Provincial Non-Obstructing Kidney Stone Primary Care Clinical Pathway

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1. History
Kidney stone identified based on previous investigations or found incidentally

2. Investigations

If not already completed:
- Order ultrasound and KUB X-ray. If there is a discrepancy between stone size and/or location, consider a CT scan
- Order urinalysis, serum calcium, electrolytes and creatinine

Are any of the following identified?
- Obstructing kidney stone
- Ureteral stone
- Any stone in a solitary kidney

No

Yes

3. Assessment & Management

Non-obstructing stone identified

Red Flag present

4. Red Flag
Any hematuria should be investigated. Follow the Hematuria Evaluation Pathway

No red flag present

Stone ≥ 1-5mm

Stone related signs & symptoms?

No

Yes

Non-specific symptoms (Vague abd/ flank/back pain)

Classic lateralizing flank pain or recurrent ER visits

Order non-contrast CT, if not already done. Offer analgesic as appropriate.

CT shows <3mm

Stone unlikely the source of the symptom. Exclude other possible causes for pain.

If unable to identify and resolve pain as non-stone related

CT shows >3mm

KUB X-ray and Ultrasound every 1-2 years

Stone 6-9mm

Stone related signs & symptoms?

Yes

No

Determine stone location

Stone in renal pelvis

Stone located in the kidney periphery (calyceal stone)

Annual KUB X-ray & ultrasound. Assess need for referral.

Stone ≥ 10mm

Stone growth trend?
- 1-5mm now >6mm
- 6-9mm now ≥ 10mm and/ or signs or symptoms

Yes

No

Promote ongoing stone prevention strategies:
- Encourage 2-3L of fluid intake per day to achieve an output of 2.5L of urine per day
- Encourage DASH diet and refer to dietitian if appropriate
- Encourage increase in physical activity and healthy body weight management

5. Refer to Urology
Follow the Provincial Urology Referral Pathway

6. Consider Non-Urgent Advice

This primary care pathway was co-developed by primary and specialty care and includes input from multidisciplinary teams. It is intended to be used in conjunction with specialty advice services, when required, to support care within the community.

EXPANDED DETAILS

Pathway Primer

Kidney stones are also referred to as *renal calculi* and *nephrolithiasis* in the medical literature. Kidney stones are the result of crystalline material aggregating in the urinary space [1]. Stones that form in the kidneys may travel throughout the urinary system and eventually be passed during urination. However, stones that persist in the urinary system may require medical management.

In Canada, the prevalence of kidney stones is approximately 12% in men and 6% among women. Recent advances in the surgical management of urinary stones have reduced patient morbidity from this disease, however new stone formation and the recurrence of stones continue to remain a significant health issue (CUA Guideline).

This pathway focuses on the primary care management of adult patients with non-obstructing kidney stones. When a non-obstructing kidney stone is identified by a Primary Care Provider in the medical home, this pathway will help guide stone prevention strategies and what referral triggers to watch for during ongoing patient monitoring.

1. History

Radiology reports do not typically indicate non-obstructing kidney stone as a specific finding. However, a kidney stone can be considered non-obstructing when it is in a calyceal or peripheral location of the kidney and there is no hydronephrosis. Most patients will be asymptomatic from these stones, but some patients with non-obstructing stones can present with symptoms including, but not limited to, flank pain, abdominal pain, and groin pain.

2. Initial Investigations / Laboratory Testing

- **Diagnostic Imaging:** The combination of a KUB X-ray and ultrasound is the minimum level of imaging that is required to determine a patient's eligibility for ongoing conservative management.
    - If there is a discrepancy between the KUB X-ray and the ultrasound findings (e.g., stone size, location, number of stones, etc.), then a non-contrast renal CT scan should be ordered to confirm the characteristics of the stone(s).
    - If the stone is identified initially by CT, and a referral is warranted to Urology, an addition of KUB X-ray is required.

  Note: If patient is pregnant, KUB x-ray is not recommended. Indicate this on the referral.

- **Laboratory Testing:** Bloodwork and Urinalysis should be performed initially, and then again during annual/bi-annual monitoring.
    - **Serum creatine:** Attention should be paid to serum creatinine. Lab values above the high threshold should be investigated for the contributing cause(s) including impaired renal function.
    - **Serum calcium:** Evaluation of serum calcium in the context of kidney stones is to rule out hyperparathyroidism as a factor in stone formation. Lab values above the high threshold should be investigated for the contributing cause(s).

3. Assessment and Management Non-Obstructing Kidney Stone

Signs and Symptoms

Patients may present with vague abdominal pain, acute abdominal or flank pain, nausea, urinary urgency or frequency, difficulty urinating, penile pain, or testicular pain.

