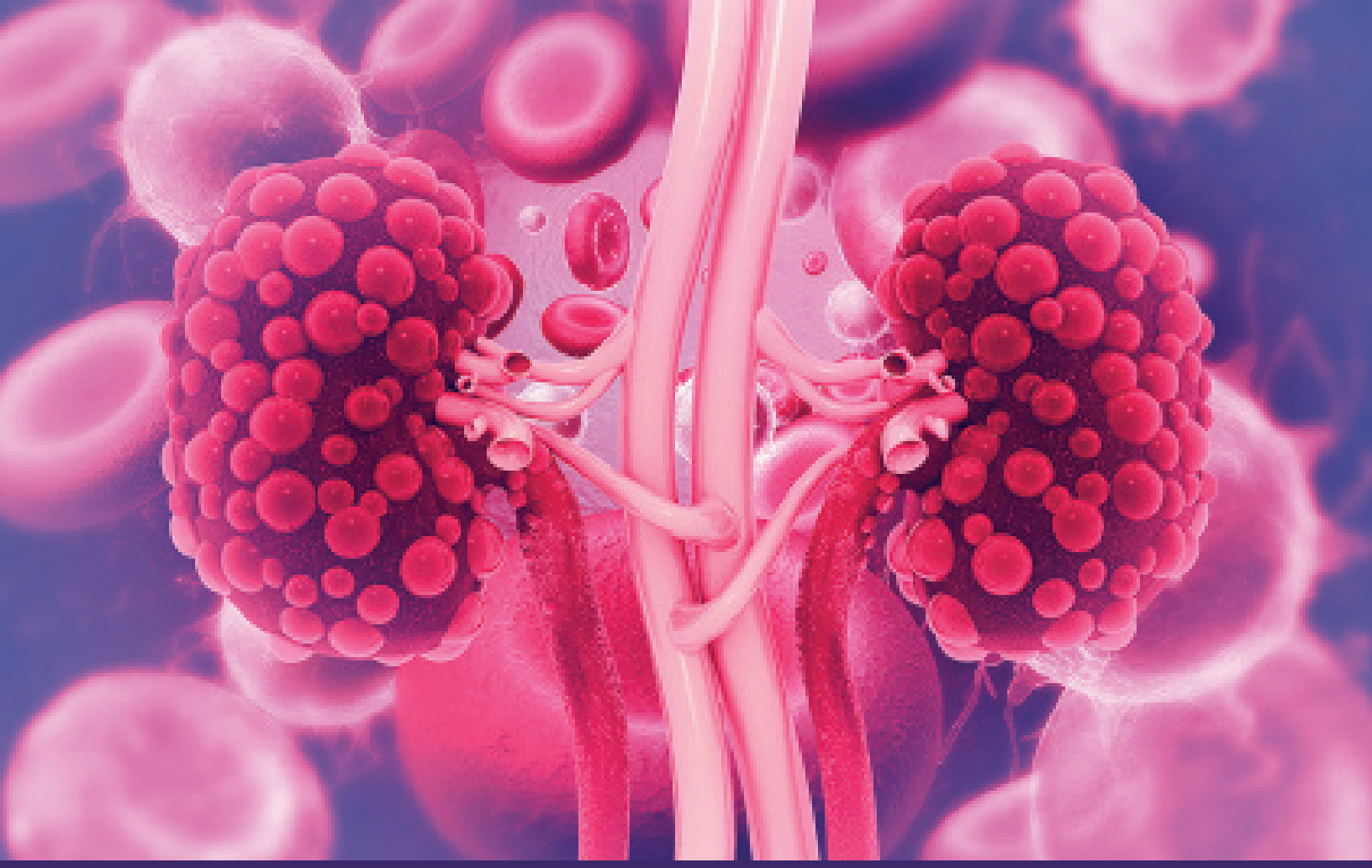

PROVINCIAL STANDARDS & GUIDELINES

BCRenal
Provincial Health Services Authority

Best Practices: Care of Patients with Autosomal Dominant Polycystic Kidney Disease in BC's Kidney Care Clinics

Created 2019

Approved by the BC Renal Kidney Care Committee and the BC Renal ADPKD Advisory Group

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This paper is a supplement to the Best Practices: Kidney Care Clinics document developed by BC's Kidney Care Clinic Committee and available at: www.bcrenal.ca ▶ Health Professionals ▶ Clinical Resources ▶ Chronic Kidney Disease (CKD) ▶ Kidney Care Guidelines

IMPORTANT INFORMATION

This BC Renal guideline/resource was developed to support equitable, best practice care for patients with chronic kidney disease living in BC. The guideline/resource promotes standardized practices and is intended to assist renal programs in providing care that is reflected in quality patient outcome measurements. Based on the best information available at the time of publication, this guideline/resource relies on evidence and avoids opinion-based statements where possible; refer to www.bcrenalagency.ca for the most recent version.

