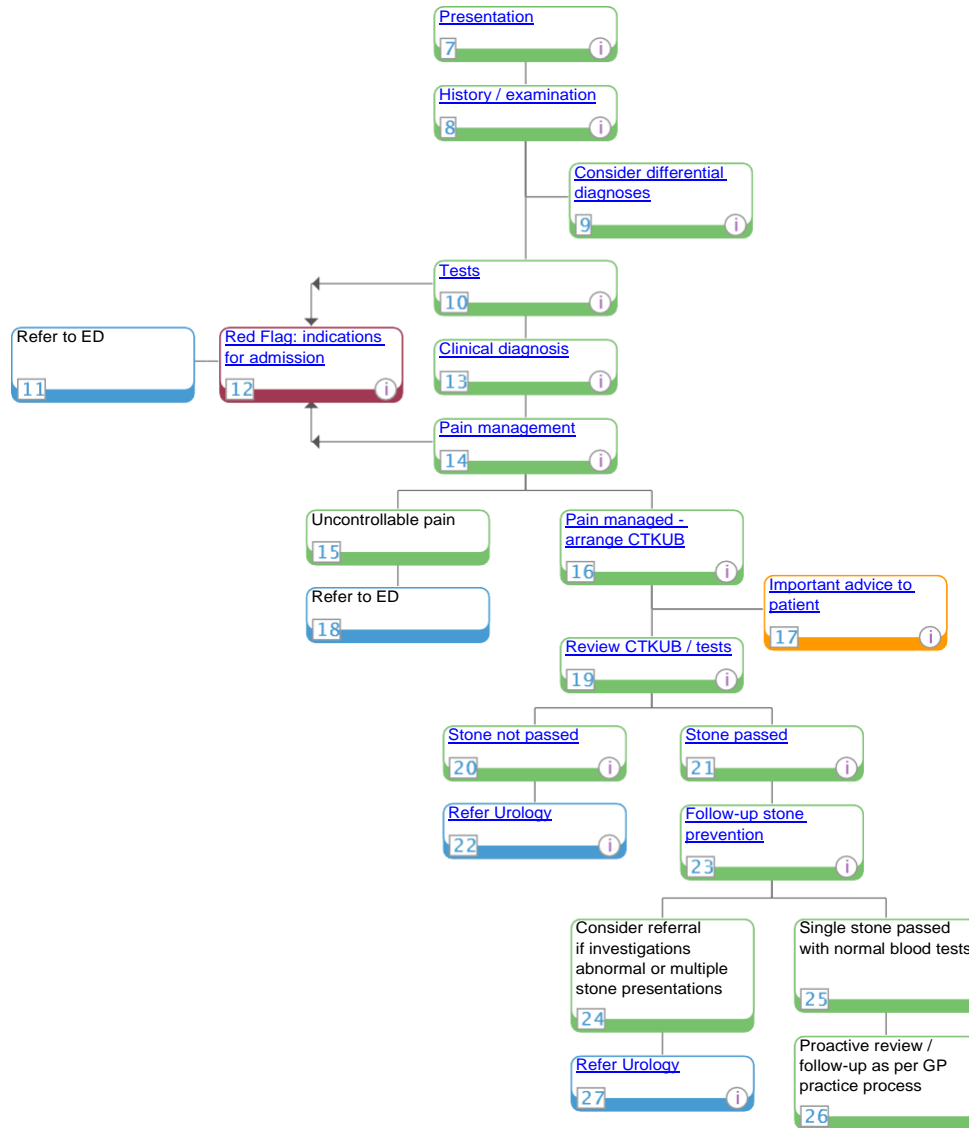


Renal Colic

Surgery > Urology > Renal Colic

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1. Care map information

Scope:

- diagnosis and management of renal colic in primary care in adults, including pregnant women
- topics covered include:
 - stone classification
 - diagnostic procedures
 - management of renal colic
 - active stone removal
 - ureteric stenting
 - management of recurrent stone disease

Out of scope:

- management of children and adolescents

Definition:

- kidney stones are aggregations formed in the kidneys from crystallisation of dissolved urinary minerals

Incidence and prevalence:

- annual incidence of 131 cases per 100,000 in NZ (142/100,000 in Pakeha, 131/100,000 in Pasifika, 89/100,000 in Māori and 57/100,000 in Asians) (1)
- average lifetime risk of 5-12% (2)
- male-to-female ratio of 3:1 but gap closing (3)
- most cases occur in patients between 30-59 years (3)
- increasing incidence and prevalence worldwide (1)

Aetiology:

When the urine becomes supersaturated with one or more crystal forming substances, crystals separate out of the urine and collect in the kidney or ureter to form stones (4).

