

APPENDIX

Appendix 1. Clinical practice guideline

Guideline



Ureteric Colic: Emergency Department Assessment and Management

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Review Process

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Approval Process

All committee endorsement/approval must be noted in the table below. Once stakeholder / Committee(s) sign off obtained, forward policy document to SWSLHD-Policy@health.nsw.gov.au.

Committee Name	Endorsement/Approval Date

Revision History

Version	Amendment Notes
Date Document Number	(include very brief advise on amendments)

1. Introduction

This guideline is intended to aid with Emergency Department (ED) decision making and to standardise management of ureteric colic, aligned with current best available evidence and practice. It is designed to reduce ED length of stay, unnecessary intervention rates and prompt appropriate and timely referral when required. Although often managed surgically, it is preferable, both from a morbidity and health economics perspective, if ureteric colic can be managed conservatively. These guidelines should be used to guide clinical practice; however, clinicians should consider the individual patient and apply the guidelines appropriately. Please contact urology if there are any concerns or you believe your patient is atypical.

The risks addressed by this guideline

Corporate risk: Extended length of stay in the Emergency Department, increased expenditure

Clinical risk: Inadequate analgesia for patients presenting with ureteric colic, Inadequate compliance with treatment and follow up for ureteric colic, and subsequent patient morbidity

2. The Aims / Expected Outcome of this guideline:

To ensure:

- *Patients receive timely and adequate treatment for the symptoms of ureteric colic*
- *Patients are appropriately investigated and have safe disposition plans*
- *Patients have appropriate and safe follow up arranged if discharged from the ED*

3. Principles

3.1. Assessment

Suspected Renal Colic

Renal colic often presents with typical features; however, patients can present atypically and renal colic can uncommonly mimic other conditions.

Symptoms and signs of renal colic:

- Unilateral loin to groin pain
 - The classical presentation is severe, sudden onset pain from the flank (or loin) to the groin. Often described as the worst possible pain, the location of the pain varies with the location of the stone
 - Suprapubic pain
 - Unilateral scrotal or labial pain in conjunction with flank pain
-

- Renal colic can rarely present with isolated scrotal pain, thus all patients with sudden onset scrotal pain should be referred urgently for assessment for torsion.
- Haematuria
- Nausea/vomiting
 - Urinary urgency, frequency and feeling of incomplete voiding in distal stones

Though flank tenderness is often found, examination in these patients has the main utility of excluding other conditions that can mimic renal colic (see below).

Additional history increasing likelihood of stone

- Past history of stones - Patients who have previously had renal colic will often tell you the diagnosis.
- Gout
- Known metabolic disturbance (e.g. hyperuricaemia, hypercalcaemia, cystinuria) (rare)

Signs not consistent with renal colic and should raise suspicion of other causes

- Acute abdomen
- Generalised peritonitis
- Anuria in a patient with two functioning kidneys

Conditions that can mimic renal colic

- Abdominal aortic aneurysm
- Pelvic inflammatory disease
- Urinary tract infection
- Atypical appendicitis
- Ectopic pregnancy
- Diverticulitis
- Rupture or torsion of an ovarian cyst

Symptoms and signs of sepsis

- Fever
- Chills/rigors
- Hypotension, tachycardia
- An isolated leukocytosis is common in patients who have been vomiting, and often does not represent infection

Other

- When patient last ate/drank
-

3.2. Investigations

Initial Investigations

Initial investigations should be ordered:

- **Urine dipstick** for demonstration of haematuria and infection (leukocyte/nitrite), and **urine culture** if there is a positive test
- **FBC/EUC/CMP/CRP**
- **b-HCG** in women of reproductive age

Imaging

Non-contrast CT KUB is the imaging modality of choice for suspected renal colic.

X-ray KUB is not adequate as the sole initial imaging modality some stones are radiolucent. However, it is a useful adjunct. If a stone is found to be radiopaque on initial X-ray, the follow-up imaging can be performed with X-ray alone. This reduces radiation exposure in patients who may have a significant lifetime radiation exposure.

