etiology

The etiology of AUR is divided into 5 categories: (1) pharmacologic, (2) neurologic, (3) infectious and inflammatory, (4) obstructive, and (5) other. BPH, which is in the obstructive category and is a primary cause of AUR, is referred to as "spontaneous" AUR. Other causes of AUR (eg, infection, medication side effects, surgery, or trauma) are referred to as "precipitated" causes of AUR.

Pharmacologic Causes

Medications may cause prolonged bladder immotility or increased sphincter tone, with resultant AUR. These medications include anticholinergics that inhibit detrusor muscle activity, sympathomimetic drugs that increase alpha-adrenergic tone in the prostate, and nonsteroidal anti-inflammatory drugs (NSAIDs) that may inhibit prostaglandin-mediated detrusor muscle contraction. Patients on chronic opioid therapy are also at an increased risk for development of AUR as a result of experiencing reduced bladder-fullness sensation. For a list of medications associated with AUR, see Table 1, page 5.

Neurologic Causes

Neuropathic etiologies (eg, diabetic cystopathy) are also causes of AUR. Up to 45% of patients with diabetes mellitus and 75% to 100% of patients with diabetic peripheral neuropathy will experience urinary retention at some point in their lives. Upper motor neuron lesions that cause a deficit above the micturition center in the sacral cord are associated with multiple sclerosis, trauma, Parkinson disease,
stroke, and neoplasms. Lower motor neuron lesions causing bladder flaccidity with AUR include spinal cord tumors, epidural abscesses, and trauma. One review examined 3 cases where cord compression as the cause of AUR was missed by the ED physician in patients with a present history of enlarged prostate.\textsuperscript{19}

**Infectious Or Inflammatory Causes**

Infectious or inflammatory causes of AUR include urethritis from a urinary tract infection (UTI), prostatitis, severe vulvovaginitis, or viral causes (eg, genital herpes involving the sacral nerves).\textsuperscript{20}

**Obstructive Causes**

Obstructive causes of AUR are divided into intrinsic causes (eg, prostatic enlargement, bladder stones), or extrinsic causes (eg, uterine or gastrointestinal masses). Obstructive causes in women often involve pelvic organ prolapse (eg, cystocele or rectocele) or malignant pelvic masses.\textsuperscript{16,17}

Although there are many possible causes of AUR, BPH remains the most common cause of AUR.\textsuperscript{21,22} One prospective study followed a cohort of 310 men over a 2-year period and found that AUR was caused by BPH in 53\% of patients, while other obstructive causes accounted for another 23\%.\textsuperscript{23} This is important to keep in mind, as precipitated and spontaneous causes of AUR differ greatly in their treatments and outcomes.

**Other Causes**

In patients during the postpartum period, the incidence of AUR was found to be 1.7\% to 17.9\%.\textsuperscript{24} In a prospective study of 1000 women, it was found that women who received epidural anesthesia during labor were significantly more likely to experience AUR than those who did not.\textsuperscript{25} In cases where trauma is a suspected cause of AUR, etiologies to keep in mind include acute trauma to the urethra, penis, or bladder; spinal cord injury; and bladder/urethral rupture with associated pelvic fracture.

Compared to chronic urinary retention, AUR is usually painful, while more-slowly obstructing pathological processes (ie, tumors) tend to be pain-

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**Figure 1. Pathophysiology Of Micturition**

![Diagram of the pathophysiology of micturition](https://example.com/pathophysiology-diagram.png)
free. Often, already established obstruction comes to light when a superimposed acute obstruction occurs, preventing effective urination (acute-on-chronic urinary retention). For many patients presenting to the ED with a first-time case of AUR, AUR is the first symptom of underlying prostate hyperplasia. The emergency clinician must distinguish more benign processes from an etiology that is emergent and requires urgent operative treatment (eg, that is caused by spinal cord compression). See Table 2 for a list of causes of AUR and Table 3 for gender-specific causes of AUR (page 6).

**Differential Diagnosis**

AUR can present with very vague complaints involving multiple organ systems, which can lead to very broad differential diagnoses. Common complaints may include abdominal pain or distension that may be mistaken for conditions such as small-bowel obstruction, organ prolapse, carcinoma, urinary tract infection, or prostatitis. A presentation of back pain may be confused with renal pathology or spinal tumors. Commonly seen urinary complaints (eg, frequency, dribbling) may also be manifestations of toxin exposure or from neurological causes such as diabetes, cerebrovascular accident, or spinal cord compression. AUR presenting as genital pain may be due to (or confused with) vaginal or penile carcinoma, severe infection, trauma, testicular torsion, or organ prolapse. Because of the large differential diagnosis in AUR, a comprehensive history and physical examination are indicated when evaluating these patients.

### Prehospital Care

**On The Ground**

Care for the patient with AUR in the prehospital setting is centered on providing comfort to the patient during transport to the ED for further evaluation. Serious cases may involve severe pain, infection, or autonomic hyperreflexia. Depending on local protocols and the patient’s presentation, prehospital management may include alleviating pain, correcting hypovolemia, and relieving urinary retention by means of Foley catheter placement.26

**In The Sky**

With an increase in the number of elderly individuals (ie, patients aged ≥ 65 years) flying on commercial aircraft, there will likely be an increasing incidence of AUR in flight. In a recent European review of over 1000 cases of surgical and medical emergencies in flight, AUR was not listed as a more

### Table 1. Medications Associated With Acute Urinary Retention

<table>
<thead>
<tr>
<th>Classification</th>
<th>Generic Names (Brand Names)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antiarrhythmics</td>
<td>Disopyramide (Norpace®), Rhythmodan®; procainamide (Pronestyl®, Procan®, Procanbid®); quinidine</td>
</tr>
<tr>
<td>Anticholinergics</td>
<td>Atropine (Atreza®, Sal-Tropane®, AtroPen®); belladonna alkaloids; dicoclylmine (Bentyl®, Byclor®); Dibint®; flavoxate (Urispas®); glycopyrrolate (Robinul®, Cuyposa®); hyoscymine (Symax®, HyoMax®, Levsin®, et al); oxybutynin (Ditropan®, Gelnique®, Oxytrol®); propantheline bromide; scopolamine</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>Amitriptyline (Elavil®, Amitri®); amoxapine (Asendin®, Defanyl®, Demolox®); doxepin (Sinequan®, Silenor®); imipramine (Tofranil®); mapprotline (Ludionil®); noripitryline (Sessoval®, Aventyl®, Pamelor®, et al)</td>
</tr>
<tr>
<td>Antihistamines</td>
<td>Brompheniramine (Ala-Hist®, Dimetane®, Brovex®, et al); chlorpheniramine (Chlor-Trimeton®, Antagonate®, Pheneton®, et al); cyproheptadine (Periactin®); diphenhydramine (Unisom®, Nytol®, Benadryl®, et al); hydroxyzine (Atarax®, Hy-pam®, Vistaril®, et al)</td>
</tr>
<tr>
<td>Antihypertensives</td>
<td>Hydralazine (Apresoline®, Dralzine®, plus multiple combination products); nifedipine (Adalat®, Nifedical®, Procardia®)</td>
</tr>
<tr>
<td>Antiparkinsonians</td>
<td>Amantadine (Symmetrel®); benztropine (Cogentin®); bromocriptine (Cycloset®, Parlodel®); levodopa (Sinemet®, Parcopa®, Larodopa®); trihexyphenidyl (Artane®, Tremin®)</td>
</tr>
<tr>
<td>Antipsychotics</td>
<td>Chlorpromazine (Promaps®, Thorazine®); fluphenazine (Permitil®, Prolixin®); haloperidol (Haldol®); prochlorperazine (Compazine®); thiouridazine (Mellaril®); thiothixene (Navane®)</td>
</tr>
<tr>
<td>Hormonal agents</td>
<td>Estrogen; progesterone; testosterone</td>
</tr>
<tr>
<td>Muscle relaxants</td>
<td>Baclofen (Kemstro®, Lioresal®); cyclobenzaprine (Amrin®, Flexeril®); diazepam (Valium®)</td>
</tr>
<tr>
<td>Sympathomimetics (alpha)</td>
<td>Ephedrine; phenylephrine (Lusonol®; plus multiple combination products, eg, Dimetapp®, Neo-Synephrine®, Sudafed PE®, et al); phenylpropanolamine; pseudoephedrine (Afrinol®, Silfedrine®, Sudafed®, et al; plus multiple combination products)</td>
</tr>
<tr>
<td>Sympathomimetics (beta)</td>
<td>Isoproterenol/isoprenaline (Isuprel®); metaproterenol (Alupent®); terbutaline (Brethine®, Bricanyl®)</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>Amphetamines; carbamazepine (Carbatrol®, Epitol®, Tegretol®, et al); dopamine (Intropin®); mercurial diuretics; nonsteroidal anti-inflammatory drugs, opioid analgesics; vincristine (Oncovin®, Vincasar®, Vincrrex®, et al)</td>
</tr>
</tbody>
</table>


