**Chronic Kidney Disease (CKD)**

**Case Definition**

Chronic Kidney Disease (CKD) is either of the following, persisting for at least three months, repeated on at least two occasions:
1. Markers of kidney damage (e.g. proteinuria, haematuria or structural abnormalities on renal imaging) and / or:
2. GFR < 60 mL/min/1.73 m².

Both eGFR and ACR are required to determine the stage and risk category of CKD as albuminuria is one of the biggest known risk factors for progression to End Stage Kidney Disease (ESKD).

**Table 1: KDIGO staging of CKD**

<table>
<thead>
<tr>
<th>eGFR (ml/min/1.73 m²)</th>
<th>ACR (mg/mmol)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 1</strong> 15-29</td>
<td>≤0.3</td>
</tr>
<tr>
<td><strong>Stage 2</strong> 30-44</td>
<td>0.3-3</td>
</tr>
<tr>
<td><strong>Stage 3</strong> 45-59</td>
<td>3-30</td>
</tr>
<tr>
<td><strong>Stage 4</strong> 60-89</td>
<td>&gt;30</td>
</tr>
<tr>
<td><strong>Stage 5</strong> 90+</td>
<td>&gt;30</td>
</tr>
</tbody>
</table>

**Screening**

Up to 60% of adults in some Kimberley communities have markers of Chronic Kidney Disease (CKD). Increased creatinine occurs late in CKD and implies significant kidney damage.

**Screening annually for patients with any of the following risk factors:**
- Aboriginal or Torres Strait Islander person aged ≥ 15 yrs of age;
- Smoking;
- Obesity (BMI > 30 kg/m²);
- Family history of CKD;
- History of cardiovascular disease (e.g. stroke/CVA, heart attack/MI, peripheral vascular disease / PVD);
- Hypertension;
- Diabetes;
- Previous acute kidney injury (AKI);
- Use of nephrotoxic drugs (e.g. NSAIDS).

Patients assessed as not having risk factors should be regularly screened for the development of risk factors over time.

**Screening for CKD requires:**
- Blood pressure (BP) measurement;
- Blood test for urea, electrolytes and creatinine (UEC);
- Urine test for albumin:creatinine ratio (ACR):
  - Dipstick prior to sending and document result;
  - If leucocytes, blood and/or nitrates consider possible UTI / STI (see RESOURCES);
  - If diabetic and not done within the last 3 months;
  - Otherwise, If not done within the last 12 months.

**Management**

- Hypertension;
- Diabetes;
- Use of nephrotoxic drugs (e.g. NSAIDS).

**Considerations in interpreting screening results:**
- Creatinine levels vary with muscle mass: eGFR on laboratory reports may under or overestimate renal function in people with extremes of body size, muscular diseases or amputations – calculators can be used to factors in body weight (see Resources);
- Abnormalities persisting less than 3 months indicate acute kidney injury (AKI) which increases the risk of subsequent CKD;
- Episodes of AKI should be investigated for a cause and documented in the medical record;
- Newly abnormal eGFR should be repeated within a week to identify rapidly declining renal function.

**Table 2: Other causes of abnormal kidney screening tests and appropriate follow-up**

<table>
<thead>
<tr>
<th>ABNORMALITY</th>
<th>MANAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proteinuria with abnormal urine dipstick due to suspected urinary tract infection (UTI) or urethritis from sexually transmissible infection (STI).</td>
<td>Send urine for MCS and consider UTI treatment. If appropriate URI guidelines for counselling, testing and treating possible STI (See RESOURCES). Repeat ACR with proof of cure of infection in three months or as clinically indicated.</td>
</tr>
<tr>
<td>Proteinuria / raised creatinine after vigorous exercise or heavy protein consumption.</td>
<td>Repeat screening when patient has not exercised in the previous 24 hours or fasting sample.</td>
</tr>
<tr>
<td>Isolated proteinuria in person without other risk factors for CKD aged less than 30 years (i.e. possible orthostatic proteinuria).</td>
<td>Recheck ACR on morning first void urine collected immediately on first standing.</td>
</tr>
<tr>
<td>Increase in creatinine after commencement of ACE-inhibitor / ARB.</td>
<td>Creatinine rise to ≤5% acceptable – see management section. Monitor weekly until stable.</td>
</tr>
</tbody>
</table>