In pregnant patients, renal tract ultrasound replaces CT as the first line imaging modality.

Order X-ray KUB AND CT KUB for ALL patients, unless pregnant.

3.3. Management

Analgesia

Parenteral analgesia is often given in a pre-hospital setting, and it may be required in significant quantities before a patient can be assessed.

NSAIDs

NSAIDs are the specific analgesia of choice for renal colic as the pain is prostaglandin mediated and NSAIDs reduces the ureteric contractions responsible for the pain.⁹ Route of administration is not related to efficacy but rectal indomethacin is preferable due to:

- A larger dose being able to be given
- High incidence of vomiting in these patients

Give indomethacin 100mg PR on initiation of renal colic pathway.

If the patient prefers not to have suppositories, give indomethacin 50mg PO TDS.

Diclofenac and ibuprofen should be avoided due to increased incidence of coronary events.¹⁰ Ketorolac may be a suitable alternative NSAID (although not frequently used in the ED).⁹

NSAIDs can be safely given in patients with haematuria. Do NOT give pregnant patients any NSAIDs.

Opioids

Pain is often severe, and morphine is the second-line agent of choice after initiation of NSAIDs. Pain requiring the use of opioids is a sign that intervention is more likely to be required, though it will often settle rapidly. Beware use of morphine in patients with renal impairment.

In **severe pain**, opioids can be used in while waiting for NSAIDs to become effective:

Morphine 0.1mg/kg (max first dose 10mg).

Fluids

IV fluids may be indicated for renal colic patients if there are signs of dehydration due to nausea and vomiting or they are NBM awaiting urological intervention.

If urological intervention appears likely, keep the patient nil by mouth.

Supranormal hydration in an attempt to aid stone passage is controversial as it is thought to possibly increase pain secondary to renal capsular distension.

Fluid resuscitation to euvolaemia is indicated. Avoid supranormal hydration.

Antibiotics

Patients who are displaying signs of sepsis and in whom renal colic is suspected should be promptly treated with antibiotics that cover *Escherichia coli*, *Staphylococcus*, *Enterobacter*, *Proteus*, and *Klebsiella*.

If you are suspicious of infection commence antibiotics within 1h of presentation. EITHER:

- ▣ **Ampicillin 2g IV q6h PLUS Gentamicin IV OR**
- ▣ **Ceftriaxone 1g IV**

See Therapeutic guidelines for antibiotic choice if allergic to penicillin.

Do not delay antibiotic administration waiting for cultures, imaging or other investigations.

Patients without signs of infection do not require prophylactic antibiotics.

Anti-emetics

Nausea and vomiting occurs in over 50% of renal colic patients due to common vagal supply of the coeliac axis and the kidney. There is no evidence to support the use of one anti-emetic over another.¹¹ Ondansetron IV is preferred because of lesser incidence of GIT stimulation and extra-pyramidal side effects. Effective pain management often causes resolution of nausea. Consider anti-emetics if nausea remains unrelieved.

First-line anti-emetic of choice is: **Ondansetron 8mg IV OR SL**

3.4. Disposition

The size of the ureteric stone is the principle deciding factor as to whether the patient is likely to spontaneously pass the stone and thus who is appropriate for conservative management.

There is variation between urologists as to the size of stones which can be conservatively managed. The size of the stone is an important predictor of spontaneous passage. A stone less than 5 mm in diameter has an 90% chance of spontaneous passage; this falls rapidly to 20% for stones larger than 8mm in diameter.

Patients with stones $\leq 5\text{mm}$ anywhere in the ureter can be safely discharged.
Contact urology for stones $>5\text{mm}$.

On review of imaging and stone location, the urology team may elect to manage more stones conservatively. Larger stones that are unlikely to pass spontaneously typically require surgical intervention. In some cases, admitting a patient with a large stone to facilitate surgical intervention is reasonable.

