

# Clinical Pathways

## Nephrolithiasis Emergency Department (ED) Clinical Pathway

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# What is a Clinical Pathway?

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An evidence-based guideline that decreases unnecessary variation and helps promote safe, effective, and consistent patient care.

# Objectives of Pathway

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- Standardize the approach to evaluation of pediatric patients presenting for suspected nephrolithiasis/ urinary stones
- Limit repeated exposure to nephrotoxic medications in patients with abnormal serum creatinine level
- Appropriate referral to subspecialty services when indicated
- Appropriate use of radiographic studies

# Why is Pathway Necessary?

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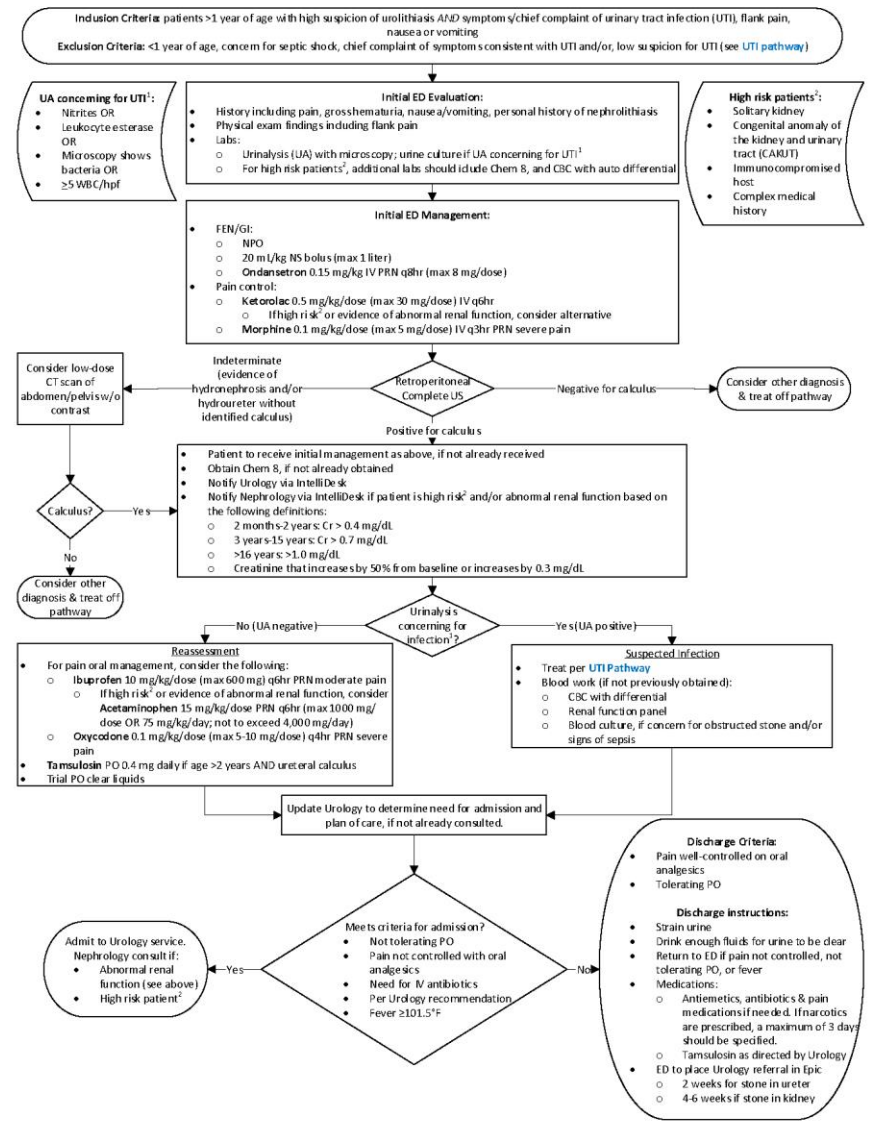
- Increasing incidence of pediatric stone disease
- Shift to outpatient care, particularly in the Emergency Department
- Regional variability of use of CT scan as initial imaging modality despite published guidelines
- Establish a multidisciplinary team approach to stone disease management

- **Population-based study of ED visits in South Carolina for nephrolithiasis (1997-2012):<sup>1</sup>**
  - Doubling of risk for developing urinary stone disease with greatest increase between patients 15-19 years of age (Tasian et al. CJASN 11(3) 2016)
- **Kids' Inpatient Database of HCUP (1997-2012) and the HCUP National ED Sample (2006-2011):<sup>2</sup>**
  - Increase in medical care for pediatric urolithiasis in the ED setting by 9% (Kusumi et. Al. Ped Neph 2015)
  - Increase in hospital charges by 20% for treatment of pediatric urolithiasis
- **Cross-sectional study of children age 1-17 y.o. with diagnostic imaging for kidney stones (2003-2011):<sup>3</sup>**
  - Average of 63% had CT scan as initial study vs 24% with ultrasound (N.B. – Image Gently guidelines)

# CLINICAL PATHWAY: Suspected Nephrolithiasis

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

This is the Nephrolithiasis ED Clinical Pathway.  
We will be reviewing each component in the following slides.



