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

*Note:* These symptoms may overlap with other conditions. Carefully consider differential diagnosis.
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
- 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 medical 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: 0.5mg/kg/dose every 6-8 hours; maximum 30mg/dose.
        - Oral: 1mg/kg/dose every 4-6 hours; maximum 10mg/dose.
      - Adolescents greater than or equal to (> ) 17 years:
        - Less than (<) 50kg:
          - IM: 30mg as a single dose or 15mg every 6 hours; maximum daily dose 60mg/day.
CLINICAL PATHWAY

- IV: 10mg as a single dose or 10mg every 6 hours; maximum daily dose 60mg/day.
- Oral: Initial: 10mg, then 10mg every 4 to 6 hours; maximum daily dose: 40mg/day.
- Greater than or equal to (≥) 50 kg:
  - IM: 60mg as a single dose or 30mg every 6 hours; maximum daily dose: 120mg/day.
  - IV: 10mg as a single dose or 10mg every 6 hours; maximum daily dose: 120mg/day.
  - Oral: Initial: 20mg, then 10mg every 4 to 6 hours; maximum daily dose: 40mg/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 0.05-0.1mg/kg every 4 hours as needed (max dose: 10mg) OR
  - Hydromorphone IV (0.005-0.01mg/kg) if unable to tolerate oral intake (max dose: 2mg)
  - OR
  - Intranasal Fentanyl 2mcg/kg x1 dose if no IV access (max dose: 100mcg)

**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): alpha1A-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: 0.4mg PO nightly at bedtime
    - Less than or equal to (≤) 4 years of age: 0.2mg PO nightly at bedtime (caregiver to mix capsule contents with 4mL water and administer 2mL for 0.2mg dose and discard remainder of solution)
  - Administration: Give at night, before bed optimally. Available as a 0.4mg 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 (10-20mL/kg)
  - Goal of IV hydration is euvolemia
- 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: 0.4mg PO nightly at bedtime
  - age less than or equal to (<4) years: 0.2mg 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


CLINICAL IMPROVEMENT TEAM MEMBERS

Brian Caldwell MD | Urology
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Katie Sellinghausen, PI Specialist | Clinical Effectiveness
APPROVED BY
Pharmacy & Therapeutics Committee – July 7, 2022
Clinical Care Guideline and Measures Review Committee – July 25, 2022
Medication Safety Committee – not applicable
Antimicrobial Stewardship Committee – not applicable

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<td>November 29, 2016</td>
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<tr>
<td>LAST DATE OF REVIEW OR REVISION</td>
<td>July 25, 2022</td>
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<td>COLORADO SPRINGS REVIEWED BY</td>
<td>Michael DiStefano, MD</td>
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<td></td>
<td>Chief Medical Officer, Colorado Springs</td>
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<td>APPROVED BY</td>
<td>Lalit Bajaj, MD, MPH</td>
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<td>Chief Quality, Equity, and Outcomes Officer</td>
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REVIEW | REVISION SCHEDULE
Scheduled for full review on date here July 25, 2026
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