Other criteria making patients unsuitable for ED discharge

- ☐ **More than one ureteric stone** – decreases the chance of passage
 - ☐ **Solitary or transplant kidney** – a stone will often result in complete obstruction
 - ☐ **Creatinine >200**
 - ☐ **Any suspicion of infection, sepsis or pyelonephritis**
-

Conservative Management

Oral Analgesia

Patients should be changed to oral analgesia after initial management of their pain. If their pain can be managed on oral medications, they meet the second criteria for conservative management.

Patients should be discharged on the following:

- ❑ **Regular paracetamol 1g PO q4-6h** (max 4g/day).
- ❑ **PRN indomethacin**
 - Ask if your patient is willing to take PR medication. You may be surprised by how many are. If they are, prescribe **100mg PR BD**. If your patient
 - is unwilling or unlikely to take PR indomethacin, prescribe **PO 25mg 1-2 tablets TDS**.
- ❑ **PRN oxycodone 2.5-5mg q4h** (max 30mg/day).

Medical Expulsive Therapy

The effectiveness of alpha-blockers to facilitate stone passage is controversial. A recent Cochrane systematic review has shown that alpha-blockers likely increase passage.¹² It is also likely to lessen pain by relaxing smooth muscle in the urinary tract.⁹ However, it is not on the PBS, and will cost patients upwards of \$30 for the course.

Patients with **distal stones** (inferior to SI joint) should be prescribed **Tamsulosin 400mcg PO daily**.

There may be a slight increase in adverse events, such as orthostatic hypotension, syncope, palpitations and tachycardia.¹² Patients with postural hypotension, already on an alpha-blocker or other contra-indications should not be prescribed Tamsulosin – please record the reason why the patient was not given a prescription in the renal colic book.

Under no circumstances should patients be prescribed Duodart (combination of Dutasteride and tamsulosin) for medical expulsive therapy. The dutasteride portion can have significant side effects in men and should never be given in women.

Follow-up

Patients with ureteric stones who do not receive follow-up are at risk of losing the affected kidney. Silent obstruction, where the kidney remains obstructed after the initial pain settles, often leads to loss of the kidney if the obstruction is not relieved (whereas patients with ongoing pain are rarely lost to follow up).

Patients should be advised that they **must have repeat imaging in the community in 4-6 weeks**

and **take the scans to their GP or a urologist** to ensure the stone has passed:

- If **stone is visible on initial X-ray KUB**, they should be given a form for a
 - **repeat X-ray.**
- If **stone is not visible on initial X-ray KUB**, they should be given a form for a
 - **repeat CT-KUB.**

Discharge all patients with the appropriate radiology request form as this is likely to improve rates of follow-up.

Please **discharge all patients with a factsheet for themselves** (also available in Arabic, Vietnamese and simplified Chinese), as well as an **information sheet to be given to their GP.**

Surgical Intervention

Treatment consists of cystoscopy and insertion of ureteric stent to relieve the obstruction by bypassing the stone. This is a small procedure, done via a cystoscope, but under a general anaesthetic.

Once this is done the stone is unlikely to pass on its own and the patient will have to return for definitive laser lithotripsy. A significant minority of patients find stents extremely uncomfortable; they may cause haematuria, urinary frequency and pain. Many patients will re-present with stent irritation.

In the public system, patients can wait up to three months for definitive treatment after stenting. Hence, conservative management is preferable if possible.

3.5. Representation

Patients discharged for conservative management have a risk of representation. Most representations are due to ongoing pain. As the stone remains in place, it is likely to continue intermittently causing pain (though usually not at the severity of the initial presentation).

These patients require a discussion regarding their management:

- γ Confirm that they have been taking the analgesia regimen as prescribed. If they have, and they still have severe pain, they are likely to require a stent.
- γ If they do not want to continue the analgesia regimen or you think they have otherwise become unsuitable for conservative management (e.g. signs of sepsis), contact urology.

The vast majority of patients representing with ongoing pain do not require repeat imaging. The pathology is known, and repeat imaging rarely yields additional information.

