Chronic Kidney Disease (CKD)

Case Definitions

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 (eg. proteinuria, haematuria or structural abnormalities on renal imaging) and / or:
2. GFR < 60 mL/min/1.73m².

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

	ACR (mg/mmol)		
eGFR	Normal <3.0	Micro-albuminuria 3.0-30	Macro-albuminuria >30
Stage 1 eGFR ≥90	**Not CKD unless haematuria, structural or pathological abnormalities present**	**MODERATE RISK CKD**	**HIGH RISK CKD**
Stage 2 eGFR 60-89			
Stage 3 eGFR 45-59	**MODERATE RISK CKD**	**HIGH RISK CKD**	**VERY HIGH RISK CKD**
Stage 3b eGFR 30-44	**HIGH RISK CKD**	**VERY HIGH RISK CKD**	
Stage 4 eGFR 15-29	**VERY HIGH RISK CKD**		
Stage 5 eGFR <15 or dialysis			

Screening

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

Screen annually for patients with any of the following risk factors:

- Aboriginal or Torres Strait Islander person aged ≥ 15 years; Non-Aboriginal people aged ≥ 60 years;
- Smoking;
- Obesity (BMI > 30kg/m²);
- Family history of CKD;
- History of cardiovascular disease (eg. stroke/CVA, heart attack/MI, peripheral vascular disease/PVD);
- Hypertension (HTN);
- Diabetes;
- Previous acute kidney injury (AKI);
- Use of nephrotoxic drugs (eg. 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; and
- Blood test for urea, electrolytes, creatinine (UEC); and
- 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 Table 2).

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 factor 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.
- **Isolated proteinuria in a person without other risk factors for CKD**: Collect a first void urine when the patient has not undertaken heavy exercise in the previous 24 hours to recheck.
- **Proteinuria with suspected urinary tract infection or urethritis / STI:** Send urine for MCS and ensure appropriate UTI / STI treatment. Repeat Urine MCS with proof of cure of the treated infection in three months or as clinically indicated.

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Principles of Management

Assessment of CKD:

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 C and HIV serology if not done within the last 12 months, with appropriate counselling;
- Hepatitis B serology, if not known to be immune;
- HbA1c:
  - 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).

Haematuria is:

- Microscopic: Hb on dipstick OR RBC on urine MCS, on two separate occasions at least a week apart, not associated with infection or menstruation, OR:
- Macroscopic: Red, brown or dark discoloration of urine observed by patient or staff + / - clots. Confirm where possible by dipstick or urine MCS. **Requires urgent follow-up.**

Microscopic haematuria may indicate glomerulonephritis. Specify if patient has haematuria on renal referral and investigate appropriately (see baseline assessment). Confirm haematuria when the patient is not menstruating if possible.

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 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; occupational exposures; chronic indwelling foreign body; previous analgesic abuse.**

Management of CKD:

PREVENT PROGRESSION TO ESKD AND REDUCE CARDIOVASCULAR RISK

People with moderate or severe CKD (ACR >30mg/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;
- Optimise control for patients with diabetes (see DIABETES protocol). Individualise Hba1c target between 6.5 – 8% based on hypoglycaemia risk;
- A healthy body weight and maintaining a healthy diet helps reduce progression to ESKD. See HEALTHY LIFESTYLE protocol.

ENSURE ROUTINE IMMUNISATIONS UP TO DATE

In CKD stage 4 – 5, also ensure HBV immune: Follow the Australian Immunisation Handbook.

PREVENT ACUTE KIDNEY INJURY (AKI):

Consider nephrotoxicity when prescribing and advise re: OTC medications such as NSAIDS (see Table 4).

In acutely unwell patients with CKD:

- Check weight, BP, fluid status and UEC regularly;
- Consider temporarily ceasing **sulphonylureas / ACE-I / diuretics / metformin / ARB / NSAIDS / SGLT-2-I** (SADMANS mnemonic), especially with hypotension / hypovolaemia (if unsure contact physician / nephrologist for advice);
- Recheck UEC once acute illness has resolved to determine new baseline and ensure ceased medications are restarted if appropriate.

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Therapeutic Protocols

USE AN ACE-I/ARB UNLESS CONTRAINDICATED

For all patients with proteinuria (ACR > 30mg/mmol, or >3 mg/mmol and DM, IHD or HTN):

- Prescribe an ACE-I **OR** ARB for all patients without contraindications, to reduce overall mortality and progression to ESKD. Titrate to maximum dose tolerated without symptomatic hypotension. Monitor BP, UEC fortnightly during up-titration. **Creatinine increase < 30% within a month of commencement / dose increase is acceptable.** Seek advice if:
  - Potassium ≥6.0 mmol/L – consider drug interactions eg. spironolactone; dietician referral;
  - Creatinine rise > 30% – consider bilateral renal artery stenosis.
- **Do not combine ACE and ARB due to risk of AKI.**
- 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-I or ARB as the preferred first option for managing HTN.