Emergency Department Evaluation

History

The history for a patient with AUR focuses on determining which of the etiologies in the differential diagnosis may be involved. The location, movement, and radiation of the pain help to determine whether the involved process is proximal or distal to the bladder. If the pain is proximal to the bladder, there is often flank pain; with pain distal to the bladder, the pain often radiates to the scrotum or labia. A full list of patient medications should be obtained including new medications, over-the-counter medications, and herbal remedies. When inquiring about a possible toxicologic cause of AUR, regardless of the patient’s gender, the emergency clinician should inquire about any illicit drug usage, misuse of medications, chemical exposure, history of psychiatric illness, and suicidal intent or ideation. In women and men, a history of weight loss, bone pain, and other constitutional signs and symptoms may suggest an underlying neoplasm.

In men, a history of urinary frequency, urgency, hesitancy, nocturia, difficulty initiating a urinary stream, decreased force of stream, incomplete voiding, or terminal dribbling may indicate an enlarged or inflamed prostate as the cause of the AUR.

Women with obstruction often complain of pelvic pain and abdominal pressure. A history of dysuria, urgency, discharge, chills, fever, low back pain, and genital itching should be sought in order to assess for possible infectious causes such as UTI and vulvovaginitis.

The elderly patient, the nonverbal patient, or the patient with dementia may not be able to divulge a history and may present with only agitation and restlessness. In these patients, family and caregivers may provide the critical history needed to direct the evaluation. Other questions to ask include a history of known neurological disorders and history of prior episodes of urinary retention.

Regardless of gender, neurologic issues should be considered. While spinal cord injury with paraparesis or quadraparesis is usually obvious, other entities such as cauda equina syndrome require a higher index of suspicion.

Physical Examination

The general appearance of patients presenting to the ED with AUR varies greatly, depending on the etiology, age, and underlying comorbidities of the patient. A rectal examination is important in both men and women. In women, a rectal examination should be performed to rule out rectal or uterine prolapse. In men with BPH, the prostate may be enlarged; however, a normal prostate examination does not exclude BPH. The prostate in a patient with prostate cancer is generally enlarged and nodular. One meta-analysis by Roehrborn et al found that prostate volumes estimated by digital rectal examination and measured by transrectal ultrasound (TRUS) were significantly correlated (r = 0.4-0.9), but it also concluded that digital rectal examination often underestimates prostate size if TRUS volume is > 30 mL. However, digital rectal examination may still help identify patients with prostates likely to be larger than certain cutpoints by TRUS. Patients with prostatitis often present with a tender, warm, and boggy prostate. It is common practice to avoid

Table 2. Common Causes Of Acute Urinary Retention

- Benign prostatic hypertrophy
- Bladder calculi
- Bladder clots
- Meatal stenosis
- Neoplasm of the bladder
- Neurogenic etiologies
- Paraphimosis
- Penile trauma
- Phimosis
- Prostate cancer
- Prostatic trauma/avulsion
- Prostatitis
- Urethral foreign body
- Urethral inflammation
- Urethral strictures

Table 3. Gender-Specific Causes Of Acute Urinary Retention

<table>
<thead>
<tr>
<th>Women</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstructive Causes</td>
<td>Obstructive Causes</td>
</tr>
<tr>
<td>Cystocele</td>
<td>BPH</td>
</tr>
<tr>
<td>Tumor</td>
<td>Meatal stenosis</td>
</tr>
<tr>
<td>Infectious Causes</td>
<td>Phimosis/paraphimosis</td>
</tr>
<tr>
<td>Operative Causes</td>
<td>Tumor</td>
</tr>
<tr>
<td></td>
<td>Infectious Causes</td>
</tr>
<tr>
<td></td>
<td>Operative causes</td>
</tr>
</tbody>
</table>

Abbreviation: BPH, benign prostatic hypertrophy.
performing digital rectal examinations in patients with suspected acute bacterial prostatitis, so as not to elicit bacteremia. However, we could find no significant evidence supporting this widely accepted notion and it remains an area for further study.

In both sexes, a thorough genital/pelvic examination is necessary. In men, the examination looks for phimosis or paraphimosis, lesions, and tumors as potential causes of AUR; in women, the examination looks for lesions, tumors, uterine prolapse, cystocele, enlarged uterus, or enlarged ovaries. If there is clinical suspicion for neurogenic disease or a history of trauma, it is important to perform a thorough neurological examination, focusing on strength, sensation, and lower extremity reflexes. When ruling out spinal pathology as a cause for AUR, one must assess the bulbocavernosus reflex, anal reflex, sphincter tone, and perineal sensation.

**Diagnostic Testing**

**Laboratory Tests**
The paramount test in patients with AUR is the urinalysis. A urinalysis will reveal infection and determine the presence of hematuria, which can be a sign of infection, tumor, toxin, trauma, or calculi.

The 3-cup bacterial localization study, described initially by Mears and Stamey in 1968, has been the classic method for diagnosis of bacterial prostatitis in men.\(^3^6\) The patient is asked to retract the foreskin, cleanse the meatus, and void, collecting the first 5 to 10 mL of urine. This first cup represents bacterial growth from the urethra. Then, the next 100 to 150 mL of urine is voided, and 5 to 10 mL of that is collected in a second cup, representing the bladder component of bacterial growth. The prostate is then massaged until a drop of fluid is expressed, collected, and then examined by microscope. More than 10 white blood cells per high power field is abnormal and consistent with prostate inflammation. Lastly, the third cup captures the first 5 to 10 mL of urine collected after prostate massage, and this is sent for culture, representing a prostatic source.\(^3^7\) Clinically, the 3-cup test has proven time-consuming and cumbersome, and its use as a diagnostic tool is declining. Simply obtaining urine cultures before and after prostate massage has become a clinically useful alternative. A 2009 retrospective study by Magri et al of semen cultures from 1100 patients found that it can be a useful adjunctive diagnostic tool; however, further studies are needed to confirm these findings and determine whether a semen culture alone may represent a reasonable diagnostic alternative.\(^3^7\)

Electrolytes, blood urea nitrogen, and creatinine levels may be obtained to evaluate for impaired renal function from prolonged obstruction and potential electrolyte imbalance in those requiring bladder irrigation.

Clinical judgment should be used in each case to determine the significance of obtaining a chemistry panel to evaluate renal function. Prostate-specific antigen (PSA) levels are frequently elevated in the setting of AUR;\(^3^4,3^5\) however, PSA is not a routine ED test and will not differentiate cancer from other causes of urinary retention. Complete blood count (CBC) should be considered in patients with suspected serious infection, hypovolemia, or hematologic disorders.

**Imaging Studies**

In both men and women, when obstruction is the likely cause of urinary retention, renal ultrasound may show signs of hydronephrosis, stone, or obstruction. Kidney ultrasound can evaluate for hydronephrosis that would indicate downstream obstruction. (See Figure 2.) In women, pelvic ultrasound using the bladder sonographic window may

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**Figure 2. Ultrasound Images Of Hydronephrosis**

![A](image1.png)  
**A** Renal parenchyma  
Dilated renal pelvis  

![B](image2.png)  
**B** Renal parenchyma  
Dilated renal pelvis  

Images show hydronephrosis in a 21-year-old male eventually diagnosed with nephrolithiasis. Image A shows mild hydronephrosis. Image B shows moderate hydronephrosis.
show masses (such as ovarian or uterine tumors). Bladder ultrasound can assess for free fluid in cases of trauma, and it can assess bladder volume and reveal the presence of urethral jets (which would rule out upstream ureteral blockages). Bladder ultrasound can also demonstrate urinary retention (see Figure 3), confirm correct Foley or suprapubic catheter placement, and can also detect the presence of masses.

