

Urinary retention is the inability to empty the bladder.¹⁴ Urinary retention is common following anesthesia and surgery, with a reported incidence of postoperative urinary retention (POUR) in joint arthroplasty between 10.7-84%.¹⁰ The wide range could be related to patient population, operative procedure, anesthesia methodology, and the difficulty in evaluating the prevalence of urinary retention.⁹ The evidenced –based approach to prevention and management of POUR during the perioperative phase is recommended.

Risk Factors for Post Operative Urinary Retention

Perioperative risk factors for POUR include age, gender, co-morbidities, effects of anesthesia and analgesia, duration of surgery, intravenous fluids (IVF), and medications (see Table 1).

Table 1: Risk Factors for POUR

Predisposing Risk Factors (Preoperative)	Precipitating Risk Factors (Intraoperative or Postoperative)
Age > 50	Prolonged duration of surgery
Male	Excessive exposure to cold
Diabetes	Opiates (Systemic or Epidural)
Excessive alcohol intake	Medication (see Table 2)
Constipation	Pain
Medications (see Table 2)	Immobility
Elevated serum creatinine	Anesthesia
Renal insufficiency	Perioperative fluids
History of renal disease	
Urethral stricture (BPH, prostate cancer, tumor, prostatitis)	
Cystocele, rectocele, bladder suspension	
History of chronic UTI	

Age & Gender

Regardless of age, POUR can affect up to 20% of individuals,²¹ but the incidence of POUR increases in patients over the age of 50.^{1,22} The normal consequence of aging results in a change in bladder sensation which causes many older adults to feel the need to void at bladder capacity instead of half capacity in younger adults.² Frail elderly patients are at high risk of developing POUR due to immobility, effects of anesthesia and analgesia.² Males are more likely to develop urinary retention than females due to gender –specific pathologies (benign prostatic hypertrophy (BPH), prostatitis, and prostate cancer).

Co-morbidities

Neurologic diseases (stroke, Parkinson's, polio, cerebral palsy, multiple sclerosis, and spinal lesions), diabetic and alcoholic neuropathy, chronic UTI, constipation, fecal impaction, presence of BPH, cystocele, or rectocele, are predisposing factors to the development of POUR.^{1, 14}

Duration of Surgery and IVF

The duration of surgery can affect the incidence of POUR. Longer operations may be associated with large volumes of IVF's and higher doses of opioids administered. Excessive infusion of IVF can lead to over distension of the bladder. There was a significant increased incidence in POUR among patients with anesthesia longer than 60 minutes.²² In the

study by Petros, Rimm, Robillard, & Argy (1991), duration of surgery was a significant factor associated with POUR. In this study, patients receiving general anesthesia had a higher incidence of POUR, suggesting this was a result of high cumulative doses of halothane administration and not length of exposure. In a study done by Pavlin, D., Pavlin, E., Fitzgibbon, Koerschgen & Plitt (1999), the authors found a significant relationship between bladder volume and the duration of surgery. Pavlin's research however failed to show a relationship between bladder volume and total IVF's administered.

Effects of Anesthesia

In a meta-analysis done by Baldini, Bagry, Aprikian, & Carli (2009), reviewing the impact of anesthesia on the incidence of POUR revealed "The overall incidence of POUR after general anesthesia was found to be significantly lower in comparison with conduction blockade." General anesthetics agents interfere with the autonomic nervous system and cause bladder atony. Spinal (sacral) and epidural (sacral and lumbar) anesthetics block the transmission of afferent and efferent nervous impulses to and from the bladder. The onset and duration of the block is dependent on the pharmacokinetics properties of the local anesthetic agent used. As expected, use of long acting local anesthetics has a higher incidence of POUR. ¹ The urinary retention following spinal anesthesia is mostly caused by the block of the micturition reflex.¹⁷

Research in the Orthopaedic population is limited in findings correlating effects of anesthesia with urinary retention. In a study done by Walts, Kaufman, Moreland, & Weiskopf (1985), the choice and duration of anesthesia did not correlate to urinary retention. However in a retrospective study done by McQueen, Kelly, & Wright (1992), found a significant increase in incidence of urinary retention in orthopedic patients receiving epidural anesthesia and analgesia. Petros et al. (1991) results demonstrated a significant difference with POUR in patient receiving general anesthesia versus spinal anesthesia.