Stones can be classified into those caused by:

- non-infectious causes:
 - calcium or oxalate or calcium phosphate stones (most common)
 - uric acid stones (second most common)
- infectious causes:
 - struvite-composed of magnesium, ammonium and phosphate (third most common)
 - carbon apatite
 - ammonium urate
- genetic causes:
 - cystine stones
 - xanthine stones
- drugs:
 - indinavir, calcium supplements, Vitamin C, sulphonamides, ephedrine, guaifenesin etc.

Risk factors:

Patients with renal colic have up to 50% probability of developing further renal colic over the next 5 years (5).

Diseases associated with stone formation (6):

- hyperparathyroidism
- nephrocalcinosis
- gastrointestinal disease (e.g. intestinal resection, Crohn's disease, jejunio-ileal bypass, and malabsorptive conditions as well as urinary diversion and bariatric surgery)
- sarcoidosis
- patients with urinary tract infection due to urea splitting bacteria (*proteus*, *pseudomonas*, *klebsiella spp*) are at greater risk of struvite stones
- obesity

Genetic causes of stone formation (6):

- cystinuria
- primary hyperoxaluria
- renal tubular acidosis (Type 1)
- xanthinuria
- lesch-nyhan syndrome
- cystic fibrosis
- patients with a family history are more likely to form stones

Anatomical abnormalities associated with stone formation (6):

- medullary sponge kidney
- PUJ obstruction
- calyceal diverticulum
- ureteric stricture
- vesico-ureteric reflux
- horseshoe kidney
- ureterocele

Dietary causes:

- diets high in oxalate, sodium and animal protein
- dehydration

When ordering Computed Tomography Kidneys, Ureters, Bladder (CTKUB)

Consider risks of ionising radiation:

The risk from diagnostic radiation is primarily an increased risk of cancer. The International Commission of Radiation Protection (ICRP) has determined that the risk of a fatal cancer is 5%/Sievert (a Sievert is a measurement of absorbed radiation).

Everyone experiences background radiation of about 0.003 Sieverts a year (3 millisieverts). Radiation doses are given as an effective dose which is the actual dose adjusted for the cancer risk from the tissues that have been irradiated. This varies tremendously in diagnostic radiology from 0.001 millisievert (msv) for a finger X-ray (less than a day of background Radiation) to 30msv or more for some CT, interventional or some Nuclear Medicine studies (maybe more than 10 years of background radiation).

To put this in perspective, a plain abdominal X-ray is about 1msv and carries a risk of 1 in 20,000 of causing a fatal cancer. A non-contrast renal calculus CT scan might be 5msv, a risk of 1 in 4000 of causing a fatal cancer, and a 3 phase contrast renal tract CT scan looking for a renal or urothelial cancer might be 10msv, a risk of 1 in 2000 of causing a fatal cancer.

The other point to remember is that risk varies with age; with risk of irradiating a young adult probably 10 times that of irradiating a person in their seventies or eighties. Hence the caution in doing CT scans in young people. These risks are cumulative with any past radiation.

2. Information resources for patients and carers

[Kidney stone advice sheet](#)

[Te Ara Whānau Ora Brochure](#)

3. Information resources for clinicians

[Kidney stone advice sheet](#)

4. Updates to this care map

Date of first publication: April 2014.

Date of republication: June 2016

This care map has been updated in line with consideration to evidenced based guidelines. Below summarises changes made to the pathway following review:

- changes made to pain management:
 - Diclofenac now first line treatment
 - Tamsulosin not funded and usefulness in renal colic minimal
 - Doxazosin removed from map
 - anti-nausea medication Stemetil added
- information added to urology referral re process of urologist decision around patient follow up

For further information on contributors and references please see the care map's Provenance.

5. Hauora Māori

Māori are a diverse people and whilst there is no single Māori identity, it is vital practitioners offer culturally appropriate care when working with Māori whānau. It is important for practitioners to have a baseline understanding of the issues surrounding Māori health.