Regarding renal function testing in blood chemistries, in an observational cohort study of 96 subjects (11 female and 85 male), Shah et al showed that the presence of hydronephrosis on bedside ultrasound does not correlate with an elevated serum creatinine; a sensitivity of 70%, a specificity of 67%, a positive predictive value of 39%, and a negative predictive value of 70% were found. This study noted that, given the high prevalence of an elevated creatinine in this cohort of subjects, emergency physicians interested in identifying creatinine elevation in patients with AUR should maintain a low threshold for testing the serum creatinine.

In cases where masses or malignancy are suspected causes of AUR, further diagnostic study (such as computed tomography [CT] scan) should be undertaken to evaluate for mass or malignancy as a cause of obstruction. When new neurological deficits are elicited on examination in a patient with AUR, magnetic resonance imaging (MRI) is indicated. A lumbar MRI is indicated for suspected disc herniation, cord compression, and cauda equina syndrome.

### Treatment

AUR should initially be managed by immediate and complete decompression of the bladder through urinary catheterization with a double-lumen Foley catheter. (See Table 4 for a list of types of catheters and their uses.)

### Foley Placement

Two important aspects in Foley placement are patient reassurance and patient comfort during the procedure. In female patients, this is especially important, given the common propensity to tense the muscles, especially if the patient has had prior experiences with painful Foley insertion. In a prospective study of 50 patients, Allardice et al examined the importance of adequate analgesia, preparation, and correct technique. It was found that by using these methods, 50 consecutive male patients with a diagnosis of AUR were successfully catheterized by 12 different house persons. Often, adequate explanation regarding the procedure and having the patient exhale deeply during insertion helps greatly.

When inserting a Foley catheter, the smallest catheter size that will allow for adequate urine drainage should be used. Urinary catheter sizes refer to the circumference of the catheter, not the diameter of the lumen. Catheters are recorded in sizes French, where 1 French (F) = 1 Charrière = 0.33 mm. Sizes for adults range from 10F to 28F, with sizes 14F to 18F being the most common. Large-circumference catheters (eg, 16F-20F) are more beneficial for draining clots, debris, mucus, etc.

After examining the urogenital area and prior to starting the procedure, observe the patient’s overall condition. Palpate the suprapubic area, keeping in mind the contraindications to Foley and Coude catheter insertion. (See Table 5.) For patients with recent bladder or prostate surgery where continuous bladder irrigation may be necessary, consider placement of a double or triple lumen catheter by an emergency clinician trained in advanced catheter techniques. See Figure 4 for a picture of types of urinary catheters.

To facilitate passage of a Foley catheter in men, hold the penis at a 90° angle to the stretcher and stretch it upward to straighten the penile urethra. As in women, ensure adequate lubrication with 1 to 2 mL of lubricant inserted into the urethral meatus. Apply gentle continuous pressure to help open the prostatific sphincter, as attempting to force it through can increase sphincter contraction, making Foley passage difficult. While waiting for spontaneous urine return, a 60-mL syringe may be used to aspirate urine; if there is still no urine return, remove the Foley and attempt again under direct ultrasound guidance. Ultrasound can be useful in confirming placement as well as calculating urinary volume (postvoid residual) prior to catheter placement. Do not inflate the balloon until you have

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**Figure 3. Transverse View Ultrasound Image Of A Full, Distended Bladder**
confirmed placement with urine return. Inflate the balloon only with sterile water to ensure the balloon does not float or become lodged against the bladder wall.1

If the above fails (usually due to hindrance of passage by an enlarged prostate), placement of a curved-tip Coude catheter (see Figure 4) by an emergency clinician comfortable with advanced catheterization techniques is warranted for male patients.38 The curved tip of the Coude catheter allows easier passage over the obstruction caused by prostatic enlargement. Despite a thorough literature search, no studies were found on placement of Coude catheters by emergency clinicians other than articles recommending its use in the setting of difficult Foley catheter placement due to an enlarged prostate. If passage of neither catheter is successful, a urology consult should be obtained. Criteria for ordering a urology consult include the following:

- Urologic postoperative complications
- Failed Foley and Coude catheter placement
- Urethral stricture, meatal stenosis

At this time, there is no current indication of usage of a Coude catheter in women presenting with AUR, due to lack of curvature of the urethra and absence of a prostate.

In situations involving difficult Foley insertions in women, the emergency clinician should first examine for ureterocele, cystocele, or signs of prolapsed organs. Look for the urethral meatus first, instead of attempting to put the catheter where the meatus should be, especially in elderly women. If the vagina is accidently catheterized, do not remove the catheter; leave it in the vagina so that, when you start to recatheterize with the second tube, you will know where not to put it. Ensure adequate lubrication by placing lubricant on the catheter, as well as slowly injecting 1 to 2 mL into the urethral meatus. This helps provide lubrication further up the urethra.1

Suprapubic Catheterization

Indications for suprapubic catheterization include:
(1) AUR in a patient who has contraindications for urethral catheterization, (2) major urethral trauma when no urologist is available, and (3) failure of Foley and Coude catheterization in an AUR patient without contraindications.1 Prior to performing the procedure, ultrasound visualization of the bladder should be performed to confirm bladder distention. Emergency clinicians should also be familiar with the absolute and relative contraindications as well as the indications for performing suprapubic catheterization.

Table 4. Types Of Urinary Catheters

| Single lumen: no balloon; used for in-and-out catheterization |
| Double lumen: balloon-inflation lumen and draining lumen; used for continuous catheterization |
| Triple lumen: also called 3-way catheters; have draining lumen, balloon-inflation lumen, and irrigation lumen for bladder washout; commonly used in post-TURP patients |

Abbreviation: TURP, transurethral resection of prostate.

Table 5. Indications And Contraindications For Catheter Placement

Indications for Foley Placement
- Acute urinary retention
- Need for monitoring urine output
- Collection of urine for diagnostic purpose
- Radiographic evaluation of lower urinary tract
- Treatment of neurogenic bladder

Indications for Coude Placement
- Failed Foley placement
- Benign prostatic hypertrophy and known history of difficult catheterization

Relative Contraindications to Foley Placement/Contraindications for Coude Placement
- Abdominal or pelvic trauma with blood at urethral meatus
- Penile deformity
- High-riding prostate
- Perineal hematoma
- Known impassible catheterization
- Radiographic evidence of bladder mass/trauma
- History of known prostate or bladder neck surgery
Complications Of Catheterization

Hematuria, hypotension, and postobstructive diuresis are all potential complications of rapid bladder decompression in patients with AUR. Nyman et al performed a review of the literature on urinary decompression published from 1966 to 1996 and found that, although evidence showed that a sudden reduction in bladder wall tension reflexively produces vasodilatation with a concomitant decrease in blood pressure, this occurs with no serious clinical consequences when a patient already has a healthy cardiovascular system. Patients without a healthy cardiovascular system may be at risk for prolonged hypotension following rapid bladder decompression.22 In the past, to avoid the aforementioned sequelae, it was recommended to only gradually decompress the bladder in treating patients with AUR. Nyman’s review cast doubt on this common practice, finding no evidence that gradual bladder decompression decreased the likelihood of causing these complications, and complete and rapid emptying of the bladder was recommended.22

Other complications of catheterization include a risk of urethritis, cystitis, prostatitis, bacteremia, and sepsis. These risks are most prominent in elderly patients and patients with preexisting indwelling catheters. (See Table 6.) Also, keep in mind that a misplaced suprapubic catheter may produce an ileus, bleeding, hematoma, or infection.34 Using ultrasound guidance for direct visualization is highly recommended, as shown by Aguilera et al in a prospective study that showed 100% success rate when ultrasound guidance was used in placing 17 suprapubic catheters in the ED.39 For instructions on how to place a suprapubic catheter, see Table 7.

