

UROLITHIASIS

ALGORITHM

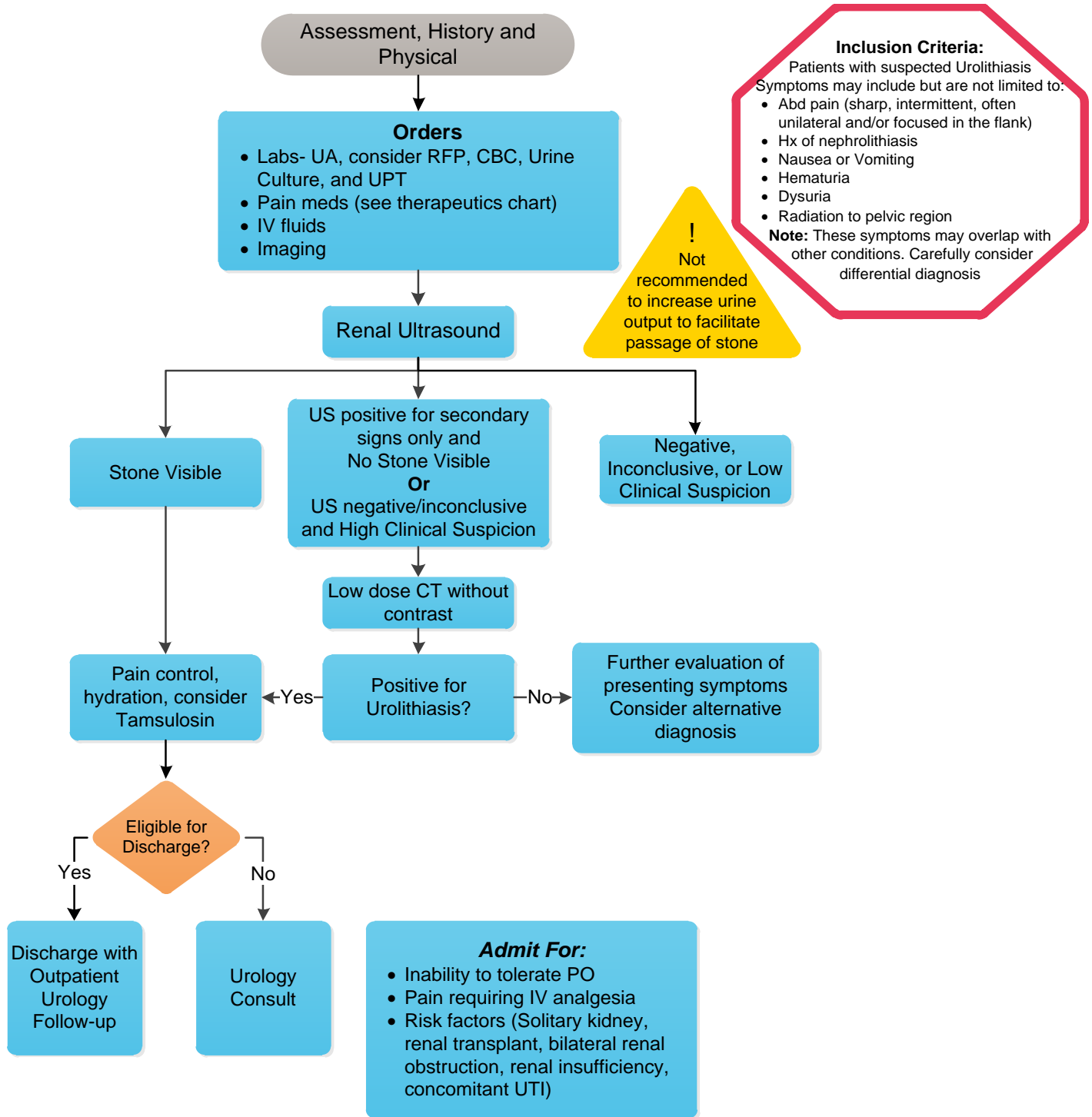


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TARGET POPULATION

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)
 - History of nephrolithiasis
 - Nausea or Vomiting
 - Hematuria
 - Dysuria
 - Radiation to pelvic region

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

BACKGROUND | DEFINITIONS

Urolithiasis may present with abdominal pain that is sharp, intermittent, often unilateral, and/or focused in the flank. 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, scrotal, penile, or vaginal pain
- Hematuria
- Dysuria
- Urine output
- Nausea or vomiting
- Fever
- Known urinary tract infection
- 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
- Send RFP if:
 - Concern for electrolyte abnormality
 - Renal insufficiency
- Send CBC & urine culture if:
 - Concern for urinary tract infection
- Send hCG if (female) patient to undergo CT scan

Imaging

- Renal Ultrasound
 - Positive for stone: follow Clinical Management Guideline
 - Negative for stone with secondary findings (hydronephrosis or hydroureter): Low dose CT without contrast
 - Negative for stone without secondary findings
 - High clinical suspicion: Low dose CT without contrast
 - Low clinical suspicion: Consider alternative diagnosis

THERAPEUTICS

Analgesia (using Visual Analog Pain Scale 1-10)

- Oral for Pain Scores 1-4
 - Ibuprofen every 6 hours as needed- refer to CHCO standard dosing *Preferred (max dose: 600mg)
 - Acetaminophen every 4 hours as needed- refer to CHCO standard dosing (max dose: 650mg)
- Oral for Pain Scores 5-7 or not relieved by other PO medications
 - Oxycodone 0.1-0.15mg/kg every 4 hours as needed (max dose: 10mg)
- IV for Pain Scores 5-7 or not tolerating PO
 - Ketorolac 0.5mg/kg every 6 hours as needed (max dose: 30mg, max duration: 48hrs)
 - Consider alternative pain management in patients with renal insufficiency
 - Ensure patient is adequately hydrated at time of administration
- IV for Pain Scores 8-10 or not relieved by ketorolac
 - Morphine 0.05-0.1mg/kg every 2 hours as needed (max dose: 4mg)
- Intranasal for Pain Scores 8-10 with no IV access
 - Fentanyl 1-2mcg/kg x1 dose (max dose: 100mcg)

Medical Expulsive Therapy

- Tamsulosin (Brand: Flomax)
 - MOA: alpha_{1A}-receptor antagonism, smooth muscle relaxation and dilation of distal ureter
 - In the Emergency Department, patient can be given first dose if formulary and given in the right timing (before bed), but can also just be sent home with prescription

- Dosing:
 - Greater than (>) 4 years of age: 0.4mg PO nightly at bedtime
 - Less than or equal to (\leq) 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)
- 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
- Urinary tract infection
- 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

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 (\leq) 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

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3. Persaud, A.C., et al., *Pediatric urolithiasis: clinical predictors in the emergency department*. Pediatrics, 2009. 124(3): p. 888-94.

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