



Chronic Kidney Disease - Identification, Evaluation and Management of Adult Patients

Effective Date: October 29, 2014

Scope

This guideline provides recommendations for the investigation, evaluation, and management of adults aged ≥ 19 years at risk of or with known chronic kidney disease (CKD), including care objectives and patient self-management. Specialized management of established CKD (e.g., erythropoietic agents for anemia, renal replacement therapy, and treatment of calcium, phosphate, or parathyroid hormone [PTH] abnormalities) is beyond the scope of this guideline.

Key Recommendations

- Identify high-risk patient groups for evaluation of CKD.
- Measure both estimated glomerular filtration rate (eGFR) and urine albumin/creatinine ratio (ACR) for evaluation and prognosis purposes.
- Determine cause of kidney disease where possible. The three dimensions of **C**ause, **eG**FR and **A**lbuminuria (CGA) are all important in developing a management plan. *
- The word microalbumin has been previously used to describe small amounts of protein in urine; however, recent guidelines and consensus recommend abandoning the term and using the ACR value instead.
- In consultation with the patient and family/ caregivers, develop individualized management plan.
- Ensure timely referral to specialists and health care teams as appropriate.

Epidemiology

CKD is defined as an abnormality of kidney structure or function that is present for greater than 3 months.¹ CKD is a serious health problem, often associated with other common chronic diseases such as diabetes, hypertension, and cardiovascular disease (CVD)² and an estimated 1:10 British Columbians has some form of significant kidney disease.³

CKD amplifies risk for multiple conditions: cardiac morbidity and mortality risk is elevated 10 times that of population mean risk;^{4,5} length of hospital stay and adverse reactions to drugs are also increased;⁶⁻¹⁰ and renal replacement therapy (RRT) is only one, rarer outcome.^{6,9,11-13} People with CKD also have higher risk of acute kidney injury (AKI).^{13,14} AKI in those with existing CKD is associated with high morbidity and mortality.^{15,16}

CKD and associated conditions (e.g., CVD, diabetes and hypertension) place persons at risk of end stage renal disease (ESRD) requiring RRT (e.g., dialysis or transplantation).^{6,13,14} Evidence clearly indicates that control of hypertension and proteinuria (and hyperglycemia in persons with diabetes) can prevent or postpone the development of progressive kidney function decline.¹⁷⁻²⁵ **The outcome of many patients who go on to dialysis remains poor with 10 per cent annual mortality; the overall 5 year survival rate is worse than that of most cancers.**⁶

* The emphasis on determining cause in addition to eGFR and ACR, is new from the 2008 guideline.

Risk Factors

Populations at increased risk for CKD and who should be screened include those with:

- Diabetes
- Hypertension
- CVD
- A family history of kidney disease (e.g. mother, father, or sibling)
- Specific high-risk ethnic groups: First Nations, Pacific Islanders, African and Asian descent

Note: age alone is not a reason for screening.

Etiology

There are many reasons for impaired kidney function. The two most common causes of CKD are hypertension and diabetes and they often co-exist.¹ Even if a primary cause seems obvious (e.g., diabetes), the possibility of a serious underlying disorder (e.g., systemic lupus erythematosus) must be considered in patients with:

- Abnormal urinalysis, (e.g. proteinuria, hematuria, cellular casts, or combinations thereof). **Note: hyaline casts are normal.**
- Rapid sustained decline in kidney function (change in eGFR > 10-15%/year) despite remedy of reversible precipitants (e.g. volume contraction, febrile illness, medications).
- Consistent impairment of kidney function in the absence of risk factors.
- Constitutional symptoms suggesting systemic illness.
- Sudden or severe onset of symptoms, (e.g. edema unrelated to heart or liver disease).

Diagnosis And Screening

At-risk populations should be screened every 1-2 years depending upon clinical circumstances (e.g., annually for persons with diabetes) using creatinine/eGFR, urinalysis and ACR, a review of risk factors and medical history.

Note: age alone is not a reason for screening.