In a meta-analysis study by McPhail et al, postabdominal surgery patients who had bladder drainage via suprapubic catheters had a decreased risk of bacteriuria and less discomfort than patients who had transurethral catheterization. The suprapubic catheter was, overall, preferred by patients versus transurethral catheterization.40 A Cochrane Database review was performed to determine patient preference and policies for catheter placement in patients with short-term voiding problems and bladder drainage problems.41 One Cochrane article confirmed patient preference for suprapubic catheterization by concluding that in patients requiring catheterization for up to 14 days, less bacteriuria, less discomfort, and reduced need for recatheterization were experienced by patients when suprapubic catheters were used compared to when urethral catheters were used.42

Medical Therapies

Since 1994, there have been major changes in the treatment of patients with urinary retention, in particular, patients with lower urinary tract symptoms and BPH. Currently, the American Urological Association guidelines treatment options for patients with modest-to-severe lower urinary tract symptoms include medical and surgical treatment. Medical therapy includes drugs that help reduce bladder muscle activity and increase bladder emptying, such as alpha-adrenergic blockers, anticholinergic agents, and opioids. Surgery options include clean intermittent catheterization, transurethral resection of the prostate, and suprapubic catheter placement. For patients with severe lower urinary tract symptoms and BPH, radical prostatectomy or urinary diversion may be considered.

Table 6. Indications And Contraindications For Suprapubic Catheter Placement

<table>
<thead>
<tr>
<th>Indications for Placement</th>
<th>Contraindications for Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUR in a patient with contraindications for urethral catheterization</td>
<td>No urologist present</td>
</tr>
<tr>
<td>Failure of transurethral catheterization in an AUR patient</td>
<td>Uncontrolled coagulopathy</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>Pediatric cases (urologist input necessary)</td>
</tr>
<tr>
<td>Bladder not palpable and/or not visible on portable ultrasound</td>
<td>Gross or morbid obesity</td>
</tr>
<tr>
<td></td>
<td>Prior abdominal or pelvic surgery (may need consult first, given the risk of adhesion)</td>
</tr>
<tr>
<td></td>
<td>Pelvic radiation</td>
</tr>
</tbody>
</table>

Abbreviation: AUR, acute urinary retention.

Table 7. Procedure For Placement Of A Suprapubic Catheter

1. Identify location 2 finger-breadths above the pubic symphysis and anesthetize with 1% lidocaine with epinephrine.
2. Insert a 22-gauge spinal needle into the midline and aimed caudally.
3. Advance until urine is aspirated (return of air suggests bowel penetration; movement cephalad with the needle is recommended); then place a wire through the needle and remove the needle.
4. After aspiration, make a 1-cm skin incision deep through the subcutaneous fat.
5. Incise the fascia, ensuring a wide enough incision to allow trocar placement.
6. Inspect the trocar to make sure it can be easily removed from the sheath.
7. Insert the trocar, with sheath, into the bladder using a “cork-screw” motion until urine flashback is seen; advance 1 cm further to ensure safe placement within the bladder.
8. Remove the trocar from the sheath and place the catheter down the lumen of the sheath into the bladder.
9. Remove the tear-off strip from the sheath and remove the sheath.
10. Inflrate the balloon.
11. Suture in place.

Note: If the above catheter is not available, a central venous catheter set may be used, with 12- to 18-inch tubing inserted into the bladder using Seldinger technique.

Table 7. Procedure For Placement Of A Suprapubic Catheter
symptoms associated with BPH include: (1) watchful waiting, (2) pharmacotherapy with alpha blockers such as doxazosin or tamsulosin (which act to relax urethral muscle), and (3) minimally invasive therapies such as transurethral microwave therapy.\textsuperscript{44} Generally speaking, most patients will now undergo medical management prior to any form of surgical intervention. Before these changes, all patients with hematuria were treated with surgical intervention; today they are first offered pharmacotherapy. (See Table 8.)

**Pharmacologic Therapies**
The 2 mainstays of pharmacological treatment in BPH-precipitated AUR are alpha 1 adrenergic-blocking agents (such as tamsulosin) and 5-alpha reductase inhibitors (such as finasteride). Alpha 1 adrenergic blockers work to block alpha-adrenergic receptors in the prostate and bladder neck, thus decreasing bladder outlet resistance and facilitating normal micturition.\textsuperscript{17} The 5-alpha reductase inhibitors act by inhibiting the formation of dihydrotestosterone (the chemical responsible for androgenic prostate growth) from testosterone by blocking the enzyme 5-alpha reductase.\textsuperscript{15}

**Alpha-Adrenoceptor Antagonists**
The Prospective European Doxazosin and Combination Therapy (the PREDICT study) concluded that doxazosin is effective in improving urinary symptoms and urinary flow rate in men with BPH and more effective than placebo or finasteride alone. The addition of finasteride did not provide additional benefit to that achieved with doxazosin alone.\textsuperscript{45} Therefore, it is common for patients with urinary retention to be treated with the concomitant use of an indwelling catheter, an alpha blocker (such as alfuzosin, tamsulosin, or doxazosin), and then trial without catheter.\textsuperscript{6} Adverse side effects commonly reported with different alpha 1 blockers include dizziness, headache, postural hypotension, rhinitis, and sexual dysfunction, and these occur in about 5% to 9% of patient populations.\textsuperscript{8}

**5-Alpha Reductase Inhibitors**
The current American Urological Association guidelines regarding 5-alpha reductase inhibitors recommend them as an effective and appropriate option for treating men with enlarged prostates and associated lower urinary tract symptoms.\textsuperscript{44} The Proscar Long-Term Efficacy and Safety Study (PLESS) trial, a multicenter double-blinded, placebo-controlled trial, studied 3000 men with enlarged prostates and moderate-to-severe urinary symptoms over 4 years. The patients were randomized to finasteride 5 mg/day or placebo. Finasteride treatment resulted in significant improvement in the symptoms scores (-3.3 in the finasteride group compared to -1 in the placebo group in the first year [\(P < .001\)], and main prostate volume decreased in the finasteride group (-18%) in the first year. At 4 years, the risk of undergoing BPH-related surgery was reduced by 55% in the finasteride group versus the placebo group, and the risk for experiencing AUR in the finasteride group was reduced by 57% (\(P < .001\)).\textsuperscript{46}

In the dutasteride trials, a pooled analysis of 3 similar randomized double-blind placebo-controlled 2-year clinical trials was similar to PLESS, but it had a larger patient population (\(n = 4325\)). These trials showed that treatment with 0.5 mg of dutasteride once daily reduced the risk of AUR and BPH more than placebo. At 2 years, dutasteride therapy

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### Table 8. Pharmacologic Therapies Used For Spontaneous Acute Urinary Retention In The Emergency Department

<table>
<thead>
<tr>
<th>Class of Drug</th>
<th>Generic Name/ Dosing</th>
<th>Mechanism of Action</th>
<th>Indications</th>
<th>Side Effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha blockers</td>
<td>• Tamsulosin: 0.4-0.8 mg daily</td>
<td>Alpha 1 adrenergic blockade, thus increasing urinary flow rate</td>
<td>Patients with spontaneous AUR regardless of prior history of usage (unless contraindicated*)</td>
<td>Postural hypotension, headache, dizziness, fatigue, nausea, constipation</td>
</tr>
<tr>
<td></td>
<td>• Alfuzosin: 10 mg PO once daily</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Doxazosin: 1-8 mg PO once daily</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Terazosin: 1-10 mg PO once daily</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Silodosin: 8 mg PO once daily;</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>decrease to 4 mg PO once daily if CrCl is &lt; 50 mL/min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Prazosin: 1-2 mg PO twice daily¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-alpha reductase</td>
<td>• Finasteride: 5-mg tablets</td>
<td>Decreases the formation of testosterone into dihydrotestosterone, reducing prostate growth</td>
<td>Patients with spontaneous AUR who are currently on or have previously taken 5-alpha reductase inhibitors for BPH (unless contraindicated*)</td>
<td>Impotence, decreased libido, decreased ejaculatory volume, testicular pain, rash, pruritus</td>
</tr>
<tr>
<td>inhibitors</td>
<td>• Dutasteride: 0.5-mg capsules</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*For full list of side effects and contraindications please visit [www.FDA.gov](http://www.FDA.gov)/Drugs/*

*Not approved by the United States Food and Drug Administration for this use.