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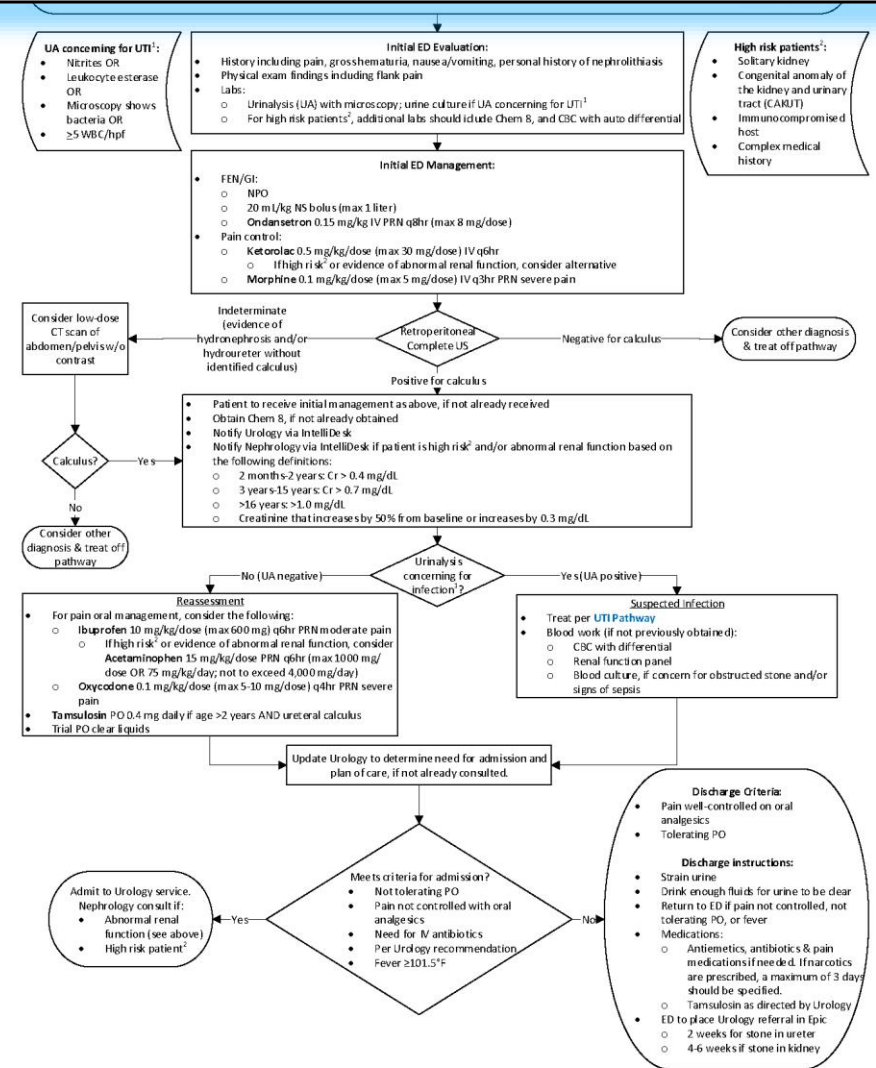
**Inclusion Criteria:** patients presented to Emergency Department (ED) who are >1 year of age with high suspicion of urolithiasis AND symptomatic/chief complaint of urinary tract infection (UTI), flank pain, nausea or vomiting

**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](#))

Nephrolithiasis should be suspected in patients with urinary symptoms AND flank pain with/without nausea or vomiting.

A personal history of nephrolithiasis should also raise the clinical suspicion.

Very young patients under 1 y.o., those presenting with sepsis, and patients with high likelihood of UTI alone will be excluded.



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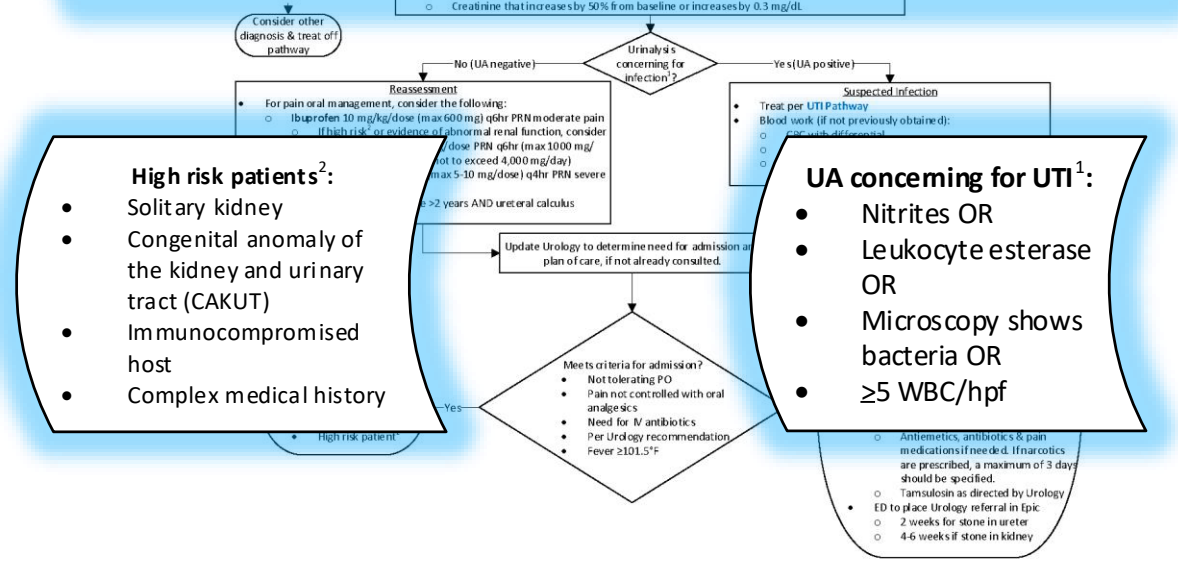
- Laboratory evaluation and medical management can occur simultaneously.
- Consider awaiting results of serum creatinine prior to administering NSAIDs.
- In high risk groups we suggest early discussion with Nephrology regarding pain management.