Effects of Analgesia

Systemic opioids have a direct effect on bladder function by inhibiting the release of acetylcholine from the parasympathetic sacral neurons resulting in a relaxed bladder tone.³ Morphine also acts to decrease the urge to void.²⁶ In a study done by Singelyn, Ferrant, Malisse, & Joris (2005), comparing the efficacy and side effects of three analgesic techniques for knee arthroplasty, found the incidence of POUR significantly lower in those patients receiving peripheral nerve block compared with epidural and patient controlled analgesia (PCA). Epidural morphine is associated with an incidence of 62% of POUR compared with 24% when systemic opioids are used.²⁴ The use of low- dose naloxone (0.1mg iv) administered intermittently has the potential to reduce complications of POUR in patients receiving morphine PCA while having no adverse impact on pain control.³

Medications

Various classes of medications work by calming overactive nerve signals and may be used to treat allergies, stomach cramps, muscle spasms, anxiety, or depression. The following drug classes may cause urinary retention: antihistamines, anticholinergics/antispasmodics, and tricyclic antidepressants¹⁴ (see Table 2).

Table 2: Medications affecting POUR (NIH, 2007)

Antihistamines	Anticholinergics/Antispasmodic	Tricyclic Antidepressants
Fexofenadine (Allegra)	Hyoscyamine (Levbid, Cystospaz, Anaspaz, Gastrosed)	imipramine (Toranil)
Diphenhydramine (Benadryl)	Oxybutynin (Ditropan, Ditropan XL, Oxytrol)	amitriptyline (Elavil, Endep)
Chlorpheniramine (Chlor-Trimeton)	tolterodine (Detrol, Detrol LA)	nortriptyline (Aventyl, Pamelor)
Cetirizine (Zyrtec)	Propantheline (Pro-Banthine)	doxepin (Novo-doxepin, Sinequan)

Recommended for Practice

Assessing and Managing POUR

Because urinary retention is not easily assessed, prevention of POUR requires identification of patients with perioperative risk factors particularly in the elderly population undergoing orthopaedic surgery. The development of organizational guidelines for perioperative catheter management and protocols for POUR management is a recommended practice.¹³

Patients who receive large amounts of IVF's intraoperatively require careful monitoring. Discomfort in the lower abdomen has been used as conventional indicators of POUR. Nurses must rely on assessment measures other than the patient's subjective reports of bladder discomfort as the symptoms can be masked by the effects of regional anesthesia, comorbidities, and the influence of narcotic analgesic effects in the elderly.^{1,27} Post-operative genitourinary (GU) assessments should include voiding status, fluid balance and clinical exam. Voiding status should be assessed continuously during the postoperative phase every four hours or more frequently if intraoperative IVF administrations exceed 2000 ml. Careful monitoring of intake and output is imperative to assess fluid balance concerns. Tools for monitoring include a fluid balance chart or intake and output records.²⁷ Frequent inspection, light palpation, and percussion of the abdomen over the site of the urinary bladder. The adult urinary bladder has a capacity of 400-600ml. The first urge to void is felt at 150 ml and the sense of fullness is achieved at 300 ml by the activation of the bladder wall receptors.¹ When the bladder contains excess of 500 ml of urine, in a non obese patient, a large bulge is inspected in the suprapubic area.²⁷ When the bladder volume exceeds 500 ml there is a clear risk of over distension. This can result in atonia, post voiding volumes and urinary tract infections.⁶ The use of ultrasound (US) technology using a bladder scanner if available should be incorporated in the assessment to measure the volume of the bladder contents even in the presence of urination, especially patients at high risk for POUR. The use of a bladder scanner is non-invasive, safe, and a time-saving method to detect and prevent complications from POUR.²⁵ Pavlin et al. (1999) demonstrated that patients at high risk for POUR can have post void residuals greater than 600ml, even though they were able to void. Intervention should be employed to encourage spontaneous voiding prior to catheterization to include early mobilization, offering toileting with use of toilet or bedside commode to allow for upright position, and providing privacy. (See GU Assessment)