Abbreviation: AUR, acute urinary retention; BPH, benign prostatic hypertrophy; CrCl, creatinine clearance; PO, per os (by mouth).

Sources: [www.FDA.gov](http://www.FDA.gov), [www.merckmanuals.com](http://www.merckmanuals.com)
Clinical Pathway For The Treatment Of Acute Urinary Retention In Women

Perform history and physical examination

- Physical findings of vesicular lesions, infection, or severe pain
  - Treat pain and underlying cause
  - Reassess ability to void
    - Able to void?
      - Yes: Arrive disposition accordingly
      - No: Proceed to next step

  - Distended bladder present?
    - Yes: Insert single- or dual-lumen Foley catheter
      - Successful?
        - Yes: Order urinalysis, consider ordering BUN, creatinine, and CBC
          - Successful?
            - Yes: Place ultrasound-guided suprapubic catheter* (Class II)
              - Urology consult service present?
                - Yes: Consult urology
                - No: Admit
            - NO: Consider using a smaller Foley catheter or more experienced operator
        - NO: Assess other causes
          - Able to void?
            - Yes: Admit
            - NO: Proceed to next step
    - NO: Assess other causes

  - NO: Assess other causes

Is there presence of 1 or more?:
  - Severe infection
  - Significant comorbidity
  - Impaired renal function
  - Neurological deficits
  - Catheter complication
    - NO: Proceed to next step
    - YES: Able to void?
      - Yes: Admit
      - NO: Proceed to next step

- Recent gynecological or obstetric surgery
  - OR Rectal mass, ureterocele, or cystocele present
  - Place ultrasound-guided suprapubic catheter*
    - Consult obstetrics/gynecology
    - Admit

* Contraindications should be assessed prior to suprapubic catheter insertion, and it should only be attempted by or in the presence of a urologist or by a provider only when consult service unavailable.

Abbreviations: BUN, blood urea nitrogen; CBC, complete blood count.

See class of evidence definitions on page 14.
Clinical Pathway For The Treatment Of Acute Urinary Retention In Men

Perform history and physical examination

Nonenlarged prostate present

Perform ultrasound (Class I)

Enlarged prostate present

History of urethral stricture or known impassible Foley catheter

• Place ultrasound-guided suprapubic catheter* (Class II)
• Consult urology

Signs of urethral or bladder trauma

Recent urological operation (ie, TURP)

Consult urology

Distended bladder?

YES

Insert Foley catheter (class I)

NO

Assess other causes

Order urinalysis (Class I), consider ordering BUN, creatinine, and CBC

Is there presence of 1 or more?:
• Severe infection
• Significant comorbidity
• Impaired renal function
• Neurological deficits
• Catheter complication
• Etiology other than BPH

NO

YES

Consider using smaller Foley catheter or more experienced operator

Successful?

NO

Insert Coude catheter (Class I)

YES

Successful?

Consult urology

Urology consultation service present?

NO

YES

Precipitated cause likely?

Admit

• Voiding present: discharge home, discontinue offending agent, treat other precipitating cause
• Voiding absent: admit

NO

NO

• Place ultrasound-guided suprapublic catheter* (Class II)
• Admit

• Leave Foley in (Class I)
• Place a hip bag
• Arrange follow-up
• Prescribe alpha blocker (Class I)
• Discharge home

* Contraindications should be assessed prior to suprapubic catheter insertion and it should only be attempted by or in the presence of a urologist or by a provider only when consult service is unavailable.

Abbreviations: BPH, benign prostatic hypertrophy; BUN, blood urea nitrogen; CBC, complete blood count; TURP, transurethral resection of prostate.

See class of evidence definitions on page 14.
reduced the risk of BPH-related surgery by 48% and AUR by 57% compared to placebo ($P < .001$).\textsuperscript{47}

In both the finasteride and dutasteride trials, drug-related sexual adverse events (such as decreased libido, impotence, ejaculatory disorders, gynecomastia, and rash) occurred more frequently in the 5-alpha reductase inhibitor groups than in the placebo groups. In both finasteride and dutasteride, the onset of adverse effects appeared in the first year, and there was no evidence of increased adverse effects compared to placebo after the first year of therapy. Both agents appeared to be reasonably safe and well tolerated.\textsuperscript{48}

**Combination Therapy Trials**
The Medical Therapy of Prostatic Symptoms Study (MTOPS) was a long-term, double-blind trial that compared the effects of placebo, doxazosin, finasteride, and combination therapy on measures of the clinical progression of BPH over 4 years.\textsuperscript{49} The trial followed 3047 men at 17 clinical centers between 1993 and 1998. Men aged ≥ 50 years with a symptom score of 8 to 30 and a maximum urinary flow rate between 4 and 15 mL/sec with a voiding volume of at least 125 mL were included in the study. Exclusion criteria included men with prior medical and/or surgical intervention for BPH, patients who were hypotensive while supine, and those with a PSA > 10 mg/mL. The results of this study showed that combination therapy with both doxazosin and finasteride was safe and reduced the risk of overall clinical progression of BPH significantly more than treatment with either drug alone. In all groups, the risk of AUR increased with increasing PSA levels.\textsuperscript{49} Furthermore, the Combination of Avodart and Tamsulosin (CombAT) trial was a multicenter randomized double-blind study of clinical outcomes in 4844 men with symptomatic BPH who received either tamsulosin 0.4 mg, dutasteride 0.5 mg, or a combination of both. After 4 years, the study found that the incidence of AUR or BPH-related surgery was higher in men treated with tamsulosin than in those treated with dutasteride or combined therapy ($P < .001$). Prevention of AUR secondary to BPH may be achieved by long-term treatment (4-6 years) with dutasteride, finasteride, or a combination of finasteride and doxazosin.\textsuperscript{46,47,50} The current American Urological Association guidelines only recommend using the 5-alpha reductase inhibitors (finasteride and dutasteride) in men with considerable prostate enlargement on digital rectal examination.

**Antibiotics**
In addressing the case for giving antibiotics, it is important to first recognize what is being treated. If only a catheter has been placed and there is no suspicion for concomitant infection, prophylactic antibiotics should not be initiated unless the patient is pregnant or preoperative, as antibiotics have been found to promote organism resistance.\textsuperscript{51} A Cochrane review article found that silver alloy-impregnated urethral catheters were associated with decreased rates of UTI versus standard catheters.\textsuperscript{41} In suspected acute or chronic bacterial prostatitis, a 4- to 6-week course of a fluoroquinolone (such as levofloxacin) is the first-line treatment. Adjunctive therapy for prostatitis includes alpha blockers, 5-alpha reductase inhibitors, and NSAIDs.\textsuperscript{52}

**Class Of Evidence Definitions**
Each action in the clinical pathways section of Emergency Medicine Practice receives a score based on the following definitions.

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Always acceptable, safe</td>
</tr>
<tr>
<td></td>
<td>Definitively useful</td>
</tr>
<tr>
<td></td>
<td>Proven in both efficacy and effectiveness</td>
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<tr>
<td>Level of Evidence:</td>
<td></td>
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<tr>
<td>One or more large prospective studies are present (with rare exceptions)</td>
<td></td>
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<tr>
<td>High-quality meta-analyses</td>
<td></td>
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<tr>
<td>Study results consistently positive and compelling</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Safe, acceptable</td>
</tr>
<tr>
<td></td>
<td>Probably useful</td>
</tr>
<tr>
<td></td>
<td>Level of Evidence:</td>
</tr>
<tr>
<td>Generally higher levels of evidence</td>
<td></td>
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<tr>
<td>Nonrandomized or retrospective studies:</td>
<td></td>
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<tr>
<td>historic, cohort, or case control studies</td>
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<tr>
<td>Less robust randomized controlled trials</td>
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<tr>
<td>Results consistently positive</td>
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<tr>
<td>III</td>
<td>May be acceptable</td>
</tr>
<tr>
<td></td>
<td>Possibly useful</td>
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<tr>
<td></td>
<td>Considered optional or alternative treatments</td>
</tr>
<tr>
<td>Level of Evidence:</td>
<td></td>
</tr>
<tr>
<td>Generally lower or intermediate levels of evidence</td>
<td></td>
</tr>
<tr>
<td>Case series, animal studies, consensus panels</td>
<td></td>
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<tr>
<td>Occasionally positive results</td>
<td></td>
</tr>
</tbody>
</table>

Indeterminate

- Continuing area of research
- No recommendations until further research

- Level of Evidence:
- Evidence not available
- Higher studies in progress
- Results inconsistent, contradictory
- Results not compelling

This clinical pathway is intended to supplement, rather than substitute for, professional judgment and may be changed depending upon a patient’s individual needs. Failure to comply with this pathway does not represent a breach of the standard of care.