Similarly, **patients presenting with stent irritation generally do not require imaging.**

Please contact urology for all representations, including those for both ongoing pain and stent irritation.

4. Definitions and Acronyms

[Term]	[definition]
ED	Emergency Department
CT	Computed tomography
KUB	Kidney, Ureters, Bladder
NSAIDs	Non-Steroid Anti-Inflammatory Drug
FBC	Full Blood Count
UEC	Urea, Electrolytes and Creatinine
CMP	Calcium, Magnesium and Phosphate
CRP	C-reactive protein
b-HCG	Beta Human Chorionic Gonadotropin

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Related Policy Directives / Guidelines

MoH - PD2016_049	NSW Health Policy Directives and Other Policy Documents	Link
SWSLHD_PD2015_009	Corporate and Clinical Policy Directive and Guideline Development and Management	Link

6. Background Information

Renal colic is a common, extremely painful but rarely life-threatening cause of presentation to the ED with up to 80% of ureteric stones passing spontaneously.¹ Lifetime risk of a renal tract stone is 12% in men and 6% in women.² Stones are formed because of an imbalance of inhibitors and various minerals, causing supersaturation and crystal formation. These crystals aggregate to form stones. The term renal colic is somewhat of a misnomer, as stones located in the kidney rarely cause symptoms and thus form undetected. When they migrate through the urinary tract, however, they cause obstruction leading to increased pressure and stretching of tissue proximal to the stone, causing intense pain. Presentation is influenced by geographical and seasonal factors, with higher incidences in warmer climates and during the summer months.³

Despite the high incidence of renal colic, there are no existing clinical practice guidelines at a local or state-wide level. Subsequently, assessment and management of suspected renal colic is at the discretion of the attending ED physician and there is wide variation in clinical practice in our ED. This guideline aims to standardise the assessment and management of renal colic to streamline and improve quality of patient care and optimise hospital outcomes.

Many patients can be discharged safely from ED for conservative management as approximately 80% of ureteric stones pass spontaneously.¹ However, a significant proportion of patients sent home to await stone passage often represent to ED due to inadequate pain management or a misunderstanding of their conservative management plan. The catchment area for Bankstown-Lidcombe ED services a large population of non-English speaking background (NESB) patients, with 21.1%, 19% and 8.1% speaking

Arabic, Vietnamese and Mandarin/Cantonese, respectively.⁴ The guideline encourages streamlining of conservative management, particularly ensuring that all patients are discharged with sufficient analgesia, in an effort to reduce ED representations and urological intervention that can be avoided with adequate pain management. It also includes patient factsheets in English, Arabic and Vietnamese as well as GP factsheets to aid in compliance.