Bladder catheterization is a standard treatment of POUR utilizing both in-out and indwelling urinary catheters (IUC). Incorporating the use of a bladder scanner in postoperative monitoring can assist the nurse in the need for catheterization. In Joelsson-Alm, Nyman, Lindholm, Ulfvarson, & Svenson's (2009) article, the authors noted "when the bladder volumes exceed a critical limit, 400-500 ml, actions to empty the bladder must be initiated." A catheterization is recommended when the bladder volumes exceed 600ml.¹⁶ If POUR occurs in low risk patients and catheterization is required, intermittent catheterization is recommended. Bladder catheterization is recommended for 24 hours in patients at high risk for POUR and undergoing major orthopedic surgeries with or without epidural anesthesia/analgesia. Subsequent in-out catheterization should be guided by ultrasound.¹

GU Assessment

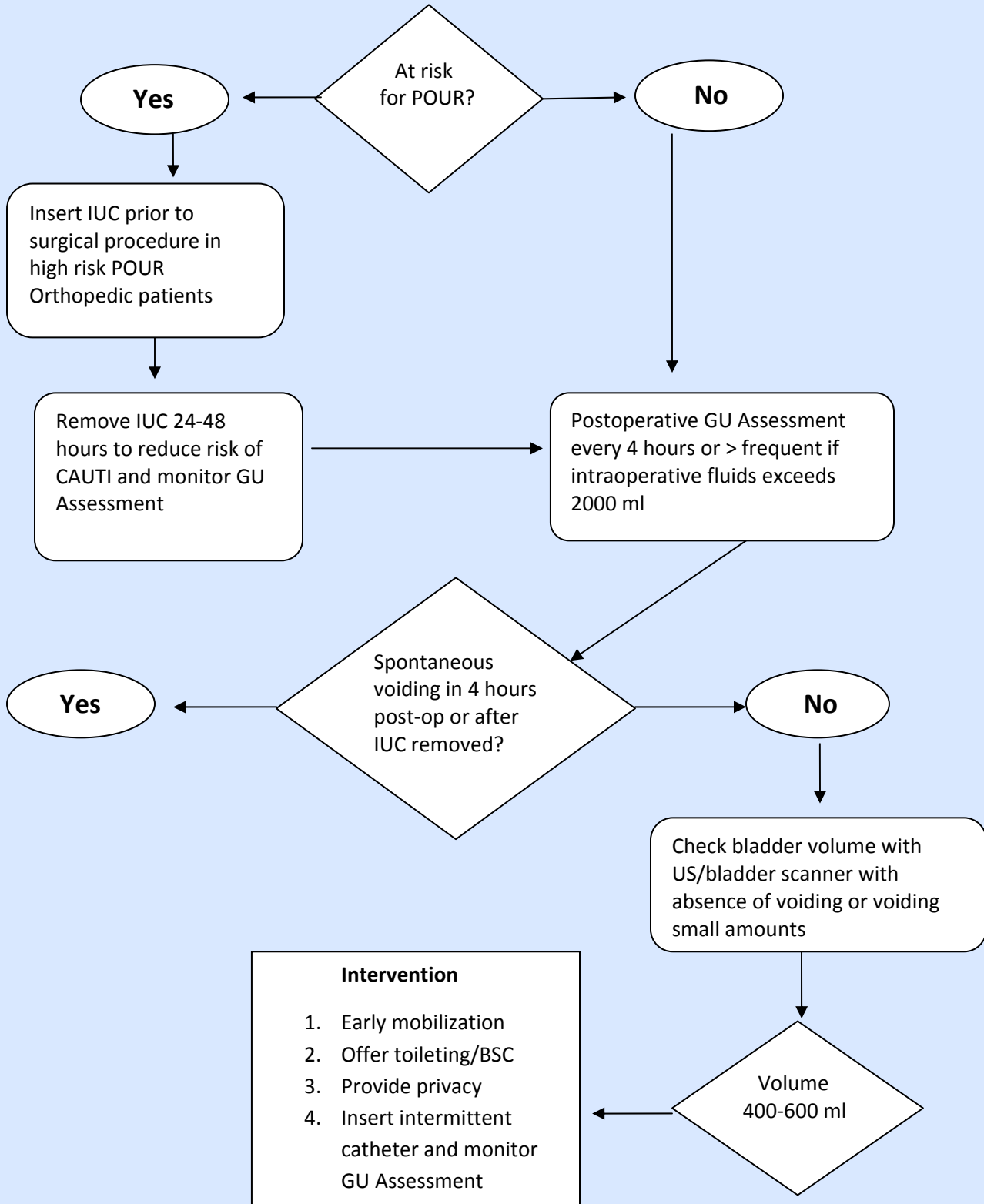
1. Postoperative GU Assessment every 4 hours (> frequently if intraoperative fluids exceed 2000 ml).
2. Assessment to include: voiding status, fluid balance, and clinical exam
3. Voiding status
 - a. Ability to void spontaneously
 - b. Amount voided; if a small amount is voided check residual using a bladder scanner
4. Fluid Balance (Intake and Output)
 - a. Intraoperative fluid intake
 - b. Oral intake
 - c. Intraoperative blood loss
 - d. Urine output
5. Clinical Exam
 - a. Frequent inspection
 - b. Light palpation of bladder
 - c. Percussion
 - d. Bladder scanner