**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<sup>1</sup>
  - For high risk patients<sup>2</sup>, additional labs should include Chem 8, and CBC with auto differential

**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 30 mg/dose) IV q6hr
  - If high risk<sup>2</sup> or evidence of abnormal renal function, consider alternative
  - **Morphine** 0.1 mg/kg/dose (max 5 mg/dose) IV q3hr PRN severe pain



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- Providers should complete a thorough, focused history to assess for symptoms and risk factors.
- Patients with CAKUT have underlying chronic kidney disease.

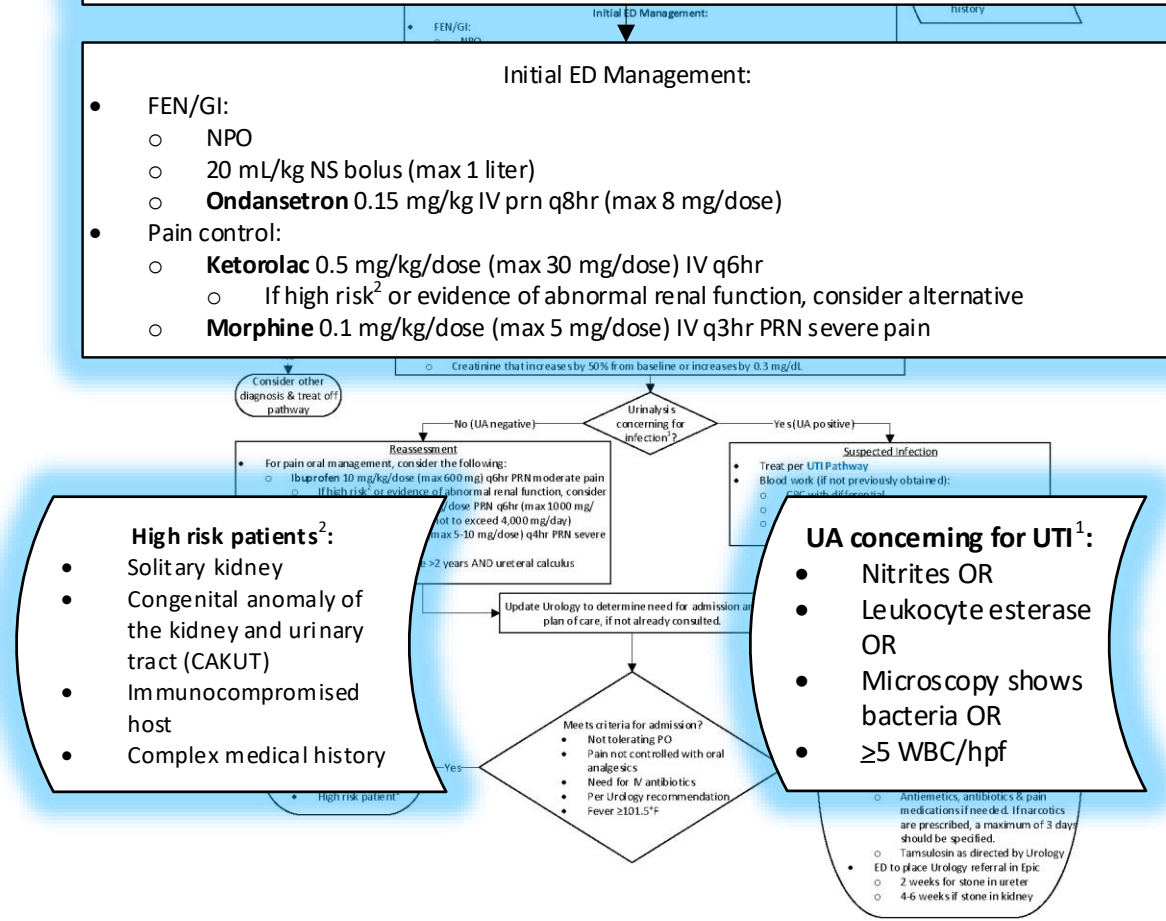
- High risk patients may require additional evaluation and specialty consultation.
- Renal function panel provides the pertinent metabolic assessment for these patients.

