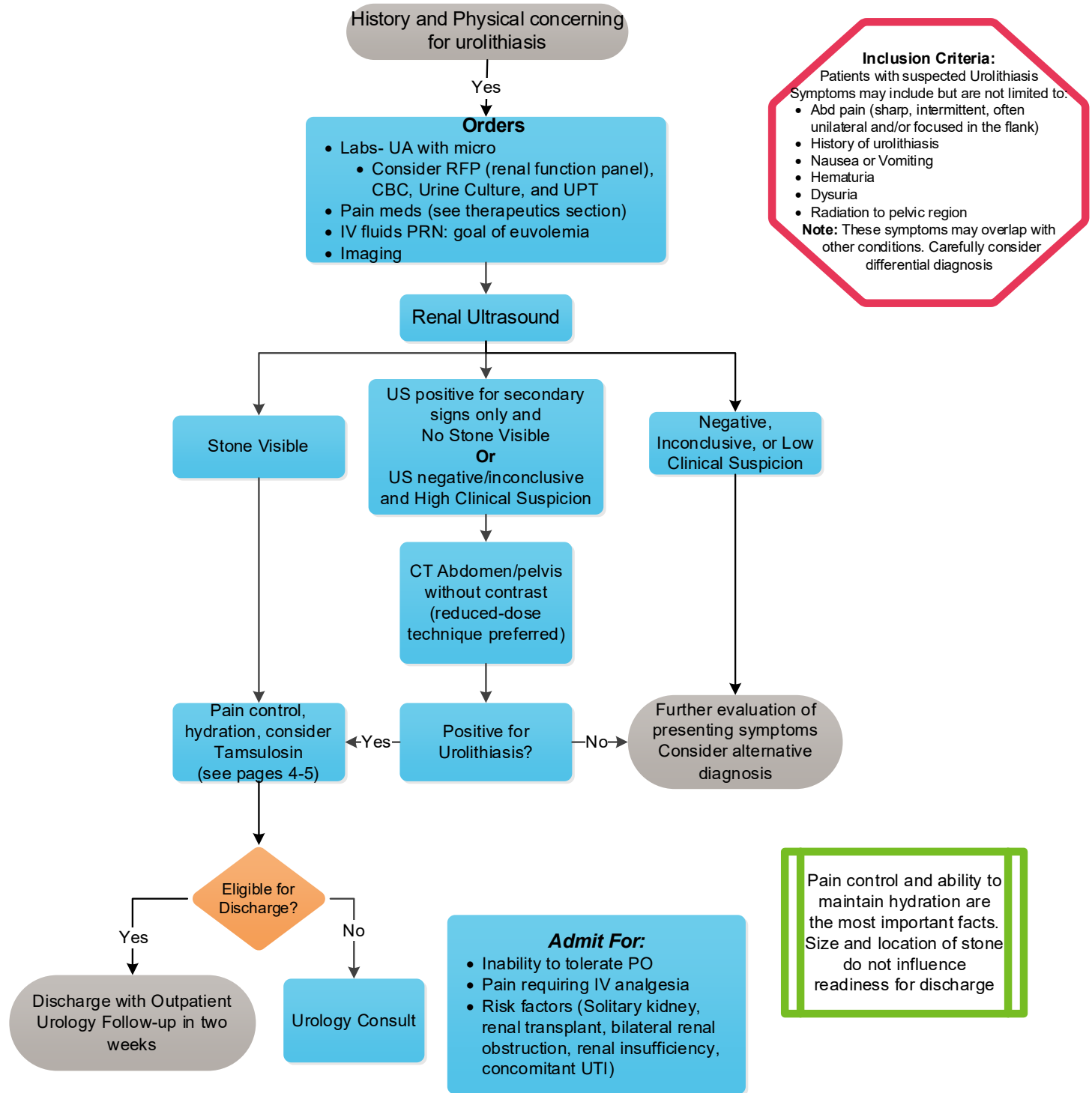


# UROLITHIASIS

## ALGORITHM



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## TARGET POPULATION

### Inclusion Criteria

- Patients with suspected Urolithiasis
- Symptoms may include but are not limited to:
  - Abdominal pain (sharp, intermittent, often unilateral and/or focused in the flank or back)
  - History of urolithiasis
  - Nausea or vomiting
  - Hematuria
  - Dysuria
  - Radiation to pelvic region