TABLE 2: ACE-I AND ARB ON THE KSDL

	KSDL	Supplementary list
ACE-Inhibitors	**Ramipril:** (2.5mg, 5mg, 10mg tab)	**Enalapril:** (5mg, 10mg, 20mg tab) **Quinapril:** (5mg, 10mg, 20mg tab) **Quinapril / HCT: (**20mg / 12.5mg tab)
ARB	**Irbesartan:** (75mg, 150mg, 300mg tab)	**Irbesartan / HCT:** (300mg/12.5mg tab)

TREAT COMPLICATIONS OF LATE CKD (STAGES 3B-5):

Hyperparthyroidism of renal disease:

Hyperphosphataemia requires dietary advice + / - dietician referral + / - phosphate binders (eg. caltrate, sevelamer). Binders must be taken with food to work and should be timed to correspond to larger meals.

Mild hypocalcaemia (Ca++ ≥ 1.9 mmol/L) without symptoms: Check vitamin D level and supplement with cholecalciferol as needed to achieve levels > 50nmol/L.

Moderate hypocalcaemia (Ca++ ≤ 1.9 mmol/L), symptomatic or persistent hypocalcaemia despite cholecalciferol OR elevated PTH ≥ 5 x ULN:

Consider calcitriol in discussion with renal GP or nephrologist. Calcium levels and PTH should be closely monitored when introducing or increasing calcitriol doses. **Hypercalcaemia** may require cessation of cholecalciferol, caltrate or calcitriol.

Acidosis (serum bicarbonate < 15 mmol/L):

If persists **AFTER** correction of hypocalcaemia, can be treated with 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 < 110: 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 first line in CKD 5;
- TF saturation > 20% and Hb < 100: May require erythropoietin stimulating agent (ESA) (eg. Mircera). Discuss with renal GP / nephrologist.

Symptoms of ESKD:

Should be assessed for regularly:

- Ask about nausea, vomiting, anorexia, lethargy, SOB, pruritis, leg swelling, restless leg symptoms and chest pain.
- Monitor for infections. Patients with CKD are immunosuppressed and vulnerable to infections. Severe infections may occur without prominent fever and dose adjustment of antibiotics may be needed. Contact renal GP, physician or nephrologist for advice as needed.

Initiate advanced care planning processes and refer to the pre-dialysis co-ordinator for support in counselling and renal pathway planning. Consider a palliative care referral if appropriate.

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TABLE 3: COMMONLY PRESCRIBED DRUGS WHICH REQUIRE CAUTION IN CKD

Drug	Risks in CKD / Action required
Diabetes management	
Insulin	Accumulation, increased risk of hypoglycaemia. Dose adjust based on BSL monitoring.
Gliclazide	Accumulation, increased risk of hypoglycaemia. Dose adjust: eGFR 45-60: Reduce dose, eGFR < 45: Cease.
Metformin	May increase risk of lactic acidosis, particularly when unwell. Withhold if unwell. Dose adjust: eGFR 30-45: Max 1g/day; eGFR <30: Cease, or discuss with nephrologist / on-call physician.
Sitagliptin	Accumulation, drug toxicity. Dose adjust: eGFR 30-50: 50mg daily, eGFR < 30: 25mg daily OR use Linagliptin.
Empagliflozin	Mechanism of action dependent on eGFR. If eGFR persistently < 45: Cease, or discuss with nephrologist / physician.
Other	
Atenolol	Accumulation may cause bradycardia, especially in AKI (monitor closely).
Diuretics	Volume depletion, contributing to AKI. Electrolyte disturbance. Withhold if unwell or dehydrated. Monitor UEC regularly.
Colchicine Digoxin Gentamicin Vancomycin	Accumulation, drug toxicity. Adjust dose according to eGFR (see eTG) + / - monitor levels.
ACE-I, ARB	May increase risk of AKI during acute illness. Hyperkalaemia. Monitor K+. Withhold if unwell. Cease if eGFR < 15 and not required for HTN.
NSAIDS	Increase risk of AKI. Avoid.
Radiological contrast media	Avoid unnecessary contrast in CKD stages 4/5 or stage 3b with additional AKI factors. Risk reduction by IV pre-hydration and withholding other nephrotoxic agents may be needed. Provide all information on radiology form. Consider discussion with radiologist and nephrologist.
Trimethoprim / Cotrimoxazole	Reduce tubular secretion of Cr & K+, causing hyperkalaemia and appearance of AKI.