6. Principles to prevent complications of POUR
 - a. Awareness of risk factors for POUR (Table 1 & 2)
 - b. Insert IUC if patient at high risk for POUR prior to surgery
 - c. If low risk for POUR GU assessment q 4 hours
 - d. If unable to void spontaneously or voiding small amounts verify bladder volume using a bladder scanner. If the bladder volume is 400-600 ml, intervention is necessary.
 - i. Early mobilization
 - ii. Offer toileting or bedside commode to allow upright position
 - iii. Provide privacy
 - iv. Intermittent catheterization

Best Practice

1. Development of institutional guidelines & protocols for appropriate perioperative catheter management to include:
 - a. procedure specific guidelines for catheter placement and removal
 - b. management of POUR with nurse directed use of intermittent catheterization and use of bladder US scanners
2. Perioperative Risk Assessment for POUR prior to surgical intervention.
3. Insertion of indwelling catheter in high risk patients for POUR having major orthopaedic surgery with or without epidural anesthesia/analgesia is recommended.
4. Use of a silver alloy (hydrogel) catheter is recommended for short term use in decreasing the incidence of CAUTI.
5. Insertion of IUC should be done with aseptic technique.
6. Catheter size (14-16 Fr) is recommended for intermittent and indwelling catheters.
7. IUC device should be secured to the abdomen or thigh post insertion.
8. IUC device is for short term use and should be assessed daily for continued indications.
9. Postoperative GU assessment should be done every four hours or more frequently if intraoperative fluids exceed 2000 ml. Assessment should include voiding status, I&O, and clinical exam.
10. Use of US (bladder scan) should be incorporated into the GU assessment if available.
11. Intermittent catheterization is recommended in low risk patients for POUR with inability to void guided by US Bladder scan (bladder volume >600).

POUR
Post-operative Urinary Retention



Likely to be Effective

- Low dose naloxone (0.1mg iv) repeated every four hours as a postoperative standard of care can assist in the prevention of urinary retention.³

Benefits Balanced with Harm

Catheterization is an invasive procedure with the potential to cause complications, including catheter associated urinary tract infection (CAUTI), urethral trauma, prostatitis, and patient discomfort.¹ The use of an indwelling catheter after joint arthroplasty for 24 hours or less decreased the incidence of POUR without increasing the incidence of CAUTI.¹² In a study done by Iorio, Whang, Healy, Patch, & Appelby (2005), there was no difference in CAUTI when either IUC or intermittent catheterization techniques were used in total hip arthroplasty. The prophylactic use of an indwelling catheter retained for 24 hours postoperatively did not affect the incidence of CAUTI but an increased risk of CAUTI was observed greater than 48 hours.²³

The short term (<14 days) use of IUC using a silver alloy (hydrogel) has been shown to decrease the incidence of CAUTI.⁸ Indwelling catheterization should be performed using aseptic technique. Appropriate selection of the catheter size and securing the device post insertion is imperative to reduce urethral trauma. The catheter size 14-16 French (Fr) gauge is preferred. The use of large size catheters (18 Fr) is not recommended as this can lead to erosion of the bladder urethral mucosa.¹⁵ The IUC device should be secured to the thigh or abdomen to prevent movement and the exertion of excessive force on the bladder neck or urethra.⁴

Not Recommended for Practice

- Routine use of indwelling catheter for patients undergoing orthopaedic surgery at low risk for POUR

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