► Investigations or Tests

eGFR is the best marker for CKD and is calculated from creatinine. All labs in British Columbia (BC) automatically report eGFR when creatinine is ordered. **Note: the recommended equations for eGFR may change over time and are estimates only.**

Other evidence of kidney damage includes: kidney biopsy abnormalities, urinalysis and urine albumin excretion, and imaging studies (e.g., ultrasound). Ultrasound can help to identify polycystic kidney disease, cancer, stones, and obstruction.

Table 1. Potential complications of chronic kidney disease (CKD)

Potential Complications of CKD ² (listed alphabetically)	
<ul style="list-style-type: none">• Acute Kidney Injury (e.g., dehydration, dye, drugs)• Anemia• BP increases• Calcium absorption decreases• Drug toxicity• Dyslipidemia• Heart failure/volume overload	<ul style="list-style-type: none">• Hyperkalemia• Hyperparathyroidism• Hyperphosphatemia• Left ventricular hypertrophy• Malnutrition potential (late)• Metabolic acidosis

²Listed complications are not specific to CKD but tend to occur with increasing frequency and are more directly attributable to more severe reduction in kidney function. If complications are noted at an early stage of CKD, investigation of alternative causes is recommended (e.g., profound anemia at eGFR of 55 mL/min is likely not attributable to low kidney function alone). Kidney damage is defined as pathological abnormalities (e.g., kidney biopsy results) or markers of damage including abnormalities in blood or urine tests (e.g., protein/albumin in the urine, red blood cells, white blood cells or casts) or imaging studies.¹

► eGFR Values and Interpretation

- Values of > 60 mL/min and < 100 mL/min, in the absence of urine abnormalities or structural abnormalities on imaging studies (e.g., ultrasound), do not indicate kidney disease.
- Values of < 60 mL/min which are persistent (present for ≥ 3 months) indicate a reduction in kidney function.
- A single isolated measurement < 60 mL/min does not indicate CKD, but does reflect reduced kidney function. Further follow up is required, with the frequency and interval of follow-up dictated by clinical circumstances.

○ Note: acute illness, exercise, diet and/or hydration may transiently affect kidney function estimates or degree of albuminuria/proteinuria. If in doubt, repeat test.

- eGFR may also be unreliable in patients on specific diets (e.g., very high or very low protein), and in patients receiving medications that interfere with the excretion of creatinine (e.g., trimethoprim and sulfamethoxazole, cimetidine, angiotensin-converting enzyme inhibitors [ACEI], ciprofloxacin, fenofibrate).^{26,27}
- Note: extremes of height or weight (both directions), limb amputees, or age over 75 years will lead to less accurate eGFR values.²⁸ Seek guidance from an internist or nephrologist if interpretation or clarification is needed.

► Urinalysis and ACR Values and Interpretation

- Random urine tests for urinalysis and ACR:
 - Significant abnormalities: persistent white blood cells or red blood cells in the absence of infection or instrumentation; presence of cellular casts is always pathological. Hyaline casts are normal, and do not indicate pathology.
 - Urine ACR is the preferred method to screen protein in the urine.
 - ACR elevation (> 3.0 mg/mmol) on 2 out of 3 serial tests performed 1 week to 2 months apart indicates micro-vascular disease +/- glomerular disease.
 - ACR may be unreliable in some patients due to acute illness, vigorous exercise, poorly controlled hypertension, or poorly controlled blood glucose. Repeat testing when in doubt.
- Urine test abnormalities, even with persistent eGFR values ≥ 60 mL/min, indicate abnormal kidney function, either as an isolated condition or as a feature of systemic disease.
- 24-hour urine collections for CKD are not necessary in most cases. If considering, discussion with a nephrologist or internist is suggested.
- ACR is the method that allows one to test for albumin presence in quantities above normal but below the detectable range on standard dipsticks. In the past, the word **microalbumin** has been used; however, recent guidelines and consensus from laboratories have recommended abandoning this term and to quote the ACR value instead.¹
- Serial ACR tests can be performed by most laboratories.
- For equivalence of dipstick protein measurements, ACR and protein/creatinine ratios (PCR), see table 2 below. ACR is the preferred and dominant method.