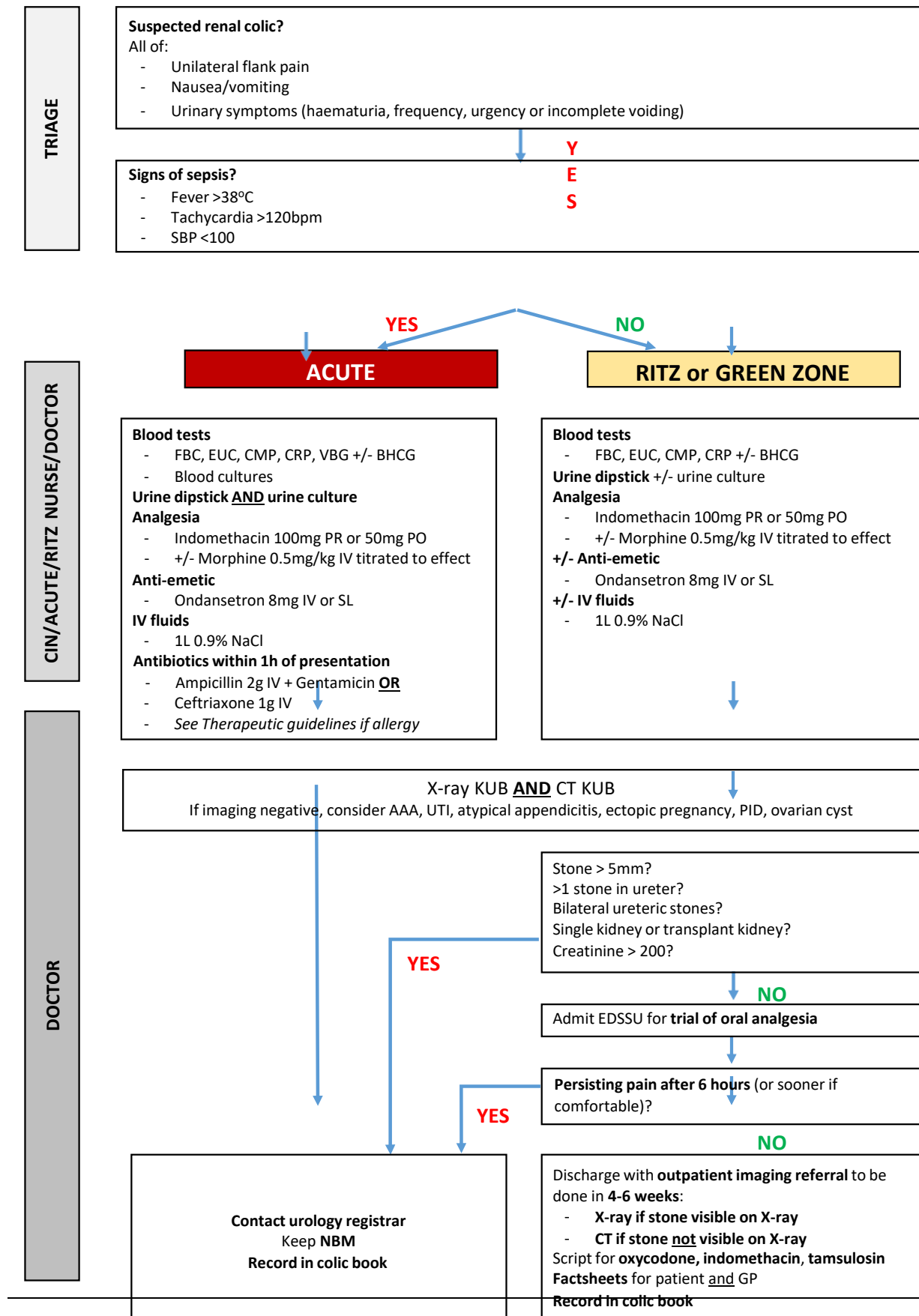
CT-KUB is generally the routine, first-line imaging modality of choice in most institutions because of its high sensitivity and specificity. The use of CT-KUB has dramatically risen in the past decade and contributes significantly to radiation burden. Patients often receive more than one CT during the course of their acute illness.⁵ Furthermore, the majority of patients with calculi will have another episode of renal colic within 5-10 years.⁶ This raises concerns regarding potential health impacts associated with radiation exposure. A recent study estimated mean cancer risk for males and females to be 24 and 46 out of 100 000 procedures, respectively. Greatest cancer risks are associated with bladder, leukaemia, stomach and colon.⁷

Follow-up imaging is essential to ensure passage of the calculi. Patients with ureteric stones who do not receive follow-up are at risk of silent obstruction, whereby the kidney remains obstructed after the initial pain settles and may lead to loss of the affected kidney. Plain X-ray KUB is able to identify radiopaque stones, which account for upwards of 60% of stones.⁸ Therefore, X-ray KUB may be a suitable alternative for patients with radiopaque stones as it may reduce radiation dose by 7-14-fold.⁷ The guideline aims to reduce patient radiation exposure by utilising dual initial imaging modalities (initial CT-KUB and X-ray KUB) to identify patients with radio-opaque stones who can then be followed up solely with plain X-ray KUB. This will reduce the need for multiple follow-up CT scans.