**Note: These symptoms may overlap with other conditions. Carefully consider differential diagnosis.**

## BACKGROUND | DEFINITIONS

Urolithiasis (including nephrolithiasis/ureterolithiasis) may present with abdominal pain that is sharp, intermittent, often unilateral, and/or focused on the flank or back. A patient with suspected urolithiasis may or may not present with the following: History of urolithiasis

- History of urolithiasis
- Radiation to the pelvic region
- Hematuria
- Dysuria
- Nausea or vomiting

## INITIAL EVALUATION

### Triage Assessment

- Review triage information, vital signs
- Assess hydration status, need for pain control, need for IV placement

### Complete History & Physical

For a complete history assess the following:

- Abdominal, flank or back, scrotal, penile, or vaginal pain
- Hematuria
- Dysuria
- Urine output
- Nausea or vomiting
- Fever
- Known urinary tract infection
- Any medication use
- Colic in infants

To obtain pertinent past history, assess the following

- Nephrolithiasis
- Urological surgeries
- Metabolic disorders, including hypercalciuria or hypocitraturia
- Determine if family history of nephrolithiasis

### Physical examination

- Abdominal exam
- CVA tenderness
- GU exam

### High Risk

- Family history of stone disease or kidney failure
- Known history of: bone disease, inflammatory bowel disease, cystic fibrosis, gout, deafness, failure to thrive, seizure disorder, immobility, cerebral palsy, spina bifida, nephrectomy, single kidney, nephrocalcinosis
- Urology abnormality: Ureteropelvic junction obstruction, posterior urethral valves, duplex system, bladder extrophy
- Medication exposure: Furosemide, calcitriol, topiramate, corticosteroids, antiretrovirals, supplement/vitamin use, ketogenic diet, acetazolamide

## LABORATORY STUDIES | IMAGING

### Laboratory Studies

- Obtain urinalysis with micro, evaluate UTI and hematuria
  - Urinary Catheterization: Straight Catheter Policy
- Send RFP (renal function panel) if:
  - Concern for electrolyte abnormality
  - Renal insufficiency
- Send CBC & urine culture if:
  - Concern for urinary tract infection
- Send hCG for post-menarchal female

### Imaging

- Plain radiographs are insufficiently sensitive and specific for urolithiasis evaluation
  - If incidentally found on plain radiographs, follow up with renal ultrasound
- Renal Ultrasound
  - Positive for stone: follow Clinical Management Guideline
  - Negative for stone with secondary findings (hydronephrosis or hydroureter): CT Abdomen/pelvis without contrast (reduced-dose technique preferred)
    - High clinical suspicion: CT Abdomen/pelvis without contrast (reduced-dose technique preferred)
    - Low clinical suspicion: Consider alternative diagnosis

## THERAPEUTICS

### Analgesia

- **Baseline pain medications** (UPT indicated for females greater than 12 BEFORE NSAIDs are provided)
  - Ketorolac - Can be administered orally, IV, or IM
    - **The maximum combined duration of treatment (for parenteral and oral) is 5 days; do not increase dose or frequency.**
    - **Consider alternative pain management in patients with renal insufficiency.**
    - **Ensure patient is adequately hydrated at time of administration.**
      - **Children greater than 2 years and adolescents less than or equal to 16 years:** *oral formulation should only be used as continuation of IV or IM therapy; do not use as initial therapy.*
        - IM, IV: 0.5 mg/kg/dose every 6-8 hours; maximum 30 mg/dose
        - Oral: 1 mg/kg/dose every 4-6 hours; maximum 10 mg/dose
      - **Adolescents greater than or equal to 17 years:**
        - Less than 50 kg:
          - IM: 30 mg as a single dose or 15 mg every 6 hours; maximum daily dose 60 mg/dose