Table 2. Interpretation of urine values to assess albuminuria and proteinuria

Categories	ACR (mg/mmol)	Protein reagent strip	PCR (mg/mmol)
Normal to mildly increased	< 3.0	Negative to trace	< 15.0
Moderately increased	3.0 - 30.0	Trace to +	15.0 - 50.0
Severely increased	> 30.0	+ or greater	> 50.0

► Interpretation Notes

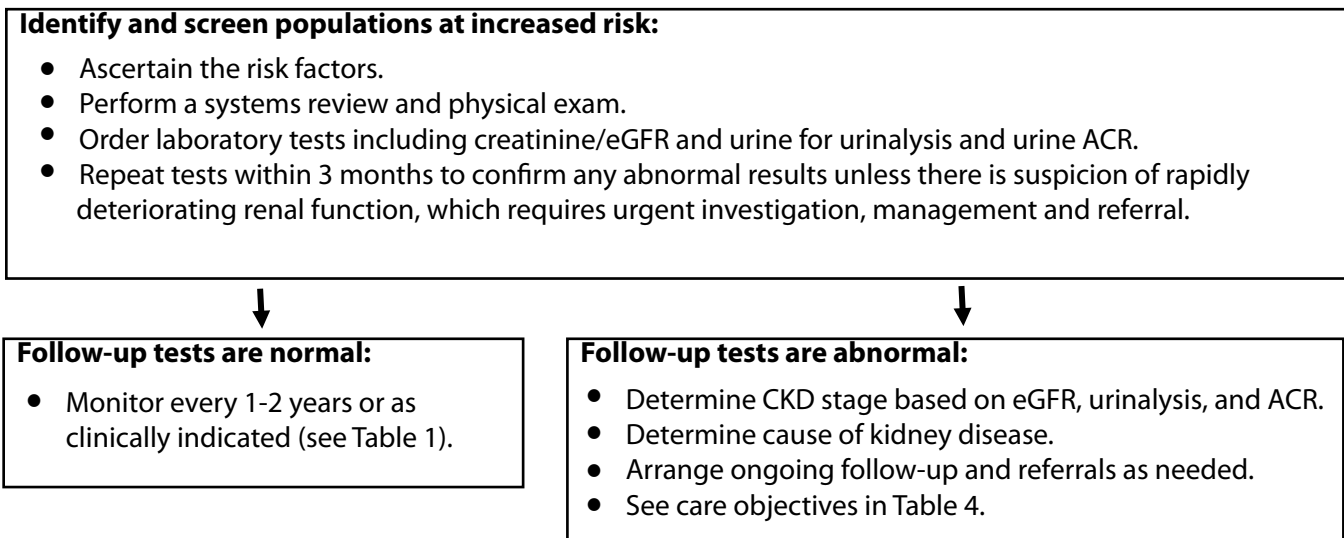
Appreciate the fluctuating nature of kidney function, for reassurance and appropriate goal setting. If baseline tests are abnormal or subsequent tests are significantly different from baseline, confirm by repeat testing, in a well hydrated state. Exercise, diet, and/or hydration status may affect kidney function estimates or urine albumin measurements.

► Follow-up of Test Results

Normal results: repeat every 1-2 years or as clinically indicated and monitor blood pressure.

Abnormal results: confirm and evaluate as per Figure 1 below:

Figure 1. Flow diagram for evaluating and managing patients with suspected CKD



► Staging of CKD

Risk staging of kidney disease is important for care planning and patient management. Risk is determined based on **Cause, eGFR, and ACR, or CGA**. See Figures 1 above and 2 below. Further details on risk determination is available in the Kidney Disease Improving Global Outcomes (KDIGO) CKD management guideline at www.kdigo.org/home/guidelines/.¹

► Referral Recommendations

Referral to specialist/nephrologist is suggested in the following circumstances shown in Table 3 below.