For information about the use and referencing of BC Renal guidelines/resources, refer to http://bit.ly/28SFr4n.

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1.0 Background & Purpose of Document

BC has a robust and well-established network of kidney care clinics (KCCs) with many strengths and expertise in the management of chronic kidney disease (CKD) (refer to *Best Practices: Kidney Care Clinics*). This includes:

- Interprofessional team environment where different practitioners offer different skills, the combination of which improves the offered care;
- Shared resources and clinical pathways that allow for standardization and consistency of care across diverse practice settings in BC;
- Flexibility to implement KCC services in a way that best suits the local practice environment; and
- Expertise in developing individualized care plans, including active participation by patients in developing these plans and self-managing their kidney disease.

Autosomal dominant polycystic kidney disease (ADPKD) is the most common inherited kidney disorder, affecting between 1-2.5/1000 individuals.[1] Although exact provincial numbers are lacking, this estimate would suggest there are approximately 4,600 to 10,000 British Columbians living with the disease. ADPKD is marked by progressive cyst proliferation and growth but the disease course is quite variable ranging from indolent disease with little impact on kidney function to more rapidly progressive disease resulting in end-stage kidney disease (ESKD) at a young age.[2] Of patients with an identifiable etiology of ESKD, ADPKD is the 4th leading cause of ESKD in Canada.[3]

As patient evaluation and treatment strategies have evolved and become more complex, it is recommended that patients with suspected or confirmed ADPKD be referred to a nephrologist as soon as possible for assessment and initiation of relevant treatment strategies.[4] At the same time, several needs assessments and practice surveys in BC have determined that substantial variability in ADPKD management exists in terms of location of care, services offered, provider familiarity with new management strategies, and the application of recommended treatments.

The **purpose of this document** is to outline how the existing experience and strong network of KCCs across the province can be utilized as the framework for the care of patients with ADPKD. This framework will enable consistent and sustainable delivery of best-practices in ADPKD care while still operating within the scope of existing KCC services.

While the majority of the concepts outlined in the *Best Practices: Kidney Care Clinics* document apply to patients with ADPKD, this document focuses on variations in practice and considerations specific to the care of ADPKD patients. The outline and headings used in this document follow those used in the *Best Practices: Kidney Care Clinics* document.

2.0 Kidney Care Clinic Goals for Patients with ADPKD

ADPKD considerations

- ADPKD is a highly variable disease in terms of clinical outcomes, rates of renal progression, burden of symptoms, complications and treatment pathways.
- Although primarily a kidney disease, ADPKD is a multisystem disorder with implications beyond an individual's kidney health.
- Being a genetic disease, ADPKD carries implications that affect entire families across

multiple generations.

- ADPKD is a rapidly evolving field wherein understanding of the natural history of the disease, as well as evaluation and treatment strategies for individual patients have changed greatly over recent years and continues to evolve.
- Tools to evaluate and prognosticate kidney outcomes such as assessment of kidney expansion/kidney volumes and imaging-based classifications are becoming more specialized and complex.
- Treatment strategies continue to emerge, most recently vasopressin antagonism, a treatment with a host of patient selection, symptom management and monitoring implications.

Target population of KCC patients with ADPKD

The tools and protocols in this document are applicable to all patients with ADPKD. Depending on individual circumstances, any ADPKD patient could be a candidate for KCC care, but the target population that would be expected to particularly benefit from the interdisciplinary services of the KCCs are patients with rapidly progressing ADPKD, those requiring specialized treatments/support, and/or those with a high burden of symptoms or complications and their families.

Goals for KCC patients with ADPKD

KCCs work collaboratively with patients with ***rapidly progressing ADPKD and/or a high burden of symptoms or complications*** and their families to provide evidence-based, interprofessional care which aims includes:

1. Early identification and accurate diagnosis and prognostication of kidney outcomes and disease trajectory.
2. Selection of appropriate ADPKD management and treatment strategies throughout a patient's disease course.
3. Screening for complications, monitoring and managing symptoms and treatment of comorbidities.
4. Attention to the unique implications of inherited kidney disease that has impacts on multiple generations as well as a patient's current or future family planning.
5. Support for planning and preparation for management of later stage CKD as outlined for all other CKD patients.
6. Focusing on empowering patients and families throughout these steps to maximize active participation in care plans and disease self-management.

3.0 Referral of Patients with ADPKD to KCC and Repatriation to Primary Care

Because the majority of concepts described in the Best Practices: Kidney Care Clinics document also apply to ADPKD patients, the next sections focus on variations in practice specific to the care of ADPKD patients.

