CLINICAL PATHWAY:
Suspected Nephrolithiasis

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.

Inclusion Criteria: patients >1 year of age with high suspicion of urolithiasis (pain localized to the abdomen, back, flank, groin, or genitals, nausea or vomiting, dysuria, hematuria)
Exclusion Criteria: <1 year of age, concern for septic shock, chief complaint of symptoms consistent with UTI and/or, low suspicion for UTI (see UTI pathway)

UA concerning for UTI[1]:
- Nitrites OR
- Leukocyte esterase OR
- Microscopy shows bacteria OR
- ≥5 WBC/hpf

Initial ED Evaluation:
- History including pain, gross hematuria, nausea/vomiting, personal history of nephrolithiasis
- Physical exam findings including flank pain
- Labs:
  - Urinalysis (UA) with microscopy; urine culture if UA concerning for UTI[1]
  - Blood: renal function panel or istat chem8 for ALL patients; if fever and/or UA with signs of UTI[1] add CBC with auto differential with blood culture

High risk patients[2]:
- Solitary kidney
- Congenital anomaly of the kidney and urinary tract (CAKUT)
- Immunocompromised host
- Complex medical history
- Renal transplant

Initial ED Management:
- FEN/GI:
  - NPO
  - 20 mL/kg NS bolus (max 1 liter)
  - **Ondansetron** 0.15 mg/kg IV PRN q8hr (max 8 mg/dose)
- Pain control:
  - **Ketorolac** 0.5 mg/kg/dose (max 15 mg/dose) IV q6hr
    - If high risk[2] or evidence of acute kidney injury (AKI)[3], consider alternative
    - If NOT high risk, can administer prior to lab results
  - **Morphine** 0.1 mg/kg/dose (max 5 mg/dose) IV q3hr PRN severe pain

Retroperitoneal Complete US (or CT if US unavailable)

- Positive for non-obstructing calculus *without* hydronephrosis → Routine outpatient Urology follow up
- Indeterminate (evidence of hydronephrosis and/or hydroureter *without* identified calculus) → Consider low-dose CT scan of abdomen/pelvis w/o contrast
- Positive for obstructing calculus

ED Management Continued:

Medications:
- Administer ketorolac and/or morphine as above if not already done

Labs:
- Obtain renal function panel if not already obtained
- Strain all urine for renal calculi and send to lab for stone analysis

Consults:
- Notify Urology via IntelliDesk urgently if:
  - Obstructing calculus WITH concern for UTI
  - Obstructing calculus WITH fever
- Consult Nephrology via IntelliDesk if patient is high risk[2] and/or acute kidney injury[3]

Obstructing calculus? Yes → ED Management Continued

No → Consider other diagnosis & treat off pathway

[3]Definition of Acute Kidney Injury
(It should be noted that this definition does not apply to children <1 year of age)

AKI is defined by having ***either***:
- At least a 50% increase in Scr above baseline* **and** new Scr ≥0.5 mg/dL **OR**
- An increase by 0.3 mg/dL from baseline*, **and** new Scr ≥0.5 mg/dL

**If a baseline creatinine is unknown, estimate baseline Cr using the Schwartz Calculation (baseline creatinine = (0.413 * height cm)/120 GFR). For patients with Chronic Kidney Disease (CKD), use the CKiD U25 Calculator.*

Pain well controlled AND/OR normal renal function?

Yes:
- Trial regular diet
- For pain oral management:
  - **Ibuprofen** 10 mg/kg/dose (max 600 mg) q6hr PRN moderate pain [consider substituting with **Acetaminophen** 15 mg/kg/dose PRN q6hr (max 1000 mg/dose OR 75 mg/kg/day; not to exceed 4,000 mg/day) if high risk[2] or evidence of AKI[3]]
  - Consider **Oxycodone** 0.1 mg/kg/dose (max 5-10 mg/dose) q4hr PRN severe pain

Unable to tolerate PO →
- Admit to Pediatric Hospital Medicine service
- Admission criteria:
  - Pain not well controlled
  - Not tolerating PO
  - AKI[3]
  - Admission per urology or nephrology recommendation

Inpatient Management:

FEN/GI
- Regular diet as tolerated
- IVFs if poor PO intake
- Ondansetron PRN

Pain Management
- Ketorolac or PO equivalent
- Morphine or PO equivalent

Nursing
- Strain all urine for renal calculi

Consults
- Consult Urology urgently for fever or concerns for infection; routinely for obstructing calculi
- Consult Nephrology for AKI[3]

Discharge Criteria:
Pain well-controlled on oral analgesics and tolerating PO nutrition/hydration

Discharge Medications:
- **Tamsulosin** 0.4 mg PO daily x 30 days if age >2 years AND ureteral calculus
- **Ibuprofen** x 30 days (consider substituting with **acetaminophen** if high risk[2]) – see dosing in box above
- **Oxycodone** x 3 days– see dosing in box above
- **Ondansetron ODT** PO 2 mg (<15 kg), 4 mg (≥15 kg) x 3 days

Discharge Instructions:
- Strain urine (provide patients with strainer)
- Drink enough fluids for urine to be clear
- Return to ED if pain not controlled on discharge medications, not tolerating PO, or fever
- ED to place Urology referral in Epic for outpatient appointment in
  - 2-3 weeks for obstructing calculi
  - Routine for non-obstructing calculi

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