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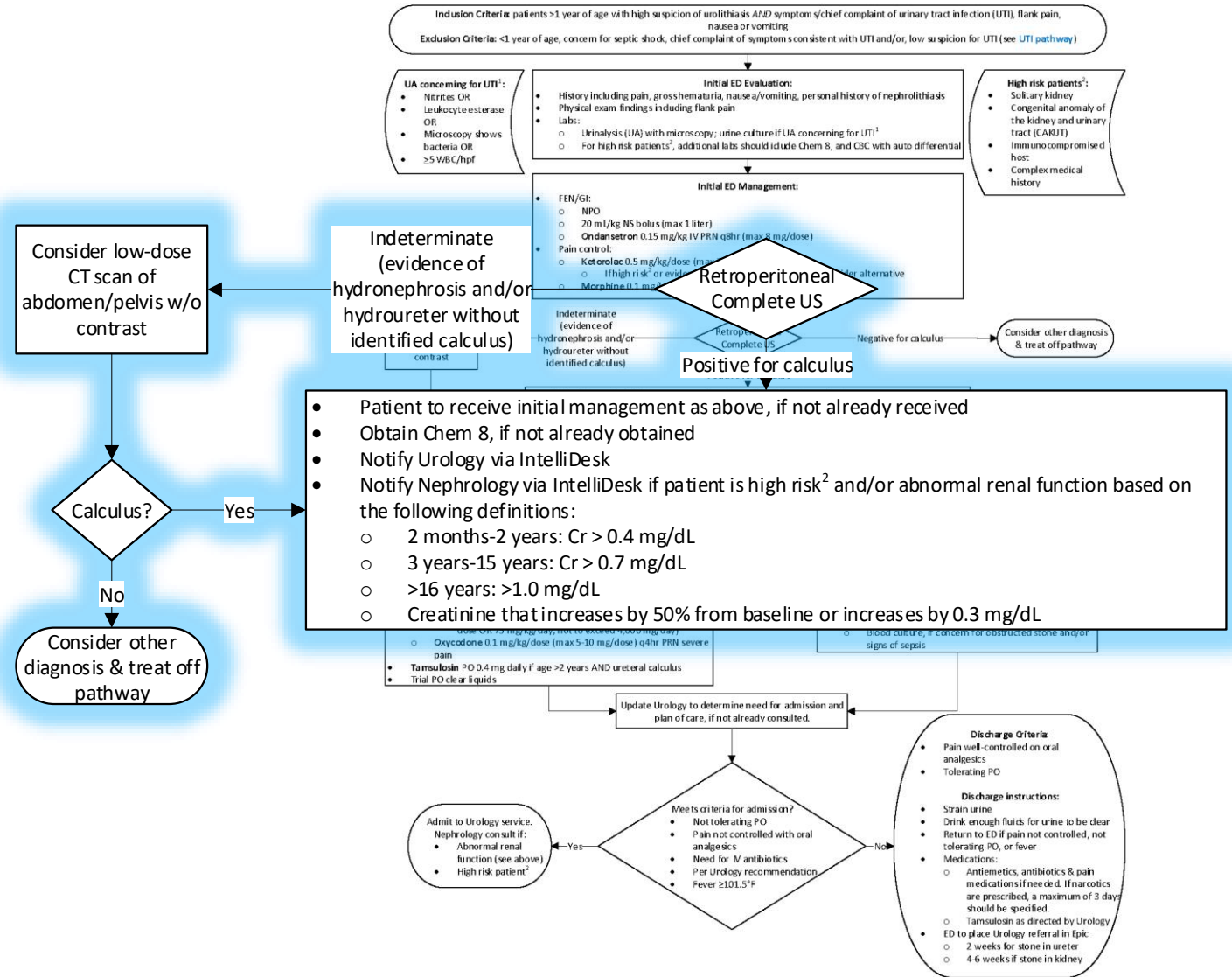


## Imaging Modality:

- Retroperitoneal/ renal bladder ultrasound (RBUS) – recommended by AUA as the 1<sup>st</sup> line study for children with suspected stones
- If indeterminate but high suspicion for stone exists then consider low-dose CT scan
- If stone confirmed on either imaging Urology should be notified.
- Contact Nephrology for patients in high risk group and those with abnormal serum creatinine level.