Table 3. Referral recommendations

<ul style="list-style-type: none">• Presence of active urine sediments (red blood cell casts or cellular casts ± protein), constitutional symptoms, or unexplained severity of kidney dysfunction.• AKI or abrupt sustained fall in eGFR.• GFR < 30 mL/min.• Persistent finding of ACR >30 mg/mmol.• Rapid and sustained deterioration in kidney function (a decline of eGFR >10-15% within 12 month period) warrants urgent referral to a nephrologist or internist, irrespective of eGFR values.• Progressive CKD.• CKD and hypertension refractory to treatment.• Persistent abnormalities of serum potassium.• Hereditary kidney disease.• Where there is no obvious etiology for kidney disease and primary care provider believes knowing etiology may impact care plan. Note: occasionally screening for etiology will identify serious systemic disease or early stages of acute illness.• Preparation for kidney replacement treatment requires at least 12 months, so referral to a nephrologist and team for thorough education about kidney replacement therapy options should take this into account.
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Figure 2. Referral decision making by estimated glomerular filtration rate (eGFR) and albuminuria

				Urine ACR categories		
				Description and range		
				A1	A2	A3
				Normal to mildly increased <3mg/mmol	Moderately increased 3-30mg/mmol	Severely increased >30mg/mmol
eGFR categories (mL/min/1.73m ²) Description and range	G1	Normal or high	≥90		Monitor	Refer*
	G2	Mildly decreased	60-89		Monitor	Refer*
	G3a	Mildly to moderately decreased	45-59	Monitor	Monitor	Refer
	G3b	Moderately to severely decreased	30-44	Monitor	Monitor**	Refer
	G4	Severely decreased	15-29	Refer*	Refer*	Refer
	G5	Kidney failure	<15	Refer	Refer	Refer

Notes: This figure is designed to reflect the risk of progression by intensity of colouring, with green boxes as lowest risk stage and bright red boxes as highest risk stage. Monitoring and referral is dependent on clinical situation. Individual circumstances will dictate referral or monitor decision.

*Referring clinicians may wish to discuss with their nephrology service depending on local arrangements for monitoring or referring.

**The instance of monitoring in red box (A2 and G3b) is not an error. While an admittedly high risk box may not warrant specialist intervention. If in doubt, telephone consultation with nephrologist or internist recommended.

Adapted from KDIGO CKD Work Group. KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. *Kidney Inter., Suppl.* 2013;3:1–150.

Management

► General Care Principles

General care principles for the care of patients with chronic disease, including CKD, call for individualized, patient-centred care, use of patient registries, organized system recalls, and effective patient record management (see *Associated Document: Chronic Kidney Disease Flow Sheet*). The care of CKD and other chronic diseases can be improved by the implementation of regularly scheduled reviews of clinical and laboratory parameters.

Engaging the patient and family and/or caregivers in discussions and care planning is key to chronic disease management, including for promotion of prevention and lifestyle changes that can slow or delay the onset of ESRD or need for RRT. See the patient resource section and the Kidney Foundation of Canada's *Living with Kidney Disease* patient manual available at www.kidney.ca.

Patients benefit from inclusion in multidisciplinary clinics, for prevention, education and management perspectives. It is recommended that primary care physicians seek opportunities within their communities to enable access to multidisciplinary clinics, including by telehealth.²⁹⁻³¹

► Management Plan: Care Objectives and Targets

Physicians can develop individualized care objectives for patients with CKD (see Table 4) as part of overall evaluation and management (see Appendix A: *Summary Evaluation and Management of CKD patients*). Since CKD often co-exists with hypertension, diabetes and CVD, assessments and management can be streamlined. Explaining the linkage between these conditions and how treating one condition benefits others may lessen the psychological impact of several separate diagnoses.³² Depending on the level of kidney function and complexity of therapy required, an interdisciplinary renal team may be useful to achieve care objectives.