Women of childbearing age:

- Encourage use of reliable contraception, pre-pregnancy counselling and early antenatal care.
- Stop ACE-I / ARBs as soon as pregnancy planned or suspected, and replace with pregnancy-safe anti-hypertensive agent if required. If pregnant, discuss with obstetrician / physician promptly and consider early referral to high-risk pregnancy clinic.
- If breastfeeding, use enalapril as preferred ACE/ARB.

Refer Discuss

TO KIMBERLEY RENAL SERVICES:

Via MMEx to KRS Kimberley
Via email to krsadmin@kamsc.org.au OR
Via fax to 08 9191 8600 (call 9191 8600 to confirm receipt).

CKD patients of any stage. **Please include serum creatinine trend over time, urine ACR and renal tract ultrasound results with referral unless not available.** Referrals will be triaged and allocated to a nephrology or renal GP clinic. Indications for nephrology review include:

- Persistent haematuria plus proteinuria;
- Proteinuria > 1g/day (ACR > 70, PCR > 100);
- Patients with very high risk CKD;
- CKD and difficult to manage HTN on three agents;
- Persisting anaemia despite iron therapy.

URGENT DISCUSSION (ON CALL RENAL GP OR NEPHROLOGIST):

- Abnormal eGFR / ACR and suspected connective tissue disease (eg. facial rash, polyarthritis, lethargy, abnormal investigations);
- Possible nephrotic syndrome (heavy proteinuria (ACR>220), oedema, hypoalbuminaemia, hyperlipidaemia);
- Rapidly declining renal function (eGFR decline by 15mL/min within 12 months).

TO OBSTETRICIAN if CKD and planning pregnancy or early pregnancy.

TO ALLIED HEALTH as part of a Team Care Arrangement, and particularly CKD with:

- Diabetes educator: Poor diabetic control or on insulin;
- Dietician: Suspected malnutrition (unplanned weight loss >10%, BMI < 18.5, low albumin, low phosphate), hyperkalaemia, hyperphosphataemia or fluid overload.

TO SOCIAL / EMOTIONAL WELLBEING:

Patients impacted by physiological and psychological changes of CKD / ESKD treatment.

Call your local renal health centre for support regarding the care of patients with CKD in the Kimberley region. Appropriate early referral and management improves outcomes.

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FOLLOW-UP OF STABLE CKD PATIENTS BY RISK CATEGORY*

CKD STAGES	CKD RISK CATEGORY			
	MODERATE RISK:	HIGH RISK:	VERY HIGH RISK (NOT YET ESKD)	ESKD
CKD STAGE 1 AND 2	eGFR > 60 + Microalbuminuria	eGFR > 60 + Macroalbuminuria		
CKD STAGE 3	eGFR 45-60 + Normal ACR	eGFR 45 – 60 + Microalbuminuria	eGFR 45 – 60 + Macroalbuminuria	
CKD STAGE 3B		eGFR 30 – 45 + Normal ACR	eGFR 30 – 45 + Microalbuminuria	
CKD STAGE 4			eGFR 15 – 30	
CKD STAGE 5				eGFR < 15
PATHOLOGY:				
UEC, ACR, LFT, FBP, CRP, Ca++, Mg++, phosphate	12 monthly	3 – 6 monthly	1 – 3 monthly	Monthly
HbA1c, lipids	12 monthly, more often for other conditions as needed (eg. diabetes)			
PTH				Every three months
Iron studies	As needed for the investigation and management of anaemia.		Monthly if Hb < 100, otherwise 3 monthly	Monthly
CLINICAL REVIEW:				
BP, weight, assess smoking, diet, exercise	12 monthly	3 – 6 monthly	1 – 3 monthly	Monthly
Symptoms of ESKD			1 – 3 monthly	Monthly
Review by renal GP	At any stage, on referral from primary provider			
Review by nephrologist and pre-dialysis coordinator	On referral from primary provider		3 – 6 monthly	Each opportunity

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

Resources

- Kidney Health Australia for: Chronic Kidney Disease (CKD) Management in Primary Care: https://kidney.org.au/health-professionals/ckd-management-handbook ;CKD-Go! app for health professionals: https://kidney.org.au/health-professionals/ckd-management-handbook/ckd-go-app; Patient information sheets also available.
- Caring for Australasians with Renal Impairment Guidelines, Kidney Health Australia: http://www.cari.org.au/
- KRS contact list: See https://kams.org.au/kamsc-services/kimberley-renal-services/ or call 08 9191 8600 to request a copy.
- On-call renal GP mobile: **0427 808 873**. For an acutely unwell patient requiring transfer or outside of dialysis unit operating hours, contact nephrology service through Royal Perth Hospital.
- Creatinine clearance calculators: https://www.ebmconsult.com/app/medical-calculators/glomerular-filtration-rate-gfr-calculator
- HealthPathways Chronic Kidney Disease: https://wa.communityhealthpathways.org/56652.htm