Offer analgesic as appropriate

Recommend nonsteroidal anti-inflammatory drugs (NSAIDs) for management of the pain. May consider acetaminophen in conjunction with NSAIDS. Concomitant gastroprotection should be considered when prescribing NSAID's in patients with a history of or at high risk for upper GI bleeds. NSAID's should be prescribed with caution - or not at all, in patients with impaired renal function.

Obstructing stone, ureteral stone or stone in solitary kidney

Determine if any of the following are present and if so then complete a referral to Urology using the Referral Process for Kidney Stone (Acute/Ureteric).

- **Obstructing Stone:** A stone that obstructs a ureter may lead to permanent kidney damage through a buildup of pressure characterized by hydronephrosis.
- **Ureteral Stone:** A stone that is that ureter may cause pain, obstruction, hydronephrosis, infection or loss of renal function.
- **Solitary Kidney:** A stone in a lone kidney, either obstructing or non-obstructing, should be referred to urology immediately due to the risk of complete kidney failure with a known obstruction, or a stone that becomes obstructing.

Determine stone location

Patients with non-obstructing 6mm – 9mm sized stones in the renal pelvis should be referred. The rationale is that stones in the renal pelvis can be mobile. A 6mm – 9mm stone could migrate into the ureter causing a blockage, whereas a smaller stone in the 1mm – 5mm category may pass through the ureter [2].

Patients with non-obstructing 6mm – 9mm sized calyceal stones (e.g., not in the renal pelvis) may be referred based on a primary care provider's clinical judgment. Factors such as age, contributing co-morbidities and those patients who would benefit most from stone removal may be considered for referral, or a consultation prior to referral. A patient's desire to meet, or remotely consult with, a urologist can also be considered. A patient with a history of stones that required specialist treatment may inform how proactive a primary care provider should be in referring their patients to urology.

Stone growth trend

Patients with kidney stones who are managed in the medical home should be reassessed for stone growth, every 1 to 2 years, via both an ultrasound and KUB X-ray.

1mm – 5mm Initial Size: A stone that starts in this range may pass through the ureter and be expelled naturally. The rates of spontaneous passage decrease rapidly in stones beyond 5mm in size [2]. If a stone that starts in the small category approaches 6mm, the patients should be referred due to the availability of less invasive approaches to remove the stone. (e.g. Shock Wave Lithotripsy vs. the more invasive percutaneous nephrolithotomy or percutaneous nephrolithotripsy).

6mm – 9mm Initial Size: Non-obstructing stones initially identified in this size range are considered appropriate to manage in the medical home only if they are designated as calyceal stones. These stones are in the proximal kidney within the renal calyx structures at the point of urine collection. Calyceal stones are less mobile and therefore present less of a risk for migration toward a ureter and subsequent occlusion. However, should 6mm –9mm stones grow to ≥ 10mm, the patient should be referred to urology, as stones that are 10mm and beyond present a greater overall risk to kidney function.

Stone Prevention Strategies

Globally, the majority (80%) of kidney stones are composed of calcium oxalate. The remaining stone compositions include struvite stones (10%), uric acid stones (9%), and cystine stones (1%) [3].

The DASH (Dietary Approaches to Stopping Hypertension) diet, focusing on higher intakes of vegetables and fruit, legumes, nuts, whole grains, fish and low-fat dairy products, and lower intakes of red and processed meats, sodium, and sugar-sweetened beverages is recommended. Comprehensive dietary guidance for the management of kidney stones is available via Alberta Health Services: Nutrition Guidelines: Kidney Stones (albertahealthservices.ca)

Referring patients to a Registered Dietitian may be needed due to the complexity of adjusting the intake of elements (e.g., calcium) from food and supplement sources, the risks of restricting animal proteins and not replacing with a suitable plant-based protein source, and the individual food preferences of the patient [4].

Fluid Intake: drinking enough fluid in a day is one of the most important *prevention* approaches for patients who are identified as stone formers (Note: uric acid stone management focuses on alkalizing the urine versus increasing fluid intake). Current dietary literature suggest that patients should consume enough appropriate fluid to produce 2.5 liters of urine per day. Patients can accomplish this by self-monitoring their voiding frequency and fluid intake. Patients can be assisted by using a mobile phone tracking application. You should encourage patients to:

- Self-monitoring their 24-hour urine output.
- Drink regularly even though they are not thirsty. Patients should track their intake to understand what volumes are appropriate for them to achieve appropriate output.
    - Avoid sugary beverages including fruit juice (patients should opt for fresh fruit instead).
- Drink after each void.
- Increase their fluid intake to account for hot weather and physical activity.