Table 4. Care objectives and targets for CKD

Care	Objective	Target
Avoid Acute Kidney Injury	Avoidance of situations where AKI is likely to occur is important. Transient insults to the kidney may result in a change in trajectory of stable kidney function. Hold ACEI, ARB and diuretics if patient receiving dye, has acute illness with dehydration, or is having surgery.	Minimal number of AKI events, where AKI = increase in Cr by >26µmol/L.
Blood pressure	Measure and record at diagnosis and at every visit thereafter. See BC guideline: <i>Hypertension - Diagnosis and Management</i> at BCGuidelines.ca.	<ul style="list-style-type: none"> • Blood pressure < 140/90. • ACEI or ARB recommended in addition to other drugs.*
Kidney function measurements	Obtain regular measurements of Cr/eGFR (at least q 6 months) and after any change in medications (e.g. ACEI, ARB, or diuretics), medical intervention, or clinical status.	Stability of kidney function or < 10-15% decline in eGFR annually.
Urine testing	ACR every 6-12 months or as clinically indicated.	<ul style="list-style-type: none"> • Reduce abnormal values, or ensure stability from baseline. • ACEI or ARBs recommended.*
Monitor potassium	<ul style="list-style-type: none"> • Measure after change in medications, medical intervention, or clinical status with particular attention to K+. • Check Cr and K+ prior to starting ACEIs or ARBs, within 7-14 days of starting, and within 7-14 days after dose increase. • Cr rise >20% or eGFR decrease >15% after dose increase should be followed by further measurements within 7-14 days. 	K+ < 5.5
CVD risk assessment & lipid profiles	<ul style="list-style-type: none"> • Calculate & record CVD risk. See BC guideline: <i>Cardiovascular Disease – Primary Prevention</i> at www.BCGuidelines.ca. • Manage in accordance with relevant guidelines (note: KDIGO lipid guidelines). • Check lipids once to establish baseline and after therapy x 1. • After LDL reduction achieved, regular monitoring of lipids may not be necessary. 	<ul style="list-style-type: none"> • Reduce risk in those at high risk. • Consider use of statins and lipid lowering strategies irrespective of LDL levels.
Diabetes: Blood glucose control over time	<ul style="list-style-type: none"> • Measure A1C q 3-6 months or as clinically indicated. • Long-acting sulfonylureas may be associated with hypoglycemia with unstable eGFR, especially those below 45. If recurrent hypoglycemia, or unstable eGFR consider using short-acting sulfonylureas or non-sulfonylureas. • In those with unstable eGFR or acute changes in clinical condition, metformin should be held, avoided, or reduced. 	A1C: ≤ 7.0% (0.07). *typically; may not be appropriate for all populations. See BC Guideline: <i>Diabetes Care</i> at BCGuidelines.ca.
Weight & nutrition	Record weight and body mass index on each visit for comparison.	Adequate nutrition and body mass index near ideal (18.5-24.9).†
Smoking	Encourage patient to stop smoking, enquire at every visit, support when receptive	Complete smoking cessation.
Assessment of conditions associated with CKD	Measure at least annually (more frequently with advanced CKD): <ul style="list-style-type: none"> • CBC and iron profiles (percent iron saturation). • Mineral metabolism (calcium, phosphorus). • Nutrition profile (albumin). 	<ul style="list-style-type: none"> • Hgb within normal range for sex if not on ESA. Hgb ≥ 95- 115 g/L if on ESA treatment • Percent iron saturation ≥ 20%. • Calcium 2.2-2.5 mmol/L. • Phosphorus 0.75-1.4 mmol/L. • Albumin in normal range.
Vaccinations	<ul style="list-style-type: none"> • Influenza vaccine annually. • Pneumococcal vaccine with once-only revaccination five years after initial vaccination. See BC Centre for Disease Control Immunization Manual at www.bccdc.ca. 	Prevention of communicable disease
Awareness of Hepatitis B risk	Immunization at a higher eGFR is more likely to result in seroconversion if patient is being considered for hemodialysis. Screening and vaccination in consultation with nephrology team.	Seroconversion, prevention of Hep B (seroconversion rate higher if immunized early). ³³
Awareness of drugs in CKD	<ul style="list-style-type: none"> • Reduce risk of acute or chronic deterioration of kidney function. • Adjust drugs according to kidney function. Use eGFR. • Note the increased probability of drug interactions in CKD. 	Avoidance of aminoglycosides, NSAIDs, COX-2 inhibitors, intravenous or intra-arterial radio-contrast studies unless essential.
Psychosocial health	Identify and address psychosocial problems (e.g., depression, grief) that affect the illness. Explain linkage of multiple conditions	Provide support and optimize self-management.
KEY: A1C=glycated hemoglobin (previously HbA1C); ACEI=angiotensin-converting enzyme inhibitor; AKI=Acute Kidney Injury; ARB= angiotensin receptor blockers; COX-2=cyclooxygenase-2; Cr= Creatinine; ESA=erythropoiesis-stimulating agent (e.g., erythropoietin or darbepoietin); HDL=high-density lipoprotein; K+=potassium, LDL=low-density lipoprotein; Hgb=hemoglobin; NSAID= non-steroidal anti-inflammatory drug		