This knowledge can be actualised by (not in any order of priority):

- acknowledging [Te Whare Tapa Wha \(Māori model of health\)](#) when working with Māori whānau
- asking Māori clients if they would like their whānau or significant others to be involved in assessment and treatment
- asking Māori clients about any particular cultural beliefs they or their whānau have that might impact on assessment and treatment of the particular health issue ([Cultural issues](#))
- consider the importance of [whānaungatanga \(making meaningful connections\)](#) with their Māori client / whānau
- knowledge of [Whānau Ora, Te Ara Whānau Ora and referring to Whānau Ora Navigators](#) where appropriate
- having a historical overview of legislation that has impacted on Māori well-being

For further information:

- [Hauora Māori](#)

6. Pasifika

[Pacific Cultural Guidelines \(Central PHO\) 6MB file](#)

Our Pasifika community:

- is a diverse and dynamic population:
 - more than 22 nations represented in New Zealand
 - each with their own unique culture, language, history, and health status
 - share many similarities which we have shared with you here in order to help you work with Pasifika patients more effectively

The main Pacific nations in New Zealand are:

- Samoa, Cook Islands, Fiji, Tonga, Niue, Tokelau and Tuvalu

Acknowledging *The FonoFale Model (pasifika model of health)* when working with Pasifika peoples and families.

Acknowledging general pacific guidelines when working with Pasifika peoples and families:

- [Cultural protocols and greetings](#)
- [Building relationships with your pasifika patients](#)
- [Involving family support, involving religion, during assessments and in the hospital](#)
- [Home visits](#)
- [Contact information](#)

Pasifika Health Service - Better Health for Pasifika Communities:

- the Pasifika Health Service is a service provided free of charge for:
 - all Pasifika people living in Manawatu, Horowhenua, Tararua and Otaki who have long term conditions
 - all Pasifika mothers and children aged 0-5 years
- an appointment can be made by the patient, doctor or nurse
- the Pasifika Health Service contact details are:
 - Palmerston North Office - 06 354 9107
 - Horowhenua Office - 06 367 6433
- [Better Health for Pasifika Communities brochure](#)

Additional resources:

- Ala Mo'ui - [Pathways to Pacific Health and Wellbeing 2014-2018](#)
- Primary care for pacific people: [a pacific health systems approach](#)
- Tupu Ola Moui: [The Pacific Health Chart Book 2004](#)
- Pacific Health [resources](#)
- [Central PHO Pasifika Health Service](#)

7. Presentation

Common presentations of renal colic pain include:

- severe sudden onset
- colic in nature
- associated nausea
- great imitator
- classically loin to groin

8. History/examination

Considerations:

- loin pain is not automatically renal colic and is not diagnostic of renal stone disease until proven on Computed Tomography Kidneys, Ureters, Bladder (CT KUB)
- consider serious alternative pathology, such as Abdominal Aortic Aneurism (AAA), ectopic pregnancy and appendicitis, all of which are commonly mis-diagnosed as renal colic
- a plain abdominal x-ray (KUB) is not a diagnostic study (follow-up only)
- many patients presenting with stones can be managed conservatively on an outpatient basis and will never require operative intervention
- 78% of stones measuring 4mm or smaller will usually pass spontaneously, 60% of stones measuring 5-7mm but only 39% of stones measuring more than 8mm. Looking at stone location alone, 79% of VUJ stones will pass spontaneously, 75% of distal ureteric stones, 60% of mid ureteric and 48% of upper ureteric stones (7)
- non-steroidal anti-inflammatory drugs (NSAIDs) provide the best analgesia in renal colic, even compared to opioids, and also reduces recurrent colic (8). There is little evidence to suggest renal function is impaired in patients on NSAIDs with previously normal renal function (9)
- alpha blockers such as Tamsulosin improve spontaneous stone passage rates by up to 29% and reduce recurrent colic. Tamsulosin costs the patient \$28 for one month's supply from the Pharmacy
- stone disease in the presence of sepsis or a solitary kidney is a urological emergency

Tests to include:

- urine test - dipstick
- general examination to exclude other causes

9. Consider differential diagnoses

Approximately one third of patients presenting with suspected kidney stones have an **alternative diagnosis** – these include:

- **renal:**
 - urinary tract infection (UTI), including pyelonephritis
 - other causes of ureteric obstruction, e.g. blood clot, stricture
 - acute renal infarction
 - renal rupture
 - renal abscess
- **cardiovascular:**
 - aortic aneurysm – always consider in patients older than age 60 years
 - cardiac ischaemia
 - renal vein thrombosis
- **gynaecological:**
 - ectopic pregnancy
 - endometriosis
 - ovarian cyst, rupture, or torsion
 - pelvic inflammatory disease (PID)
 - salpingitis
 - dysmenorrhoea
- **gastrointestinal:**
 - appendicitis
 - diverticulitis
 - peptic ulcer
 - biliary colic
 - bowel obstruction
 - Crohn's disease

• **other:**

- musculoskeletal pain, e.g. rib fracture
- herpes zoster
- pneumonia or pleurisy
- factitious renal colic, e.g. Munchausen syndrome, drug dependency

10. Tests

Initially:

- test urine (dipstick):
 - if negative for blood, much less likely to be renal colic
- take temperature, blood pressure and pulse
- exclude pregnancy
- collect blood for creatinine and white cell count
- obtain Mid Stream Urine (MSU)

12. RED FLAG: indications for admission!

NB: Although haematuria not invariably associated, reconsider diagnosis.

The following symptoms and/or signs should result in immediate hospital transfer:

- pyrexia
- elevated white cell count (WCC)
- signs of shock
- intractable pain or vomiting
- anuria / oliguria indicating impending renal failure
- pain in a patient with a solitary or transplanted kidney
- pregnant patient

13. Clinical diagnosis

Unilateral colicky pain with haematuria and infection excluded.

Consider bloods (if not already conducted) if appropriate timing.

14. Pain management

Prescribe (if not contraindicated):

- Diclofenac 100mg po/pr or 75mg IM (reduce dose in renal impairment)
- opioid analgesia if required (oral route preferred); avoid as first line
- Paracetamol 1g po
- Tamsulosin 0.4mg po od:
 - not funded
 - only drug trialed with minimal benefit, if any, if stone less than 5mm
 - possible benefit if stone more than 5mm and in the pelvic ureter (for further information refer to article [Medical expulsive therapy in adults with ureteric colic](#))

- if nauseated consider stemetil 12.5mg IM

Arrange to review patient in two to three hours. If pain unremitting or other factors (see red flag), consider referral to secondary services for pain relief.

16. Pain managed – arrange CTKUB

Consider requesting Computed Tomography Kidneys, Ureters, Bladder (CTKUB) and plain film (plain film is important for follow-up purposes):

- allows definite diagnosis and may determine other aetiology
- in the absence of sepsis, patients presenting overnight can be managed conservatively and await imaging in the morning
- in pregnancy, perform an ultrasound rather than a CT

GP to mark on radiology request "as per Renal Colic pathway"

State the following on referral:

- microscopic/macrosopic haematuria
- presence/absence of pain
- history of renal stones
- any relevant past history

Phone radiology (06 350 8700) to confirm attendance.

Patient must be able to present to Radiology Department by 3.30 pm.

Consider risks of ionising radiation (see 'care map information').

17. Important advice to patient

Obtain tea strainer/fine sieve and sieve all urine until stone passed (allows diagnosis, stone analysis and unnecessary x-rays).

Retain stone for analysis.

Take and record temperature twice daily, seek advice if temperature elevated ($\geq 38^{\circ}\text{C}$) and pain continues (the combination of obstruction and sepsis can kill a kidney in two or three days).

19. Review CTKUB/tests

Review Computed Tomography Kidneys, Ureters, Bladder (CTKUB) if performed. Consider KUB plain abdominal film to check if passed.

Review white cell count and other bloods if available.

Check bloods if not previously done.

20. Stone not passed

If suspicion stone has not passed, refer for urological opinion.

Target to be seen within one month.

Arrange for estimation of serum:

- creatinine
- calcium
- uric acid
- phosphate

If not measured previously during this episode.

21. Stone passed

Send stone for analysis to Medlab.

22. Refer Urology

Depending on location and size of the stone, the patient may be referred back to the GP because of the high probability of expulsion of the stone.

If the stone is thought to be difficult to pass the urologist will prescribe a follow up radiology examination, the nature of which will be at their discretion i.e. simple Kidney, Ureter, Bladder (KUB) or Computerised Tomography (CT) KUB.