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Mustonen et al further supported the importance of urgent decompression in a prospective study of 25 patients. They concluded that AUR caused decreased renal blood flow (increase in resistive index) as measured by renal Doppler ultrasound. In two-thirds of patients, blood flow returned to normal with treatment of the precipitating factor of AUR. However, in the remaining one-third of patients, at 1 month and 6 months, blood flow was still decreased, thus stressing the importance of timely decompression and urgent treatment of the AUR precipitating factor.53

**Trial Without Catheter Following Acute Urinary Retention**

The answer to the question, “How long should the catheter stay in?” remains elusive. A 1982 prospective study of 107 patients by Breum et al found that up to 70% of men had a recurrent episode of AUR within 1 week if the bladder was drained only initially on presentation.54 A 1989 randomized control trial by Taube et al of 60 patients, with times of catheter removal of 0, 24, or 48 hours, found that there was no correlation between the time of catheter removal and the likelihood of spontaneous voiding.55 In 2006, in an observational study of 2618 patients, Desgrandchamps et al found that men with BPH and AUR catheterized for ≤ 3 days had greater success with spontaneous voiding than those catheterized for > 3 days.56 The 2003 American Urological Association guidelines recommend at least 1 attempt at voiding after catheter removal in a BPH patient before considering surgical intervention.44 In a 2006 prospective cross-sectional survey of 6074 patients, Fitzpatrick et al showed that prolonged catheterization (> 3 days) did not influence trial without catheter success, but it was associated with increased morbidity.57 A 2004 and 2005 prospective study showed that men with BPH have a greater chance of a successful voiding trial without catheter at 2 to 3 days if they are treated with alpha-adrenergic blockers for 3 days, starting at the time of catheter insertion.58,59

The PLESS study classified patients into 2 groups: “spontaneous” AUR and “precipitated” AUR. Patients with spontaneous AUR had no evidence of precipitating factors other than BPH, while patients with precipitated AUR (in addition to BPH) had clinical evidence of other precipitating factors such as: (1) UTI, (2) preceding surgery, (3) predisposing medication exposure, or (4) inciting medical event. Outcomes showed that patients with spontaneous AUR had a higher rate of recurrent spontaneous AUR and a greater need for BPH surgery than patients with precipitated AUR (in whom trial without catheter immediately after bladder drainage can be attempted).46

**Pre-Foley Insertion Balloon Testing**

Whether it is necessary to test the balloon for patency prior to urethral catheterization remains uncertain. Pretesting the balloon ensures it is symmetrical, that it inflates without leaking, and that it deflates. Negative effects of balloon testing include balloon cuffing, the formation of ridges or creases, and the possibility of urethral trauma and balloon entrapment.60,61

A review of practice guidelines by Barnes et al looked at 3 catheters in a laboratory setting and 4 in a clinical setting and found a substantial increase in resultant diameter with pretesting (inflation and deflation), which could make catheter placement more difficult.60 Moreover, a review article found that the collapse of the balloon during inflation and deflation results in ridges or cuff formation, which can result in urethral trauma and make atraumatic removal of the catheter difficult or even impossible.61 Another conclusion of this article was that there is a growing (but still limited) evidence base for managing patients with Foley catheters, leaving many questions unanswered. Until these and other questions are answered, recommendations are to carefully apply clinical guidelines, regularly review existing evidence, and ensure that institutional protocols follow the manufacturers’ guidelines.61-63

Future areas of research in this area could include cost and prevalence studies, studies on adequate volumes of prefill, “gravity drainage” versus manual aspiration, slow versus fast catheter removal, and usage of silicone versus latex catheters.

**Managing The Entrapped Foley Catheter**

One potential complication of Foley catheter removal is entrapment of the catheter as a result of balloon malfunction, a faulty valve mechanism, malfunction of the inflation channel, or crystallization of fluid within the balloon. This often becomes evident as a failure to deflate despite manipulation and repeated attempts at fluid aspiration. Often, this phenomenon is due to cuffing, which happens after complete removal of fluid contents from the catheter balloon. This cuff can attach on to soft tissue within the bladder or urethra. This can be avoided by 2 techniques. The first techniques is by very slow deflation of the catheter balloon or by passive deflation with the syringe. The second technique is instilling 0.5 to 1 mL of water back into the balloon after complete evacuation of fluid contents from the balloon, eliminating the already-formed balloon cuff and smoothing the retaining ridge.53

If the Foley still cannot be removed after following the above procedures, the next step is to confirm placement in the bladder, using bedside ultrasound, and then to cut the balloon port proximal to the inflation valve. A review by Hollingsworth et al of 13 patients with Foley balloon malfunction found that
this technique was successful in 31% of their cases.\textsuperscript{65} If this method fails, there is, most likely, a more distal obstruction that may be fixed by inserting a fine-gauge guidewire through the inflation channel. If the blockage persists after guidewire insertion, the next step is to thread a 22-gauge central venous catheter over the wire and remove it when the catheter tip is in the balloon, allowing for drainage.\textsuperscript{64} This technique was successful in 15% of Hollingsworth et al’s cases.\textsuperscript{65}

If all of these methods are unsuccessful, the balloon may be dissolved chemically using 10 mL of mineral oil and waiting 15 minutes. This can be repeated only once, if needed. The most extreme and final methods described in the literature involve active rupture of the Foley balloon with a sharp instrument. These numbered 31% of Hollingsworth et al’s cases. Some approaches include transabdominal, transvaginal, transperineal, and transrectal puncture of the catheter balloon using ultrasonography. Due to the risk of bladder rupture and severe pain, hyperinflation of the balloon with either air or saline is not recommended.\textsuperscript{64}

\textbf{Disposition}

AUR patients with concomitant infection, significant comorbid illnesses, impaired renal function, neurological deficits, or complications of catheterization require emergent urological consultation and likely admission.\textsuperscript{66}

Because of the 70% recurrence rate of spontaneous AUR in patients with BPH, the catheter should be left in place at discharge from the ED. One retrospective review of 1257 patients found that 90% of patients with AUR in the ED are discharged home with a catheter in place to await further intervention from a urologist in an outpatient setting.\textsuperscript{67}

Return parameters (such as fever, penile pain, repeated vomiting, abdominal pain, and catheter blockage) as well as instructions on hip/leg bag and Foley care, should be discussed and verbalized by the patient. In patients discharged with indwelling catheters, prophylactic antibiotics should not be initiated, as they have been found to promote organism resistance (unless the patient is pregnant or preoperative).\textsuperscript{51} Among patients discharged with indwelling catheters, bacteriuria often develops, but it is typically asymptomatic.\textsuperscript{51}

Regarding pharmacological treatment, an alpha blocker (such as tamsulosin) should be started in patients with AUR secondary to BPH prior to discharge from the ED not only because of improved urinary symptoms and flow rate, but because of the increased chance of successful voiding at days 2 to 3. Remember to explain the increased risks of orthostatic hypotension with the use of alpha blockers, especially in the elderly.

Prevention of AUR recurrences over 4 to 6 years in men with BPH may also be achieved by long-term management with finasteride in patients with enlarged prostate on clinical examination; however, we recommend that this medication be started by a physician who can provide follow-up.

Lastly, because of the increased risk of morbidity (as shown by Fitzpatrick et al) and the poorer success rates for spontaneous voiding (as shown by Desgrandchamps et al), urge patients to consult a urologist within 3 days. At this follow-up appointment, the need for further urodynamic studies, laboratory studies such as PSA levels, and additional pharmacotherapy (such as 5-alpha reductase inhibitors) may be discussed with the patient.\textsuperscript{32} AUR secondary to precipitated causes are at lower risk of recurrence and, thus, might benefit from trial without catheter in the ED directly after bladder drainage. \textbf{See Table 9} for recommendations on outpatient treatment and follow-up for patients discharged from the ED who present with AUR.