* Reduction of proteinuria can be facilitated by the use of ACEI or ARBs. This has been shown to reduce the rate of progression of chronic renal insufficiency in hypertensive patients with diabetes or chronic glomerulonephritis.^{23,24,26}

† In severe CKD (eGFR < 15mL/min), weight loss may indicate a catabolic state and a possible need for dialysis.

Figure 3. Suggested frequency of evaluation (number of times per year) by eGFR and albuminuria category

				Urine ACR categories		
				Description and range		
				A1	A2	A3
				Normal to mildly increased <3mg/mmol	Moderately increased 3-30mg/mmol	Severely increased >30mg/mmol
eGFR categories (mL/min/1.73m ²) Description and range	G1	Normal or High	≥90	1 if CKD	1	2
	G2	Mildly decreased	60-89	1 if CKD	1	2
	G3a	Mildly to moderately decreased	45-59	1	2	3
	G3b	Moderately to severely decreased	30-44	2	3	3
	G4	Severely decreased	15-29	3	3	4+
	G5	Kidney failure	<15	4+	4+	4+

Notes: This figure is designed to reflect the risk of progression by intensity of coloring, with green boxes as lowest risk stage and bright red boxes as highest risk stage.

The numbers in the boxes are a guide to the frequency of regular patient evaluation **and recommend the number of times per year that patients should be evaluated**, either in person or by reviewing patient history and lab results. Frequency of evaluation/visits is intended to be conducted using shared care principles, and individualized to patient circumstances. Numbers in the boxes are not recommendations for reordering lab tests; please see lab test section and Table 4 for recommendations on number of times per year for specific lab tests. Individual circumstances will dictate variations in frequency of patient evaluation/visits.

Adapted from Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. *Kidney inter., Suppl.* 2013;3:1–150.

► Additional Caveats and Practice Points for Goal Setting

When setting goals with your patient, consider the following points:

Cardiovascular/blood pressure

- Management of blood pressure has been shown to reduce risk of complications and mortality rates.
 - The elderly are at risk of adverse events with aggressive blood pressure management, so individualization is recommended. **Note: escalating doses of ACEI or ARB are not recommended in this population.**
 - Inhibition of the renin angiotensin system with ACEI or angiotensin receptor blockers (ARBs) has been shown to be very effective. Diuretics, β-blockers, and/or calcium channel blockers may also be required since most patients need more than two medications to reach desirable values.³⁴ See BC Guideline: *Hypertension – Diagnosis and Management*.
- Every adult with kidney disease may be at increased risk of CVD.^{5,7,9} Assess patients for CVD risk factors. See BC Guideline: *Cardiovascular Disease - Primary Prevention*.³⁵
- In the population with CKD, statins have demonstrated benefit in reducing atherosclerotic events. For patients at high risk of atherosclerotic events, the 2013 KDIGO guidelines recommend lifestyle changes (e.g., smoking cessation) and cholesterol-lowering treatment with low dose statin therapy, without target levels of low-density lipoprotein (LDL).¹ Reduction of LDL from baseline irrespective of the value is the goal. Note: see KDIGO Lipid Management guideline for caveats at kdigo.org/home/guidelines/lipids/.³⁹
- The BC Guideline for *Cardiovascular Disease – Primary Prevention* provides guidance related to statin therapy.³⁵ **Note: it recommends that physicians consider statin therapy as a second-line intervention only after evaluating the risks and benefits objectively, by having an individualized discussion with the patient.**