3.1 Referral criteria

While the management strategies contained in this document are applicable to all patients with ADPKD, the patients mostly likely to benefit from the interdisciplinary expertise available within Kidney Care Clinics include:

- Patients with rapidly progressing ADPKD
- Patients with a high burden of symptoms or complications
- Patients with treatments that require more intensive monitoring and support (e.g. vasopressin antagonism)
- Any other ADPKD patients whose clinicians expect would benefit from the interdisciplinary environment and approach of the KCC

3.2 Criteria for Repatriation to Nephrologist/Primary Care

Refer to *Best Practices: Kidney Care Clinics* document.

4.0 Target KCC waiting times for patients with ADPKD

Refer to *Best Practices: Kidney Care Clinics* document.

5.0 Tasks and Timelines for Patients with ADPKD

5.1 KCC Patient Flow Algorithm

Refer to *Best Practices: Kidney Care Clinics* document.

5.2 KCC Milestones

Refer to *Best Practices: Kidney Care Clinics* document.

5.2.1 Referral to KCC

Refer to *Best Practices: Kidney Care Clinics* document.

5.2.2 Orientation to KCC

For general information regarding orientation of KCC patients, refer to *Best Practices: Kidney Care Clinics* document. Additional resources that may benefit patients with ADPKD are listed below.

Additional resources for patients with ADPKD

Links to all resources are on the BC Renal website at: BCRenal.ca ▶ Health Info ▶ Kidney Care ▶ Polycystic Kidney Disease.

- Your Genes, Your Kidneys and You, Helpful Information about Inherited, Autosomal Dominant Genetic Conditions that Can Cause Kidney Cysts (English, French and Chinese)
- Adults: Polycystic Kidney Disease: What Every Family Needs to Know, PKD Foundation of Canada (English)
- KCC: Learning Needs Questionnaire for New Patients with ADPKD

5.2.3 KCC team assessment, education, goal-setting & treatment planning

Refer to *Best Practices: Kidney Care Clinics* document for a general overview of assessment, education, goal-setting and treatment planning. Most of these concepts also apply to ADPKD patients. The focus of this section is on additional considerations specific to **ADPKD and its management.**

KCC team assessment and education

In addition to the general topics covered in *Best Practices: Kidney Care Clinics*, the following ADPKD specific topics are suggested:

- Disease-specific education about the ADPKD disease process and its management. This is facilitated by the provision of ADPKD-specific materials at the orientation visit (section 5.2.2).
- An ADPKD specific educational needs assessment (as part of the initial patient learning needs assessment). In addition to general knowledge and self-management, this needs assessment covers the additional domains of understanding of

the ADPKD disease process, specific management options and genetic/family planning implications.

Goal setting and treatment planning

Refer to *Best Practices: Kidney Care Clinics* document.

5.2.4 Active Monitoring, Treatment and Psychological/Social Support

5.2.4.1 Frequency of KCC Visits for Patients with ADPKD

Given that much of the assessment and management of ADPKD occur prior to substantial changes or decline in GFR, ADPKD patients may need to be seen more frequently than other KCC patients at a similar GFR range.

Table 1 shows the general guidelines for visit frequency outlined in the Best Practices: Kidney Care Clinics document while Table 2 provides guidelines specific to ADPKD patients.

Table 1: KCC Visit Frequency based on Severity & Stability of Kidney Disease (in-person or via telehealth)

KCC PATIENTS (GENERAL GUIDELINES)	VISIT FREQUENCY
Stable G3a (45-59 mL/min)	Annually
Stable G3b (30-44)	Q6mo
Stable G4 (15-29)	Q3mo
G5 (<15)	Q2 mo

Table 2: ADPKD-specific Visit Frequency Guidelines

PATIENTS WITH ADPKD	VISIT FREQUENCY
Not on tolvaptan	Q6-12mo until significant deterioration in kidney function (GFR <30), then as per table above.
On tolvaptan*	Should be seen within several weeks of initiation (to monitor & manage side effects), then Q3 months once stabilized.

* There are many other considerations to ADPKD management than just treatment with tolvaptan. This has been specifically listed as a determining factor for frequency of visits due to the intensive monitoring and support required with this treatment, but other management factors will influence the frequency of visits as well.

5.2.4.2 Renal Imaging, Genetic Testing and Screening for Patients with ADPKD

There are additional investigations related to prognostication of renal trajectory in ADPKD as well as screening for extrarenal complications that are suggested for ADPKD patients.

Much of this information has been adapted from other guidelines of ADPKD management.[4,5]

Renal imaging

It is suggested that all patients with ADPKD have an assessment of renal size as part of their initial assessment. The objectives of this assessment are to provide prognostication to determine predicted rate of renal progression, and to assist in treatment decisions. Other tools to predict progression in ADPKD are available and reasonable to perform, but assessment of renal size, especially total kidney volume (TKV) appears to be the most robust clinical prediction tool in ADPKD so use of this assessment is highlighted in this document.