Complications of chronic catheter placement include UTI, ureteral stones, trauma, and stricture,\textsuperscript{68} and these complications have been independently associated with an increased risk of mortality.\textsuperscript{67} However, it is still important to keep in mind that early removal of urinary catheters is associated with a higher risk of recurrent AUR, so catheters should remain in place until the patient can visit a urologist as an outpatient.

\textbf{Summary}

AUR in men is a very common syndrome that is frequently diagnosed and managed in the ED. While there is a vast array of published material on the incidence, etiology, and treatment of AUR in men, with the exception of few case reports, there is very little published on the treatment of women with

\begin{table}
\centering
\caption{Recommendations On Outpatient Treatment And Follow-Up For Patients Discharged From The Emergency Department With Either Spontaneous Or Precipitated AUR}
\begin{tabular}{|c|c|c|}
\hline
\textbf{AUR Therapies} & \textbf{Sources of AUR} & \\
\hline
\textbf{Benign Prostatic Hypertrophy} & \textbf{Precipitated Causes} & \\
\hline
Medications & Prescribe alpha blockers & Prescribe antibiotics, if needed \\
\hline
Catheters & Leave in place & Remove, if passed voiding trial in ED \\
\hline
Follow-up & See urologist within 3 days & At discretion of ED clinician \\
\hline
\end{tabular}
\end{table}

Abbreviations: AUR, acute urinary retention; ED, emergency department.
AUR, and this remains a small but important area for research.

Due to the wide variety of symptoms for suspected AUR in the ED, a careful history and physical examination are vital. In men and women, thorough genital, pelvic, and rectal examinations are needed to assess for emergent precipitators of AUR. Ultrasound may be used diagnostically and therapeutically in aiding invasive catheter placement, and also as a cost-saving measure. While most laboratory studies may be ordered at the discretion of the emergency clinician, most patients may only require urinalysis. Once AUR is identified, patients should be treated with prompt and total bladder decompression, with utilization of a Coude catheter if a Foley catheter cannot be passed.

When considering patient admission versus discharge, the emergency clinician should consider patient comorbidities and precipitating factors. In precipitated cases of AUR, the catheter can be removed and a voiding trial performed prior to discharge from the ED. When BPH is the cause, the urinary catheter should be left in, an alpha blocker prescribed, and urology consultation arranged within 3 days. As always, patient and family education, with discharge instructions for Foley care and leg bag emptying, are of the utmost importance.

**Case Conclusions**

In the case of the 66-year-old man with hypertension and high cholesterol, after you performed a thorough head-to-toe examination and a complete history, you performed a rectal examination, which showed good rectal tone with an enlarged, smooth prostate. You used bedside ultrasound to evaluate the bladder and saw a full, distended bladder with an approximate volume of 1100 mL. Urgent bedside complete bladder decompression was performed with a 16F dual-lumen Foley catheter, and urine was sent for urinalysis and culture. The patient's symptoms improved, his vital signs remained stable, and the urinalysis returned as normal. You arranged a urology follow-up appointment in 3 days, had the Foley bag changed to a hip bag, and gave the patient care and changing instructions. You prescribed him a 2-week course of doxazosin and discharged him home with return instructions if his condition worsened.

In your second case, the 72-year-old man, a quick physical examination revealed only a distended bladder. A urethral catheter was placed, and 700 mL of urine was obtained, with much relief for the patient. Not forgetting the patient’s presentation and his stumble while changing stretchers, you decided to perform a thorough neurological examination, and you found nearly absent rectal tone and absence of sensation and vibration below T11. Urgent MRI confirmed your diagnosis of spinal cord compression. You consulted neurosurgery, and the patient was admitted for decompressive laminectomy and eventual chemotherapy.

In the third case, the 46-year-old febrile woman with HIV, after taking her history and giving her a thorough physical examination, you performed a rectal examination, which showed good rectal tone and no evidence of obstruction. You then performed a pelvic examination (with a chaperone present), and it showed vesicular lesions suggestive of herpes. Adequate pain control was achieved. Ultrasound showed a fully distended bladder. You gave the patient acetaminophen, IV acyclovir, and IV fluids, and you started cardiorespiratory monitoring. You performed complete bladder decompression using a 16F Foley and sent the urine for urinalysis and culture. The urinalysis returned positive for white blood cells, so you gave her IV ceftriaxone and admitted her to medicine for IV antibiotics, IV fluids, and antivirals.

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**Time-And-Cost-Effective Strategies**

- In patients with no comorbidities where BPH is the likely etiology of AUR, the only laboratory study necessary is a urinalysis.
- Asymptomatic bacteriuria in patients with chronic indwelling catheters is common and does not need further intervention or antibiotic treatment.
- Utilize ultrasound for Foley, Coude, and suprapubic catheter placement to avoid costly complications.
- Remember that guidelines state that men with mild lower urinary tract symptoms can be followed expectantly with watchful waiting rather than rushing to surgical intervention.
- Urgent attention to bladder decompression of extremely uncomfortable patients may result in less need for hospital resources, such as pain medications.
- Using ultrasound to diagnose AUR in a patient with abdominal pain may obviate the need for more expensive diagnostic testing (such as CT scan).
1. “My female patient was having difficulty urinating, so I assumed that it was a UTI and omitted the pelvic exam.”
A thorough pelvic examination is important in ruling out uterine prolapse or other organ obstruction as a cause of AUR in women.

2. “I treated this patient in the ED for AUR and removed his Foley prior to his discharge, but he is back again today!”
Up to 70% of men with AUR due to BPH will have recurrence if the bladder is drained only during the ED visit and the catheter is removed prior to discharge.

3. “I went to place a suprapubic catheter in my patient and aspirated air.”
Remember the potential bad outcomes involved with a misplaced suprapubic catheter and the importance of using ultrasound during placement and for confirmation of successful Foley, Coude, and suprapubic catheter insertion.

4. “The nurse kept telling me that the patient had severe low back pain. It was busy in the ED, so I gave him 2 Percocets and 4 mg of IV morphine before I assessed him. It turned out all that he needed was bladder decompression.”
Urgent bladder decompression is the definitive treatment for AUR, and it treats pain and saves money on unnecessary testing. Also, treating the patient’s pain acts to improve his ED experience.

5. “The resuscitation was busy, and I couldn’t find saline, so I injected air into the Foley balloon. Now it doesn’t work.”
Injecting air into the Foley balloon may cause it to sit inappropriately within the bladder, interfering with its function.

6. “I placed a Foley in an elderly gentlemen with AUR and discharged him home. Now he has returned with paraphimosis.”
Remember to reduce the foreskin in uncircumcised patients, as it may cause paraphimosis.

7. “I did a CT scan on a patient with abdominal pain. It showed a markedly full, distended bladder. Maybe I should have done an ultrasound first.”
A thorough history and physical examination is needed to differentiate AUR as a cause of abdominal distension and pain, and bedside ultrasound may be used to confirm the diagnosis instead of other costly diagnostic modalities.

8. “The patient seemed reliable, and I assumed he would follow up at the urology clinic. Little did I know that they didn’t have any appointments for 3 months!”
Remember the importance of prompt urological follow-up and the complications of chronic catheter usage. It is essential to ensure that the patient does actually have follow-up prior to discharge.

9. “I removed the fluid from the Foley balloon, and now it will not come out.”
There is a risk of balloon cuffing when fluid is removed too quickly from the catheter balloon. Consider instilling 0.5 to 1 mL of water into the balloon to smooth the already-formed cuffs.

10. “I sent home an elderly patient with tamsulosin and an indwelling catheter, but she came back after passing out at home.”
Though prescribing alpha blockers is recommended, orthostatic hypotension is a common side effect in patients taking these medications. Adequate instruction on the side effects of all medications prescribed must be given to the patient and family. Tamsulosin may be taken at night to reduce the impact of side effects.
References

Evidence-based medicine requires a critical appraisal of the literature based upon study methodology and number of subjects. Not all references are equally robust. The findings of a large, prospective, randomized, and blinded trial should carry more weight than a case report.