7. Attachments

Attachment 1 – Ureteric Colic ED Flowchart

Attachment 1 – Ureteric Colic ED Flowchart



Appendix 2: Kidney stones patient factsheet

Kidney Stones: Patient Factsheet

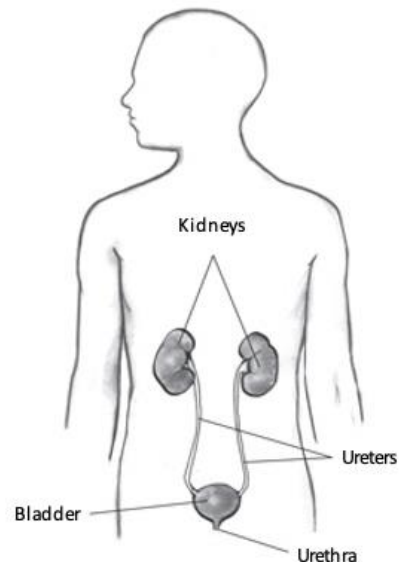
You have been given this patient factsheet because you have been diagnosed with kidney stones (medical term: renal calculi) in the emergency department (ED).

Key information

- You have been sent home with a kidney stone that is likely to pass in the next few days to weeks.
- You have been given three sheets – [1] **this patient factsheet**, [2] a **separate GP factsheet** to be given to your doctor, [3] an **imaging request form** to be booked in 4-6 weeks.
- You need to take **regular Panadol**. **IF you still have pain, ADD Indocid and Endone.**
- You need to have **repeat imaging and take these scans to your GP or urologist in 4-6 weeks even if the pain has stopped.**

What is a kidney stone?

Your kidneys filter blood and remove waste and water as urine. Kidney stones occur when some waste products clump together to form a solid crystal. They can vary in size from as small as a grain of sand to as big as a golf ball. Most stones are small and can be flushed out in your urine. Generally, the bigger the stone, the more likely it is to get stuck. Stones can become stuck at any point in the urinary tract (the passage between your kidney and bladder), causing severe pain. Stones can block the flow of urine, causing infections and kidney damage.



What causes a kidney stone?

You are more likely to have a stone if you drink small amounts of fluid, making your urine more concentrated. For most people, the exact cause of their stones is often not found. Urinary tract infections (UTIs) can lead to stone formation. Some medical conditions, such as gout or hyperparathyroidism, can cause stones. Some dietary habits, such as high salt or protein intake, can also lead to stone formation.

Treatment

Whilst you were in ED, you may have received:

- A strong painkiller to relieve your pain (Indocid (indomethacin)) inserted rectally or *morphine* via a drip) – **do not drive home if you have received these medications.**
- Medications for nausea.
- Fluids via a drip to rehydrate you.
- A urine test to look for infection and blood.
- A blood test to look for infection and to check how well your kidneys are working.
- An X-ray and CT scan to locate the stone.

Going home with a stone

You have been sent home with a kidney stone that is likely to pass in the next few days to weeks. Once the stone has reached your bladder, it is unlikely to cause pain. The time it takes to pass a stone varies from person to person. You may have persistent pain whilst the stone is passing.

Your doctor has given you some **painkillers to take at home:**

- For the first three days, take one to two tablets of **Panadol (paracetamol)** every 4-6 hours. Do not take more than eight tablets per day.
- When you have pain:
 - o **Indocid (indomethacin)** inserted rectally up to every 12 hours
 - OR if you prefer oral tablets, one to two tablets every 8 hours.
 - o **Endone (oxycodone)**, half or full tablet up to every 3 hours. Do not take more than six full tablets per day.
- You may be given a prescription for **Flomaxtra (tamsulosin)**, one tablet daily. This increases the chance of stone passage and decreases pain. There is no Medicare rebate so the course may cost upwards of \$30.

Follow-up

You have also been given an **imaging request form**. It is important that you have **repeat imaging and take these scans to your GP or urologist in 4-6 weeks even if the pain has stopped**. The pain may settle even if the stone is still stuck and this could cause kidney damage without any pain or obvious symptoms.