**Assessment**

**All patients with confirmed CKD require:**
- BP, BMI, check for peripheral oedema;
- Renal tract ultrasound;
- FBP, CRP, iron studies, uric acid, LFT, calcium / magnesium / phosphate, lipids, PTH (if calcium or phosphate are abnormal);
- Hepatitis B, hepatitis C, syphilis and HIV serology if not done within the last 12 months, with appropriate counselling as per Kimberley protocols;
- HBsAg:
  - If diabetic and not done within the last 3 months;
  - Otherwise, If not done within the last 12 months.
- If ACR > 30 and not previously done: Serum protein electrophoresis, urine protein electrophoresis, complements, ANA, ENA;
- If haematuria and not previously done: ANCA, anti-GBM;
- If haematuria and additional risk factors for malignancy (see Box 1): as above plus cystoscopy and / or urology referral, cytology x 3 (consider that transport delays may affect results).

**Macroscopic haematuria requires urgent urological follow-up to exclude malignancy, regardless of whether a urine MCS has bacterial growth, as malignancy predisposes to UTI.**

**Box 1: Risk factors for urological malignancy**

- Age > 35 years;
- Smoking history (risk correlates with the extent of exposure);
- History of macroscopic haematuria;
- History of other less common risk factors: chronic cystitis or irritative voiding symptoms; pelvic irradiation, exposure to cyclophosphamide; aristolochic acid; occupationally to chemicals or dyes (benzenes or aromatic amines), such as printers, painters, and chemical plant workers; chronic indwelling foreign body; previous analgesic abuse.

Microscopic haematuria is a sign of glomerulonephritis. Document its presence on any referrals and investigate appropriately (see baseline assessment). Confirm haematuria when the patient is not menstruating if possible.

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Management

Prevent Progression
People with moderate or severe CKD (ACR > 30 mg/mmol or eGFR < 45) are at the highest cardiovascular risk category, regardless of their score on absolute cardiovascular risk tools.

- Address all identified cardiovascular risk factors. Smoking cessation helps prevent progression to CKD. See SMOKING CESSATION and, HYPERLIPIDAEMIA protocols.
- Ensure immunisations up to date, HBV immune;
- Optimise control for patients with diabetes (see DIABETES protocol);
- Consider nephrotoxicity when prescribing and advise re: OTC medications such as NSAIDs;
- Appropriate early referral and management improves outcomes.

Manage proteinuria or hypertension with ACE/ARB:
For patients with proteinuria, ACE-Inhibitors (ACE-I) / Angiotension-II-Receptor Blockers (ARB) reduce overall mortality and progression to ESKD.

For all patients with proteinuria (ACR > 30 mg/mmol, or >3 mg/mmol and DM, IHD or HTN):
- Prescribe an ACE-I OR ARB for all patients without contraindications, titrate to maximum dose tolerated without symptomatic hypotension. Monitor BP, UEC fortnightly during up-titration. Seek advise if:
  - Potassium ≥6.0 mmol/L – consider drug interactions e.g. spirono-
    lactone;
  - Creatinine rise > 20% - consider bilateral renal artery stenosis.
- Do not combine ACE and ARB due to risk of acute kidney injury.
- Once ACE-I or ARB maximised, use other agents as needed to control BP to goal of 130/80 unless other target specified by nephrologist / physician (see HYPERTENSION protocol).

For other patients with CKD, use ACE or ARB as the preferred first option for managing hypertension.

Prevent Acute Kidney Injury (AKI):
In acutely unwell patients with CKD:
- Check weight, BP, peripheral oedema, monitor UEC regularly;
- Consider temporarly ceasing ACE-I / ARB / diuretics in especially with hypotension / hypovolaemia (if unsure consult physician / nephrologist for advice);
- Recheck UEC once acute illness has resolved to determine new baseline and ensure ceased medications are restarted.