NOTE: increasing fluid intake is not a *management* strategy for existing kidney stones. Existing stones should be monitored for their size and location, and a referral to urology is necessary when the stone size or location thresholds are met (see algorithm).

Lifestyle / Body Mass Index: High Body Mass Index (BMI) is positively associated with the development of kidney stones. High BMI relates to other factors such as high caloric intake, sedentary lifestyles, diabetes, and hypertension. These conditions can benefit by patients increasing their physical activity, while also impacting stone formation. When a patient's BMI is equal or greater than 30, the impact of BMI on stone formation is greater in women.

A large study in 2013 investigated the prevalence of kidney stones in post-menopausal women. The authors revealed how even a moderate increase in exercise (e.g., 3 hours of walking or 4 hours of light gardening per week) could reduce the incidence of stone formation by up to 31% [5]. Importantly, the time spent exercising was more impactful than the intensity.

Overall, an increase in exercise will benefit the other known contributing factors to kidney stone formation, which in turn can reduce the formation of kidney stones.

4. Red Flag: Hematuria

Unexplained hematuria, regardless of the presence of a kidney stone, is a concerning finding. It should not be assumed that hematuria is caused only by a kidney stone. The following resources provide guidance:

- Provincial Hematuria Evaluation Primary Care Clinical Pathway
- Provincial Urology, Adult Referral Pathway

5. Referral Process

Referral pathways are guidelines to help referring providers know what information, labs and diagnostic imaging are required with their referral to a specialty. These pathways are co-designed with Primary and Specialty Care, AHS Operations, and patients to ensure the right amount of information is included throughout the referral process to triage the patient as quickly as possible.

To ensure referring providers have referral information at their fingertips, referral pathways may link to clinical pathways when available. AHS manages referral pathways and extensive work is ongoing as part of the Alberta Surgical Initiative. If you have questions or want to know more about the referral pathway development process, please email access.ereferral@ahs.ca.

- **Urgent Referral** – Call urologist on call via RAAPID or call 911.
- Follow the Provincial Urology, Adult Referral Pathway available on Alberta's Pathway Hub.
- Alberta Referral Directory is also a helpful resource for all referral information.

6. Advice Options (Stones ≥ 1-5mm)

Patients with kidney stones in the 1-5mm category may not develop obstructing complications. However, these stones may cause a disruption in the patient's quality of life due to recurrent or unmanaged pain. In these cases, an advice consult is suggested. Based on a consultation with a urologist, a referral may be initiated, or additional patient care strategies may be developed. In addition to where specified in the clinical pathway algorithm, you can request non-urgent specialist advice at any point when uncertain about medications, next steps in treatment, imaging, or resources available.

Zone	Program	Online Request	Phone Number
Urgent Telephone			
All Zones	RAAPID	N/A	**North:** 1-800-282-9911 or 780-735-0811 **South:** 1-800-661-1700 or 403-944-4486
Non-Urgent Electronic			
All Zones	Netcare eReferral		N/A

BACKGROUND

About this pathway

- This pathway was developed in collaboration with Urologists, Primary Care physicians, Patient and Family Advisors, and the Alberta Health Services Provincial Pathways Unit (AHS PPU).
- Condition-specific clinical pathways are intended to offer evidence-based guidance to support primary care providers in caring for patients with a range of clinical conditions.

Authors and conflict of interest declaration

- The authors represent a multi-disciplinary team including primary care physicians, urologists, patient advisors, and representatives of Alberta Health Services. Names of the content creators and their conflict-of-interest declarations are available on request by emailing AlbertaPathways@ahs.ca.

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Pathway review process, timelines

- Primary care pathways undergo a scheduled review every two years or earlier if there is a clinically significant change in knowledge or practice. The next scheduled review is February 2026. However, we welcome feedback at any time. Please send us your feedback here.

Copyright information

DISCLAIMER

This pathway represents evidence-based best practice but does not override the individual responsibility of healthcare professionals to make decisions appropriate to their patients using their own clinical judgment given their patients' specific clinical conditions, in consultation with patients/alternate decision makers. The pathway is not a substitute for clinical judgment or advice of a qualified healthcare professional. It is expected that all users will seek advice of other appropriately qualified and regulated healthcare providers with any issues transcending their specific knowledge, scope of regulated practice or professional competence.

PATIENT RESOURCES

Resources	Link
Patient Pathway on MyHealth Alberta > A webpage and two PDF formats are available to allow for easy printing, download, or scanning a QR code with the patient's smart phone for more information at their convenience.	Your Journey with Non-Obstructing Kidney Stones https://myhealth.alberta.ca/HealthTopics/kidney-stone-pathway/Documents/kidney-stone-pathway-summary.pdf

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