Prevention

If you have had a kidney stone, there is a higher chance you will have another stone in the future.

To reduce your risk of another stone:

- **Drink 3-4 litres of water (or other clear fluids) a day.** If your urine is dark yellow,

you are not drinking enough. If you are diabetic, do not drink fruit juice. If you have heart/kidney failure, you must discuss the amount of fluid you should drink with your GP.

- Get prompt treatment if/when you have a urinary tract infection (UTI).
- Your doctor may arrange tests to check for an imbalance of salts and minerals in your blood.
- You may be advised to make changes in your diet when you see your GP/urologist. The changes recommended will depend upon the cause of your kidney stone.
- You may be advised to take a medication to reduce the risk of future stones.

When to seek help

In a medical emergency, go to the nearest hospital emergency department or call an ambulance (dial 000).

See your local GP or return to the emergency department if you have:

- Pain that is getting worse despite taking painkillers.
- Fevers, sweats or shivers.
- Repeated vomiting.
- Urine that is cloudy or has blood in it.
- Pain on passing urine.

Disclaimer: This health information is intended for general education purposes. Please consult a doctor if you have any questions or concerns.

Appendix 3: Conservative management of renal calculi – GP factsheet

Conservative Management of Renal Calculi: GP Factsheet

You are receiving **this GP factsheet** because your patient has been diagnosed with renal calculi at the Bankstown-Lidcombe emergency department (ED). We are aiming to standardise assessment and management of renal colic. This sheet is intended to clarify your patient's conservative management plan and necessity for follow-up in the community. They have been given a **patient factsheet** but we ask that you please clarify any questions/concerns they may have regarding their treatment. We thank you in advance for your assistance.

Management in ED

Whilst your patient was in ED, they may have received:

- PR *indomethacin* or IV *morphine*
- Anti-emetics
- IV fluids
- Urinalysis for demonstration of haematuria, infection (leukocyte/nitrite), urinary pH +/- urine culture (in case of a positive test)
- FBC/EUC/CMP/CRP
- b-HCG in women of reproductive age
- Both X-ray KUB AND CT KUB to locate the stone and determine radio-opacity

Conservative Management

Your patient has been discharged home with a renal calculus that is likely to pass in the next few days to weeks.

They may have persistent pain whilst the stone is passing so they have been given some **analgesia to take at home**:

- Regular *paracetamol* one to two tablets PO q4-6h (max 4g/day).
- If they have breakthrough pain:
 - o PRN *indomethacin* 100mg PR BD.
 - OR if they are unwilling or unlikely to take PR medication, *indomethacin* 25mg one to two tablets PO TDS.

- o PRN ~~*oxydocone*~~ 2.5-5mg q4h (max 30mg/day).

- They may be given a prescription for *tamsulosin* 400mcg one tablet daily. This increases the chance of stone passage and decreases pain. There is no Medicare rebate so the course may cost upwards of \$30.

Follow-up

Patients with ureteric stones who do not receive follow-up are at risk of losing the affected kidney. Silent obstruction, where the kidney remains obstructed after the initial pain settles, often leads to loss of the kidney if the obstruction is not relieved (whereas patients with ongoing pain are rarely lost to follow-up).

Your patient has been given an **imaging request form**. If their calculus was found to be radio-opaque on initial imaging, they will only require repeat X-ray KUB imaging. Otherwise, they will require repeat CT KUB.

Please remind them to have the appropriate repeat imaging in 4-6 weeks even if the pain has subsided. Please either review these scans yourself or arrange referral to the urologist as per their discharge summary.

Secondary Prevention

Please encourage your patient to implement the following strategies to reduce their risk of recurrence:

- **Drink 3-4 litres of fluid (water or juice) a day.** (Except: if they have heart/renal failure; avoid juice if diabetic).
- Prompt treatment if/when they have a urinary tract infection (UTI).
- Please consider arranging tests for metabolic disorders (e.g. hyperuricaemia, hypercalcaemia, cystinuria) and manage appropriately.