TABLE 3: ACE-I and Angiotension-II-Receptor Blockers on the KSDL

<table>
<thead>
<tr>
<th>DRUG</th>
<th>KSDL</th>
<th>SUPPLEMENTARY LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE Inhibitors</td>
<td>Quinapril (5mg, 10mg, 20mg tab)</td>
<td>Enalapril (5mg, 10mg, 20mg tab)</td>
</tr>
<tr>
<td>- Quinapril</td>
<td>Ramipril (2.5mg, 5mg, 10mg tab)</td>
<td>Quinapril / HCT (20mg / 12.5mg tab)</td>
</tr>
</tbody>
</table>

ARB
| Irbesartan (50mg, 150mg, 300mg tab) |
| Irbesartan / HCT (300mg/12.5mg tab) |

Promote a Healthy Lifestyle
Achieving a healthy body weight and maintaining a healthy diet helps reduce progression to ESKD. See HEALTHY LIFESTYLE protocol. Additionally, if eGFR is < 30 a dietician referral is recommended to manage weight, salt and phosphate intake and fluid.

Treat complications of late CKD (STAGES 4 – 5)

[Note: Contact renal GP as needed for support with routine pathology].

PTH, phosphate and calcium: Usual pattern is progressively high phosphate and low calcium (Ca++) with compensatory secondary hyperparathy-roidism. May require combination of calcitroil (titrated against PTH / serum Ca++) and phosphate binders (titrated against phosphate levels). General guidelines:
- eGFR >30 with normal Ca++ / phosphate and vitamin D levels < 50 mmol/L: Supplement with cholecalciferol;
- Acceptable PTH (< 5 times upper limit of normal (ULN)) and normal adj. Ca++ (< 2.1 mmol/L) but high phosphate (> 1.6 mmol/L): Dietary advice +/- phosphate binders (Calcitrate / Cal-sup with meals, up to two TDS as needed). Review adherence and correct use. Can add second agent – vitamin D or calcitriol according to renal GP;
- Elevated PTH (> 5 times upper limit of normal (ULN)) and normal adj. Ca++ (< 2.1 mmol/L): Treat high phosphate first, unless symptomatic hypocalcaemia. Start calcitrol 0.25mcg daily, increase fortnightly up to 1mcg daily. Seek advice if adjusted Ca++ rise to >2.4 mmol/L;
- Monitor serum Ca++ and phosphate fortnightly and PTH monthly whilst changing therapy.

Acidosis: If acidosis is persisting (serum bicarbonate < 15 mmol/L) after correction of hypocalcaemia:
- Start sodium bicarbonate tablets (Sodibic 840mg) 1 BD, up to 2 tablets TDS to a target of 22 mmol/L. Monitor for exacerbation of HTN and heart failure (increased salt load).

Anaemia and iron deficiency: Anaemia occurs in late CKD due to both iron deficiency and reduced RBC production, and can be exacerbated by fluid overload. Exclude other causes of anaemia in early CKD, with absolute iron deficiency or in refractory anaemia. General guidelines:
- TF saturation > 20% and Hb < 100: Treat for iron deficiency, check B12 / folate. Oral iron is poorly absorbed in CKD. Refer for iron infusion if no improvement after one month or as first line in CKD 5;
- women of child bearing age
  - Consider early referral to obstetrician / physician for advice as needed.

Women of Child Bearing Age
- Encourage use of reliable contraception, pre-pregnancy counselling and early antenatal care;
- Stop ACE-I / ARBs as soon as pregnancy planned or suspected. If pregnant, discuss with obstetrician / physician promptly and consider early referral to high risk pregnancy clinic;
- If breastfeeding, use enalapril as preferred ACE/ARB.