Patient Safety

- Nephrotoxic medications (e.g., non-steroidal anti-inflammatory drugs [NSAIDs], cyclooxygenase-2 [COX-2] inhibitors, aminoglycosides) should be avoided or used with caution in patients with any degree of CKD, as indicated by eGFR or ACR. Kidney function should be monitored if they are used.
- Intravenous or intra-arterial dye use poses a risk of acute kidney injury in patients with CKD.^{36,37} If imaging is required, determine if alternate imaging techniques are appropriate, in consultation with radiology. If the procedure is medically necessary, contrast may be given, according to a published protocol, or in consultation with nephrologist.
 - Note: cessation of ACEI, ARB and diuretics, as well as metformin are recommended prior to procedures, as is monitoring of creatinine pre and post dye.
- Patients with CKD are at high risk of further AKI with volume contraction, (e.g., nausea, vomiting, diarrheal illnesses), or the use of certain bowel preparations. It is recommended to hold ACEI, ARB and diuretics in these circumstances if lasting > 24 hours.
- Review medication list, identify medications excreted by the kidneys (e.g., metformin, digoxin lithium, and novel anticoagulants) and adjust dosages as appropriate or use alternate treatment.³⁸

► Lifestyle and Patient Self-Management

People with CKD have better outcomes if they are active in the management of their own condition and this should be encouraged. Denial, often associated with grief reaction, is common in patients with chronic disease affecting a vital organ. Changes in diet, smoking and exercise habits are important, as is understanding medications and their usefulness. Multidisciplinary renal teams, working with patients and primary care physicians, are often skilled in helping people with these changes.

To support patient self-management, the physician should:

- Support patients through the process of accepting the diagnosis of a chronic illness.
- Ensure that patients understand the implications of the diagnosis and their role in self-management.
- Help patients identify a support team.
- Involve patients in defining the best possible goals for care, including lifestyle modifications such as smoking cessation, healthy diets, weight management, exercise, and social support.
- Encourage patients to monitor their own progress through the use of diaries or logbooks to track clinical values, and self-monitor blood pressure (and blood glucose where appropriate).
- Reinforce lifestyle modifications at each visit.
- Explain and discuss the results of investigations and consultations.
- Identify community resources that can provide patients with the information, skills and support needed to understand and manage their condition, and direct or refer patients to those resources.
- Patient self-management resources are listed in *Associated Document: Chronic Kidney Disease: A Guide for Patients*.
- Encourage patients with CKD to consider advance care planning and their goals for future care, including for the end of life.
 - Provincial advance care planning resources are available at www.gov.bc.ca/advancecare
 - BC Guidelines on palliative care are available at www.bcguidelines.ca/submenu_palliative.html
 - BC Renal Agency information about end of life care is available at www.bcrenalagency.ca/healthcare-professionals/end-life-resources

Resources

► References

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▶ **Diagnostic code**

585 (chronic renal failure)

▶ **Appendix**

Appendix A – Summary of Evaluation and Management of CKD Patients

▶ **Associated Documents**

Chronic Kidney Disease - Physician Resources

Chronic Kidney Disease Flow Sheet

Chronic Kidney Disease – Information for Patients

This guideline is based on scientific evidence current as of the Effective Date.

This guideline was developed by the Guidelines and Protocols Advisory Committee, approved by the British Columbia Medical Association (Doctors of British Columbia), and adopted by the Medical Services Commission.