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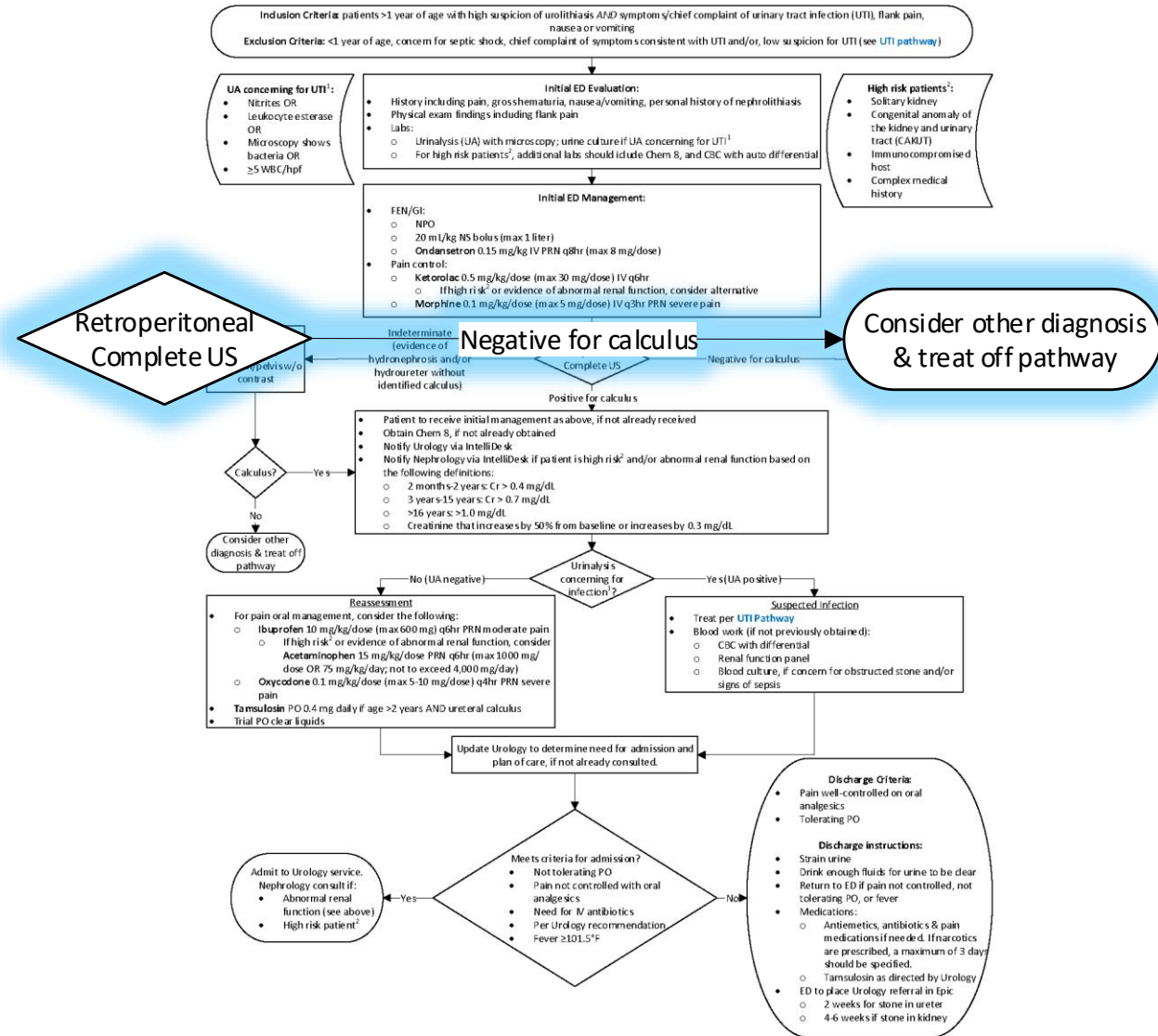
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- If the ultrasound is negative, consider an alternate diagnosis and treat off pathway.



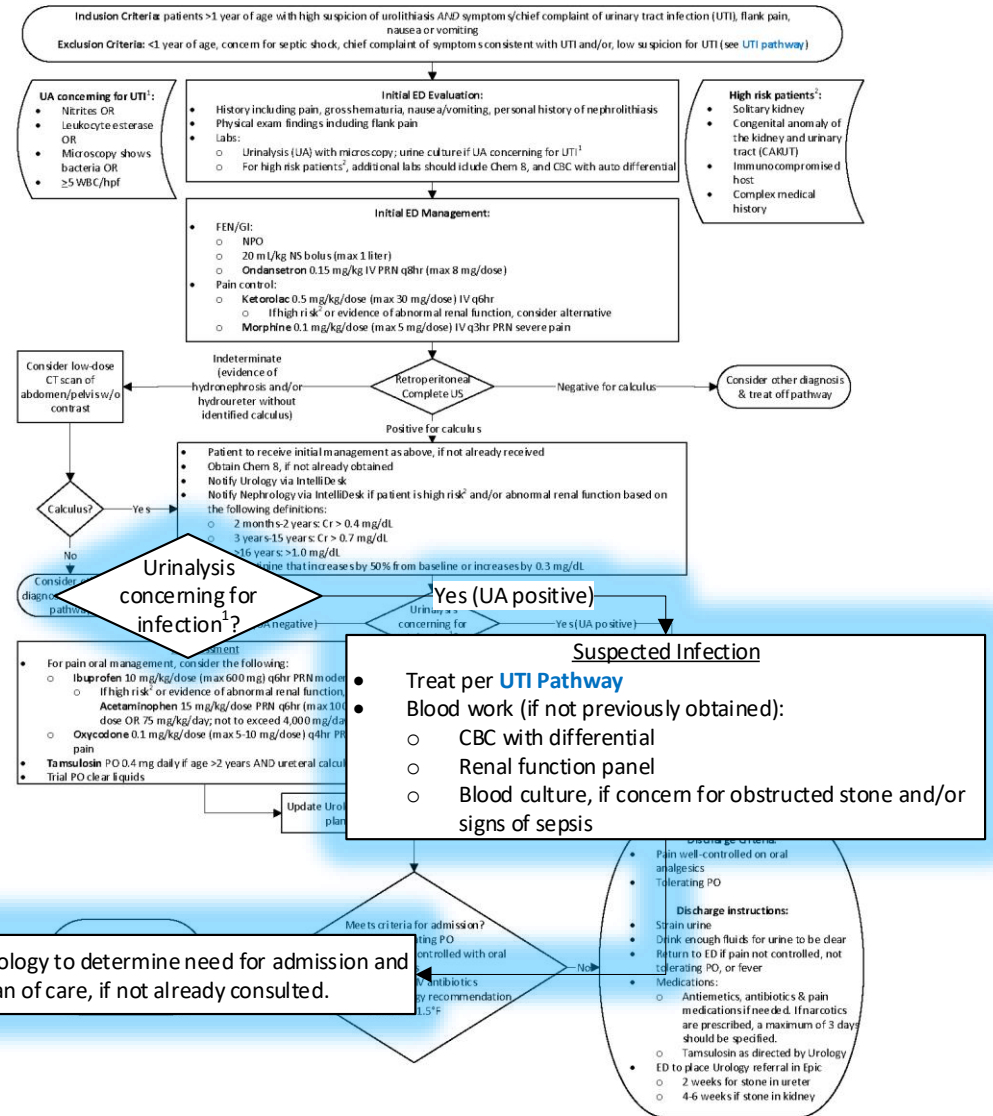
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- If the urinalysis is concerning for infection, follow treatment guidelines per the UTI Pathway.
- Additional labs should be obtained, particularly if there is a clinical concern for sepsis.