TABLE 4: Commonly prescribed drugs which require caution in CKD

<table>
<thead>
<tr>
<th>DRUG</th>
<th>RISKS IN CKD / ACTION REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td>May increase risk of lactic acidosis, particularly when unwell. Withhold if unwell. Dose adjust: eGFR 30-45: Max 1g/day; eGFR 30-50: Cease, or discuss with nephrologist / on-call physician.</td>
</tr>
<tr>
<td>Diuretics</td>
<td>Volume depletion, contributing to AKI. Electrolyte disturbance. Withhold if unwell or dehydrated. Monitor UEC regularly.</td>
</tr>
<tr>
<td>Colchicine</td>
<td>Accumulation, drug toxicity. Adjust dose according to eGFR (see Therapeutic guidelines) + / - monitor levels.</td>
</tr>
<tr>
<td>Digoxin</td>
<td>Accumulation, risk of hyperkalaemia. Monitor K+. Withhold if unwell. Cease if eGFR &lt; 15 and not required for HTN.</td>
</tr>
<tr>
<td>Insulin</td>
<td>Accumulation, increased risk of hypoglycaemia. Dose adjust based on BSL monitoring.</td>
</tr>
<tr>
<td>Sitagliptin</td>
<td>Accumulation, drug toxicity. Dose adjust: eGFR 30-50: 50mg daily, eGFR 30-20: 25mg daily.</td>
</tr>
</tbody>
</table>

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Refer/ Discuss

TO NEPHРОLOGIST:
• Persistent haematuria plus proteinuria;
• Proteinuria > 1g/day (ACR > 70, PCR > 100);
• Patients with proteinuria not tolerating ACE/ARB;
• Patients with very high risk CKD;
• CKD and difficult to manage HTN on three agents;
• Persisting anaemia despite iron therapy;

Urgent discussion required:
• Abnormal eGFR / ACR and suspected connective tissue disease (e.g. facial rash, polyarthritis, lethargy, abnormal investigations);
• Heavy proteinuria (ACR>220) and possible nephrotic syndrome (oedema, hypoalbuminaemia, hyperlipidaemia);
• Rapidly declining renal function (eGFR decline by 15/min/min within 12 months).

TO OBSTETRICIAN if planning pregnancy or early pregnancy.

TO ALLIED HEALTH as needed, and particularly:
• Dietician: CKD and high BMI or any BMI and eGFR < 30;
• Diabetes educator: CKD with insulin therapy and/or sub-optimal diabetic control.

Kimberley Renal Services

TO PRE-DIALYSIS CO-ORDINATOR if eGFR<30.

TO RENAL GP: CKD patients of any stage. Referral of patients high/very high risk assists with care coordination.

CALL YOUR LOCAL RENAL HEALTH CENTRE FOR SUPPORT REGARDING THE CARE OF PATIENTS WITH CKD IN THE KIMBERLEY REGION.

Routine schedule of care for stable CKD patients by risk category

<table>
<thead>
<tr>
<th>CKD STAGES</th>
<th>CKD RISK CATEGORY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MODERATE RISK:</td>
</tr>
<tr>
<td>CKD STAGE 1 AND 2</td>
<td>eGFR &gt; 60 + Microalbuminuria</td>
</tr>
<tr>
<td>CKD STAGE 3</td>
<td>eGFR 45-60 + Normal ACR</td>
</tr>
<tr>
<td>CKD STAGE 3B</td>
<td>eGFR 30 – 45 + Normal ACR</td>
</tr>
<tr>
<td>CKD STAGE 4</td>
<td>eGFR 15 – 30</td>
</tr>
<tr>
<td>CKD STAGE 5</td>
<td>eGFR &lt; 15</td>
</tr>
</tbody>
</table>

PATHOLOGY:
• UEC, ACR, LFT, FBP, CRP, Ca++, Mg++, phosphate - 12 monthly.
• HbA1c, lipids - 12 monthly, more often for other conditions as needed (e.g. diabetes).
• PTH - Every three months.
• Iron studies - As needed for the investigation and management of anaemia. Monthly if Hb < 100, otherwise 3 monthly.

CLINICAL REVIEW:
• BP, weight, assess smoking, diet, exercise - 12 monthly.
• Symptoms of ESKD - 1 – 3 monthly.
• Review by renal GP - At any stage, on referral from primary provider.
• Review by nephrologist - 1 – 3 monthly.
• Review by pre-dialysis coordinator - On referral from primary provider. 3 – 6 monthly.

*Does not apply to patients who are unstable or who have rapidly changing renal function.

Resources