To help the reader judge the strength of each reference, pertinent information about the study will be included in bold type following the reference, where available. In addition, the most informative references cited in this paper, as determined by the authors, will be noted by an asterisk (*) next to the number of the reference.


50. Roehrborn CG, Barkin J, Siami P, et al. Clinical outcomes after combined therapy with dutasteride plus tamsulosin or either monotherapy in men with benign prostatic hyperplasia (BPH) by baseline characteristics: 4-year results from the randomized, double-blind Combination of Avodart and Tamsulosin (CombAT) trial. *BJU Int*. 2011;107(6):946-954. (Prospective randomized controlled trial; 4844 patients)


52. Murphy AB, Nadler RB. Pharmacotherapy strategies in chronic prostatitis/chronic pelvic pain syndrome man-
5. In treating spontaneous AUR in the ED after Foley insertion, one should do which of the following?
   a. Decompress the entire bladder and leave the Foley in.
   b. Decompress the entire bladder and remove the Foley.
   c. Only partially decompress the bladder and leave the Foley in.
   d. Only partially decompress the bladder and remove the Foley.

6. Which of the following are contraindications to Foley placement?
   a. Postoperative urological patient with known bladder neck or prostate surgery
   b. Known impassible Foley insertion
   c. Radiographic evidence of bladder trauma
   d. Scrotal/perineal hematoma
   e. All of the above

7. Which of the following catheters is characterized by having a curved tip, balloon inflation lumen, and draining lumen, and is commonly used for continuous catheterization?
   a. Single-lumen Foley
   b. Double-lumen Foley
   c. Triple-lumen Foley
   d. Coude catheter

8. Which of the following is an absolute contraindication for suprapubic catheter placement?
   a. Pregnancy
   b. Uncontrolled coagulopathy
   c. Pediatric cases
   d. Prior abdominal or pelvic surgery

9. Which of the following is not an indication for urology consult?
   a. Genitourinary trauma
   b. Failed Foley and Coude catheter placement
   c. Uncontrolled hematuria
   d. Transient hypotension after bladder decompression

10. Which medication improves the likelihood of spontaneous voiding after catheter removal?
    a. Cyclobenzaprine
    b. Finasteride
    c. Tamsulosin
    d. Ciprofloxacin
This Month in *EM Practice Guidelines Update*: Current Guidelines For The Evaluation And Management Of Heart Failure

The January/February 2014 issue of *EM Practice Guidelines Update* reviews 2 recently updated guidelines on the evaluation and management of heart failure: the European Society of Cardiology guideline, a 2012 update of their 2008 publication; and the joint American College of Cardiology Foundation/American Heart Association guideline, a 2013 update of their 2009 publication. Trevor Lewis, MD; Deb Diercks, MD; and Sigrid Hahn, MD have reviewed these 2 updated guidelines and offer summary and comment on what emergency clinicians need to know about treating patients with heart failure in the ED. Although heart failure is a chronic condition, the emergency clinician must be well-versed in acute and chronic treatments and novel concepts for early detection.

Some of the recommendations discussed in this issue include:

- Chest x-ray, natriuretic peptide measurements, and ECG in the ED offer diagnostic options.
- Prompt treatment in the ED with IV diuretics has been shown to reduce morbidity in hemodynamically stable patients.
- Vasodilators may be used as an adjunct to diuretics to reduce dyspnea.

This online issue offers 2 hours of CME credit. Be sure to log on to www.ebmedicine.net to download your free subscription to *EM Practice Guidelines Update*. Not sure how to access your account? Call us at 1-800-249-5770 and we’ll be glad to help you get started.

Get 4 Hours Stroke CME Credit From The July and August 2013 Issues Of *EM Practice Guidelines Update*

The July and August issues of our online journal supplement, *EM Practice Guidelines Update*, are devoted to stroke topics, and each offers 2 hours of Stroke CME credit. All subscribers to *Emergency Medicine Practice* automatically receive free subscriptions to *EM Practice Guidelines Update*; to access the articles, simply log in to your www.ebmedicine.net account (or give us a call and we’ll help you get your account set up).

The July issue reviews the 2009 guideline on transient ischemic attack (TIA) and the revised American Heart Association/American Stroke Association (AHA/ASA) “tissue-based” diagnosis of TIA. Jonathan Edlow, MD, of Harvard Medical School, offers a guest editorial on the evolution of effective emergency care options for TIA patients, and Editor-in-Chief Sigrid Hahn, MD reviews and comments on portions of the guideline relevant to emergency clinicians. Read the issue online at: www.ebmedicine.net/TIA.

The August 2013 issue reviews 2 different guidelines published in 2013 on acute ischemic stroke and the use of intravenous t-PA (tissue plasminogen activator) from: (1) the American College of Emergency Physicians jointly with the American Academy of Neurology, and (2) the AHA/ASA. Christopher Hopkins, MD of the University of Florida College of Medicine-Jacksonville, the guest editor, provides an assessment of these controversial new guidelines, which have been 8 years in development. Read this issue online at: www.ebmedicine.net/Stroke.
Cardiovascular Toxicity: Management Of Digoxin, Calcium-Channel Blocker, And Beta Blocker Toxicity

AUTHORS:
WESLEY PALATNICK, MD, FRCPC
Professor and Program Director, Emergency Medicine Residency, University of Manitoba; Attending Physician, Department of Emergency Medicine, Health Sciences Centre, Winnipeg, Manitoba, Canada

TOMISLAV JELIC, MD
Department of Emergency Medicine, University of Manitoba, Winnipeg, Canada

The prevalence of cardiovascular disease is increasing due to the aging population, and cardiovascular medications, especially beta blockers and calcium-channel blockers, are now some of the most-prescribed therapeutic agents on the market. As a result of this growing use and availability, there has been a rise in the numbers of toxic exposures. The 2011 annual report of the American Association of Poison Control Centers found that cardiovascular medications accounted for 102,766 exposures, which was 3.74% of all exposures reported, and nearly 11% of the fatalities.

Identifying patients exhibiting toxic effects of these agents and their appropriate management may be difficult. With the advent of newer treatment modalities and controversies in others, management can be complex. Standard Advanced Cardiovascular Life Support (ACLS) protocols used for the resuscitation of patients in cardiac arrest may be insufficient due to the physiologic changes that occur with poisoning with these agents, and often, specific and specialized treatments are necessary. This issue of Emergency Medicine Practice presents the current evidence on best-practice diagnosis and management of beta blocker, calcium-channel blocker, and digoxin toxicity.

Risk Stratification And Clinical Decision-Making For Syncope In The Emergency Department

AUTHORS:
SUZANNE Y.G. PEETERS, MD
Emergency Medicine Residency Director, Haga Hospital, The Hague, The Netherlands

J. STEPHEN HUFF, MD, FACEP
Associate Professor of Emergency Medicine and Neurology, University of Virginia, Charlottesville, VA

AMBER E. HOEK, MD
Emergency Medicine Residency Director, Haga Hospital, The Hague, The Netherlands

SUSAN M. MOLLINK, MD
Emergency Medicine Residency, Haga Hospital, The Hague, The Netherlands

Accounting for 1% to 3% of all emergency department visits, syncope is defined as a transient loss of consciousness due to transient global cerebral hypoperfusion, with rapid onset and spontaneous and complete recovery. Although syncope is a symptom with a wide range of possible underlying causes, the most effective diagnostic tools in evaluating a patient with syncope are the history and physical examination. Studies show that if a nonstructured evaluation is performed, the cause of syncope will be unidentified in 50% of patients, resulting in high costs and low diagnostic yield; however, if standardized clinical evaluations are used, the diagnostic yield increases up to 76%. Several decision rules for syncope have been developed, and although none are sensitive and specific enough to use in the ED setting, they give a good overview of existing risk factors that predict short-term adverse events. This issue of Emergency Medicine Practice presents the best available evidence for diagnosis and risk stratification for syncope and provides guidance in differentiating patients who can be safely discharged and those who need to be hospitalized.
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Office: 5550 Triangle Parkway, Suite 150, Norcross, GA 30092  Phone: 1-800-249-5770  Fax: 1-770-500-1316  Web site: www.ebmedicine.net  E-mail: jagodamd@ebmedicine.net

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