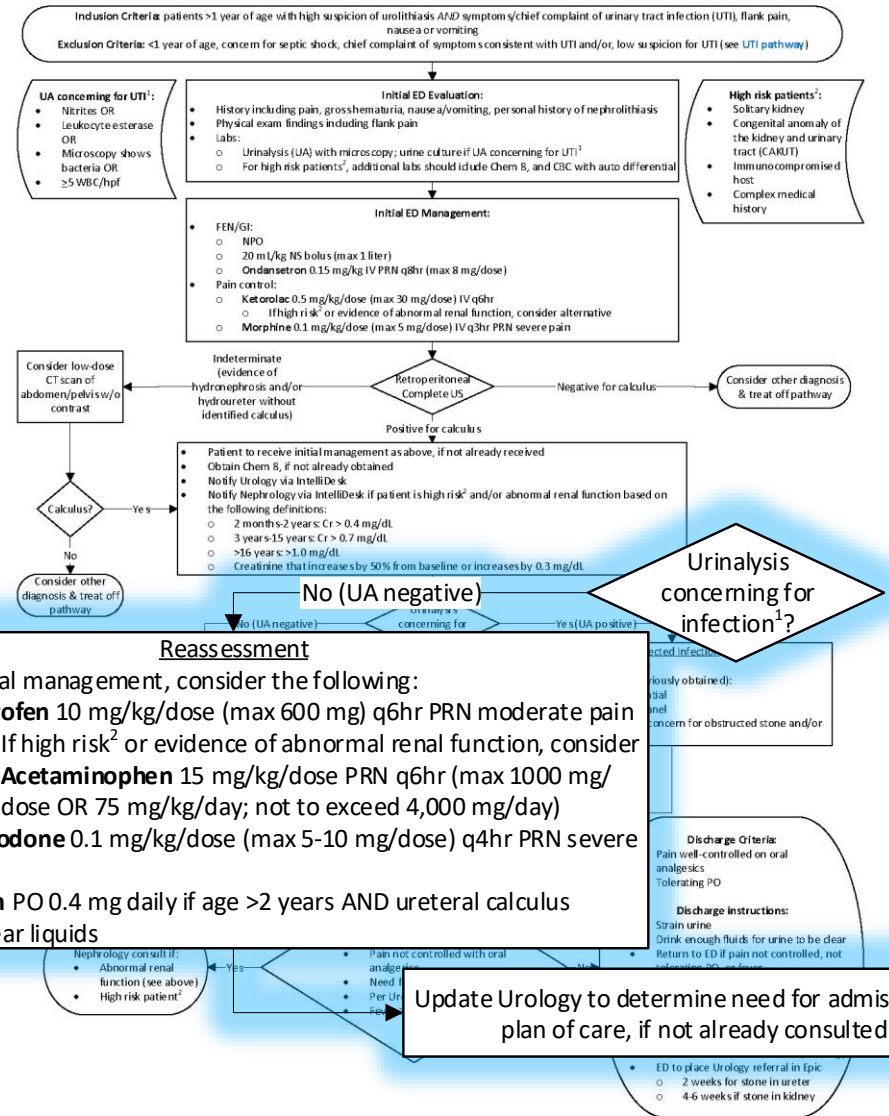
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- If the urinalysis is not concerning for infection, continue ongoing assessment of pain control and the patient's ability to tolerate oral fluids and medications.