- IV: 10 mg as a single dose or 10 mg every 6 hours; maximum daily dose 60 mg/day.
- Oral: Initial: 10 mg, then 10 mg every 4 to 6 hours; maximum daily dose: 40 mg/day.
- Greater than or equal to 50 kg:
  - IM: 60 mg as a single dose or 30 mg every 6 hours; maximum daily dose: 120 mg/day.
  - IV: 10 mg as a single dose or 10 mg every 6 hours; maximum daily dose: 120 mg/day.
  - Oral: Initial: 20 mg, then 10 mg every 4 to 6 hours; maximum daily 40 mg/day
- Acetaminophen every 4 hours as needed- refer to CHCO standard dosing (max dose: 650mg)
- **If pain not controlled with baseline pain medications** (see CHCO's [Opioid Prescribing Practices Clinical Pathway](#))
  - Add Oxycodone 0.05-0.1 mg/kg every 4 hours as needed (max dose: 10 mg) **OR**
    - Hydromorphone IV (0.005-0.01 mg/kg) if unable to tolerate oral intake (max dose: 2 mg) **OR**
    - Intranasal Fentanyl 2 mcg/kg x 1 dose if no IV access (max dose: 100 mcg)
- **Pain Control for discharge**
  - Ibuprofen\* every 6 hours as needed - refer to CHCO standard dosing (max dose: 600mg)
    - \* Preferred medication for outpatient pain associated with urolithiasis. ○ Acetaminophen every 4 hours as needed- refer to CHCO standard dosing (max dose: 650mg)

## Medical Expulsive Therapy

- Tamsulosin (Brand: Flomax)
  - Mechanism of Action (MOA): alpha<sub>1A</sub>-receptor antagonism, smooth muscle relaxation and dilation of distal ureter
  - In the Emergency Department, patient can be given first dose if the right timing (before bed), but can also just be sent home with prescription
    - **Greater than 4 years of age:** 0.4 mg PO nightly at bedtime
    - **Less than or equal to 4 years of age:** 0.2 mg PO nightly at bedtime (caregiver to mix capsule contents with 4 mL water and administer 2 mL for 0.2 mg dose and discard remainder of solution)
  - Administration: Give at night, before bed optimally. Available as a 0.4 mg capsule that may be swallowed whole or opened and administered in applesauce or mixed with water/juice

## IV Fluids

- For clinical dehydration, ongoing losses
  - Normal Saline bolus (10-20 mL/kg)
  - Goal of IV hydration is euvoemia
- Not recommended to increase urine output in an effort to facilitate passage of calculus

## ADMISSION | DISCHARGE CRITERIA

### Admission criteria

- Unable to tolerate oral intake
- Pain requiring IV analgesia
- Concurrent urinary tract infection & signs of obstruction
- Presence of risk factors:
  - Solitary kidney
  - Renal transplant
  - Bilateral renal obstruction
  - Renal insufficiency
- Otherwise, may consider discharge if:
  - Adequate pain control
  - Able to maintain hydration orally
  - If unable to discharge, consult Urology

### Discharge with Outpatient Follow-up

- Provide urine strainer to patient, with instructions
- Provide prescription for tamsulosin
  - **Age greater than 4 years:** 0.4 mg PO nightly at bedtime
  - **Age less than or equal to 4 years:** 0.2 mg PO nightly at bedtime
- Review importance of hydration
- Provide prescription(s) for pain control, as needed
- Recommend follow-up in 2 weeks in the Urology Clinic
  - Family may call the following business day for an appointment
- Pain Control and ability to maintain hydration are the most important factors.
- Size and location of stone do not influence readiness for discharge.

### REFERENCES

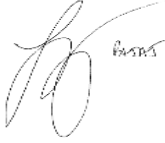


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**APPROVED BY**

Pharmacy & Therapeutics Committee – March 5, 2026  
Clinical Care Guideline and Measures Review Committee – February 23, 2026

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REVIEW | REVISION SCHEDULE

Scheduled for full review: July 2029

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