Some 95% of stones ≤ 4 mm pass within 40 d. Observation is feasible in informed patients who develop no complications (infection, refractory pain, or deterioration of kidney function). Stones >6 mm are usually treated actively, although even such stones pass occasionally

- recommendation for the conservative management of ureteral calculi - see [Table 14](#)

23. Follow-up stone prevention

Review or organise blood tests:

- creatinine
- calcium
- uric acid
- phosphate

Consider:

- cystinuria

Organise 2 x 24hr urine estimations:

- uric acid
- calcium
- citrate

Review metabolic analysis of stone. If abnormalities refer endocrinology/ urology.

27. Refer Urology

Depending on location and size of the stone, the patient may be referred back to the GP because of the high probability of expulsion

of the stone.

If the stone is thought to be difficult to pass the urologist will prescribe a follow up radiology examination, the nature of which will be at their discretion i.e. simple Kidney, Ureter, Bladder (KUB) or Computerised Tomography (CT) KUB.

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- recommendation for the conservative management of ureteral calculi - see [Table 14](#)

Renal Colic

Provenance Certificate

[Overview](#) | [Editorial methodology](#) | [References](#) | [Contributors](#) | [Disclaimers](#)

Overview

This document describes the provenance of MidCentral District Health Board's Renal Colic pathway. This pathway is regularly updated to include new, quality-assessed evidence, and practice-based knowledge from expert clinicians. Please see the Editorial Methodology section of this document for further information.

This localised pathway was last updated in June 2016.

For information on changes in the last update, see the information point entitled 'Updates to this care map' on each page of the pathway.

One feature of the "Better, Sooner, More Convenient" (BSMC) Business Case, accepted by the Ministry of Health in 2010, was the development of 33 collaborative clinical pathways (CCP).

The purpose of implementing the CCP Programme in our DHB is to:

- Help meet the Better Sooner More Convenient Business Case aspirational targets, particularly the following:
 - Reduce presentations to the Emergency Department (ED) by 30%
 - Reduce avoidable hospital admissions to Medical Wards and Assessment Treatment and Rehabilitation for over-65-year-olds by 20%
 - Reduce poly-pharmacy in the over-65-year-olds by 10%
- Implement a tool to assist in planning and development of health services across the district, using evidence-based clinical pathways.
- Provide front line clinicians and other key stakeholders with a rapidly accessible check of best practice;
- Enhance partnership processes between primary and secondary health care services across the DHB.

To cite this pathway, use the following format:

Map of Medicine. Medicine. MidCentral District View. Palmerston North: Map of Medicine; 2014 (Issue 1).

Editorial methodology

This care map was based on high-quality information and known Best Practice guidelines from New Zealand and around the world including Map of medicine editorial methodology. It has been checked by individuals with front-line clinical experience (see Contributors section of this document).

Map of Medicine pathways are constantly updated in response to new evidence. Continuous evidence searching means that pathways can be updated rapidly in response to any change in the information landscape. Indexed and grey literature is monitored for new evidence, and feedback is collected from users year-round. The information is triaged so that important changes to the information landscape are incorporated into the pathways through the quarterly publication cycle.

References

This care map has been developed according to the Map of Medicine editorial methodology. The content of this care map is based on high-quality guidelines and practice-based knowledge provided by contributors with front-line clinical experience. This localised version of the evidence-based, practice-informed care map has been peer-reviewed by stakeholder groups and the CCP Programme Clinical Lead.

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Contributors

MidCentral DHB's Collaborative Clinical Pathway editors and facilitators worked with clinical stakeholders such as front-line clinicians and pharmacists to gather practice-based knowledge for its care maps.

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Disclaimers

Clinical Board Central PHO, MidCentral DHB

It is not the function of the Clinical Board Central PHO, MidCentral DHB to substitute for the role of the clinician, but to support the clinician in enabling access to know-how and knowledge. Users of the Map of Medicine are therefore urged to use their own professional judgement to ensure that the patient receives the best possible care. Whilst reasonable efforts have been made to ensure the accuracy of the information on this online clinical knowledge resource, we cannot guarantee its correctness and completeness. The information on the Map of Medicine is subject to change and we cannot guarantee that it is up-to-date.