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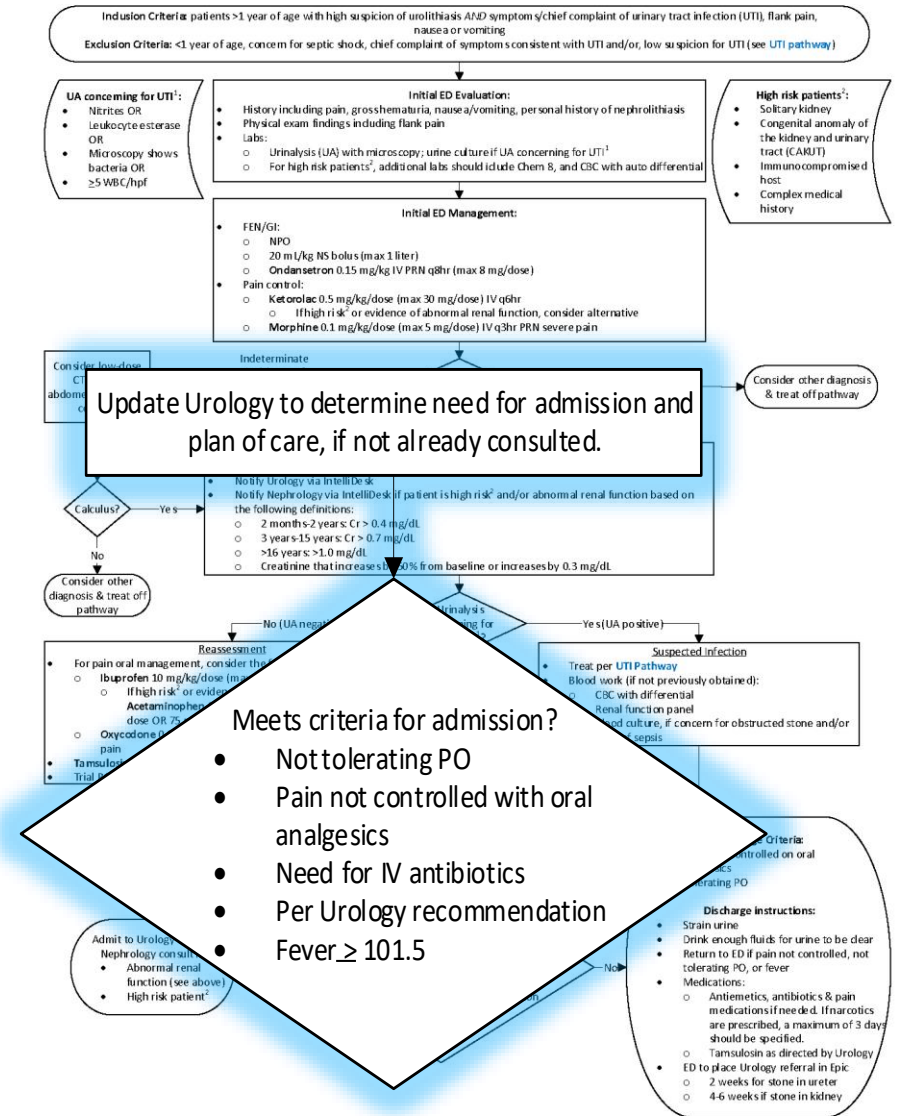
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- Update/consult Urology team.
- The decision regarding disposition is based on the response to initial management and results of diagnostic evaluation.



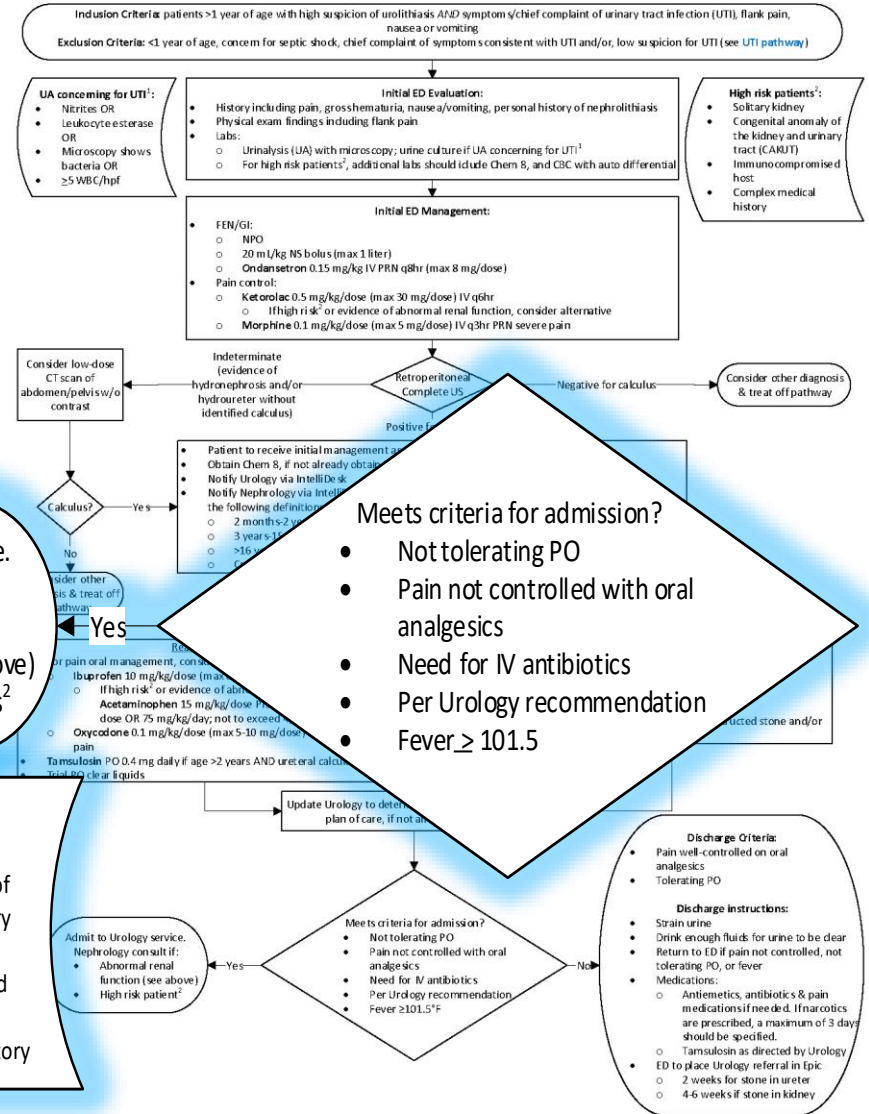
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- If the patient is admitted, consult Nephrology if:
  - Abnormal renal function
  - High risk patients