<p>The principles of the Guidelines and Protocols Advisory Committee are to:</p> <ul style="list-style-type: none">• encourage appropriate responses to common medical situations• recommend actions that are sufficient and efficient, neither excessive nor deficient• permit exceptions when justified by clinical circumstances	<p>Contact Information: Guidelines and Protocols Advisory Committee, PO Box 9642 STN PROV GOVT Victoria BC V8W 9P1</p> <p>Email: hlth.guidelines@gov.bc.ca Website: www.BCGuidelines.ca</p>
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Disclaimer

The Clinical Practice Guidelines (the “Guidelines”) have been developed by the Guidelines and Protocols Advisory Committee on behalf of the Medical Services Commission. The Guidelines are intended to give an understanding of a clinical problem, and outline one or more preferred approaches to the investigation and management of the problem. The Guidelines are not intended as a substitute for the advice or professional judgment of a health care professional, nor are they intended to be the only approach to the management of clinical problem. **We cannot respond to patients or patient advocates requesting advice on issues related to medical conditions. If you need medical advice, please contact a health care professional.**

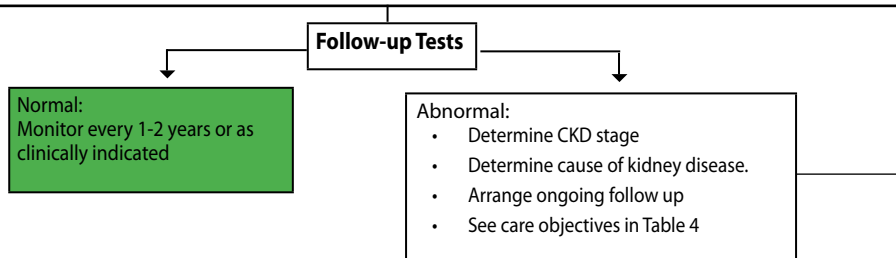


Appendix A. Summary of Evaluation and Management of CKD patients

Key Recommendations:

(i) Identify and screen at risk populations for evaluation of CKD

Populations at increased risk		
<ul style="list-style-type: none"> Diabetes Family history 	<ul style="list-style-type: none"> Hypertension High risk ethnicity 	<ul style="list-style-type: none"> CVD
Evaluation		
<ul style="list-style-type: none"> Perform a systems review and physical exam. Family history. Order laboratory tests including creatinine/eGFR, urine ACR. Repeat within 3 months to confirm abnormal results unless symptoms warrant urgent investigation, management and referral. 		



(ii) Evaluation and prognosis

- Measure both eGFR and urine ACR
- Determine Cause

				Urine ACR categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<3mg/mmol	3-30mg/mmol	>30mg/mmol
(mL/min/1.73m ²) Description and Range	G1	Normal or High	≥90	Monitor	Monitor	Refer
	G2	Mildly decrease	60-89	Monitor	Monitor	Refer
	G3a	Mildly to moderately decrease	45-59	Monitor	Monitor	Refer
	G3b	Moderately to severely decrease	30-44	Monitor	Monitor	Refer
	G4	Severely decrease	15-29	Refer	Refer	Refer
	G5	Kidney failure	<15	Refer	Refer	Refer

(iii) Develop individualized management plan

Stage	Other Results	Recommendations
	If high risk group: Diabetes, Hypertension, CVD, Family history, High risk ethnicity	Urine ACR, Creatinine/eGFR, Blood Pressure Every 1-2 years
Monitor	Determine cause of CKD. Consider - Renal ultrasound - Urologist referral for isolated hematuria (*not discussed in guideline) - Advise Nephrologist/internist referral if Urine ACR increasing, eGFR declining > 10% annually. Serum K+ repeatedly > 6.0 mmol/L.	Annual review
Monitor	In addition to management advice in guideline: Advise nephrologist/internist referral if: Urine ACR increasing or eGFR declining > 10% annually	Every 6 months
Refer	See management advice Recommend referral to Nephrology	Every 4 months OR Refer to Nephrology
Monitor	See management advice	Every 4 months
Refer	See management advice	Refer to Nephrology

(iv) Ensure appropriate follow-up and timely referral to specialist.

Adapted from Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. *Kidney inter., Suppl.* 2013;3:1-150.