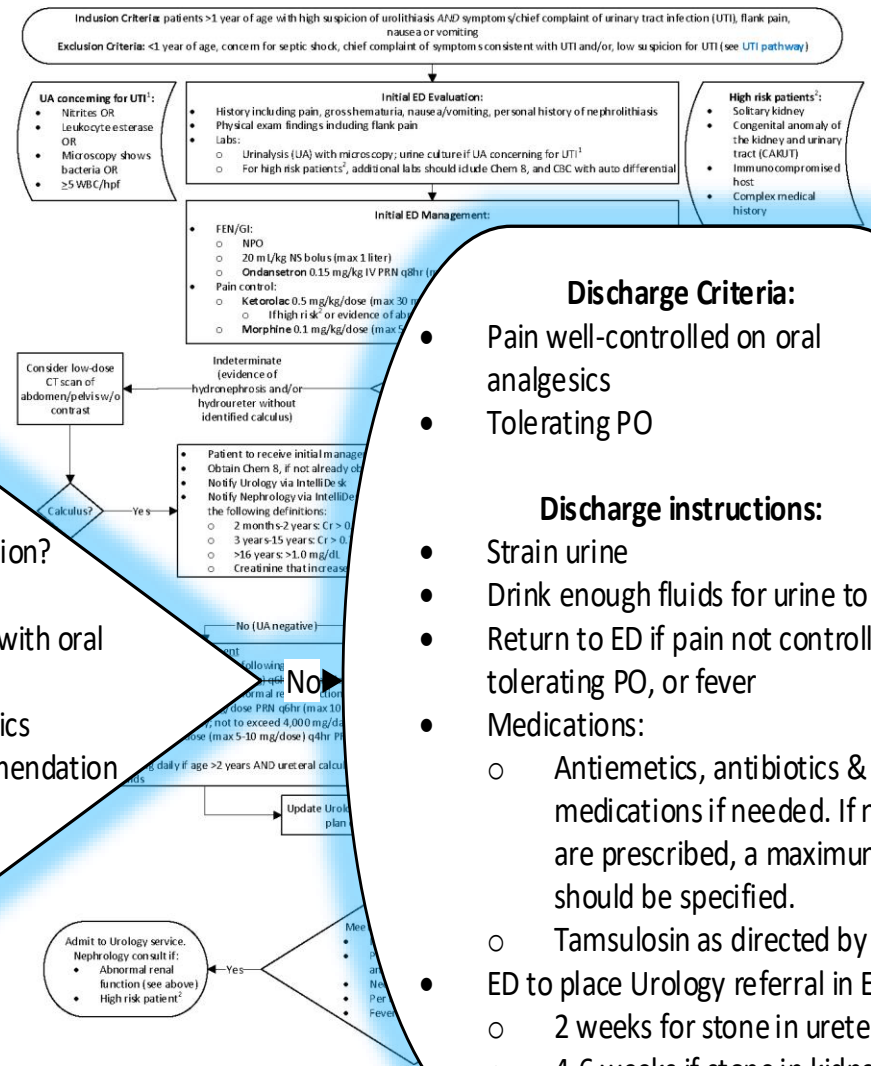
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- If the patient is able to tolerate PO and their pain is well-controlled on oral analgesics, they may be discharged home.
- Patient should be instructed to strain their urine and drink fluids.
- ED providers to place a referral to urology via Epic.

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# Review of Key Points

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- Acute care and management of nephrolithiasis typically occur in the Emergency Department
- Consideration for the complexity of patient's underlying chronic disorders in the evaluation and management of acute nephrolithiasis
- Initial imaging should begin with renal bladder ultrasound
- Obtain timely consultation Nephrology and Urology as indicated

# Quality Metrics

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- Percentage of patients seen in the ED who require admission
- Percentage of patients who have serum BUN/Cr performed
- Number of patients who undergo CT scan for stone evaluation in the ED
- Percentage of patients returning to the ED within 48 hours after discharge
- Percent of patients who received Tamulosin for treatment of confirmed ureteral stone
- LOS in the ED for stone event

# Pathway Contacts

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  - Connecticut Children's Division of Nephrology
  
- Courtney Rowe, MD
  - Connecticut Children's Division of Urology
  
- Eric Hoppa, MD
  - Connecticut Children's Division of Emergency Medicine

# References



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# Thank You!



## About Connecticut Children's Clinical Pathways Program

The Clinical Pathways Program at Connecticut Children's aims to improve the quality of care our patients receive, across both ambulatory and acute care settings. We have implemented a standardized process for clinical pathway development and maintenance to ensure meaningful improvements to patient care as well as systematic continual improvement. Development of a clinical pathway includes a multidisciplinary team, which may include doctors, advanced practitioners, nurses, pharmacists, other specialists, and even patients/families. Each clinical pathway has a flow algorithm, an educational module for end-user education, associated order set(s) in the electronic medical record, and quality metrics that are evaluated regularly to measure the pathway's effectiveness. Additionally, clinical pathways are reviewed annually and updated to ensure alignment with the most up to date evidence. These pathways serve as a guide for providers and do not replace clinical judgment.