For recommendations about which imaging test to perform and when, refer to Approach to Renal Imaging in ADPKD document. Key considerations informing this approach are maximizing available information, using tests that are feasible locally and avoiding the need for unnecessary tests.

If TKV is being measured, the preferred method of TKV assessment is the ellipsoid volume equation. Online calculators are also available to assist in this calculation (Online tool for TKV calculation and Mayo imaging classification of ADPKD)

If CT is being used solely for the purpose of TKV measurement, the "UBC Ultra-Low-Dose CT protocol for assessment of total kidney volume in ADPKD" is recommended to avoid unnecessary radiation exposure. Not all patients require serial or routine repeat measurements of renal size after an initial assessment has been performed. If serial imaging is being performed for prognostication/assessment of progression, there should be an interval of at least 1 year between tests or ideally longer. Shorter intervals make it difficult to determine the significance of differences between TKV results.

It is known that trajectories of TKV are not necessarily linear over an individual's life. For this reason, serial imaging for the purpose of assessing response to treatment should not be pursued.

Genetic testing

Based on existing data, genetic testing is not necessary for diagnosis or selecting treatment options for patients with a confirmed diagnosis of ADPKD.

There are specific situations, however, where genetic testing may be helpful including:

- In those without family history, and without clearly characteristic morphology of ADPKD;
- In those with unusual radiographic appearances where other cystic diseases need to be excluded;
- Workup of family members being considered for transplant; and
- For family planning, especially where it may influence decision to conceive or pursue preimplantation diagnosis

If genetic testing is being pursued, at present this must be done via a medical genetic referral: http://www.bcrenal.ca/resource-gallery/Documents/Genetic_Testing_and_Referral_Criteria_for_ADPKD.pdf.

Screening for extra-renal complications

Intracranial aneurysm (ICA) screening

Aneurysms are more common in ADPKD (9-12%) than in the general population (2-3%) The only definitive risk factor is family history of aneurysm (risk is 15% or more if a family history of aneurysms exists). Once present, aneurysms in patients with ADPKD have the same risk of rupture as any other ICA; i.e., an established aneurysm in a patient with ADPKD is of no higher risk of rupture than an aneurysm in a person without ADPKD. In a minority of cases, a patient with an initial negative scan can develop aneurysms later in life (mean age at diagnosis ~50 years).

In many guidelines, it is recommended that individuals with a family history be screened for ICA, but the role of screening in individuals with no family history is unclear. This controversy is not because of any risk related to the screening imaging test, but rather from a desire to avoid unnecessary interventions and undue patient anxiety given the fact that most aneurysms discovered are small and carry a low risk of rupture.[6,7,8]

Suggested approach to ICA screening:

- Patients with family history of ICA or sudden/unexplained death should all be screened for ICAs.
- For patients with no family history, screening should be discussed with all patients. This discussion should highlight the above considerations about ICA testing, and the decision whether or not to screen should then be made in discussion with the patient.

If ICA screening is being performed:

- Either MRA (does not require gadolinium) or CTA can be used for this purpose. Clinical characteristics of the patient (such as risk of CT contrast or contraindications to MRI) may guide your choice of imaging.
- If an aneurysm is detected:
  - The patient should be referred for neurosurgical assessment regarding risk of rupture and role of intervention.
  - The frequency of follow-up imaging is to be determined by radiology/neurosurgery.
  - Aggressive risk factor medication is warranted for these patients (BP control, modification of CVD risk factors, smoking cessation).
- If no aneurysm is detected:
  - In a small percentage of those with an initial negative scan, aneurysms can develop later in life.
  - Patients with a family history of aneurysm should be offered re-screening 5-10 years after an initial negative scan.
  - The role of re-screening in patients with no family history and a negative scan is unclear, but this should be discussed on a case-by-case basis with patients. If repeat screening is being performed, it can be offered at the same interval of 5-10 years.

Screening of other extra-renal complications

We agree with the approaches as suggested by the summary from the KDIGO controversies conference[9], which are summarized in Table 3.

Table 3: Screening of Extra-Renal Complications[9]

MANIFESTATION	ASSOCIATED	% AFFECTED	SCREEN	COMMENT
Cardiac valve abnormalities	Yes	Mitral valve prolapse 25%	No	Screen only if cardiovascular signs/symptoms.
Pericardial effusion	Yes	Up to 35%	No	Screen only if cardiovascular signs/symptoms.
Extracranial aneurysms	Yes, case reports	Unknown	No	Clinicians should be aware of vascular phenotype in some patients.
Arachnoid cysts	Yes	8-12%	No	Possible increased risk for subdural hematoma.
Spinal meningeal cysts	Yes	1.7%	No	Rare cause of spontaneous intracranial hypotension.
Pancreatic cysts	Yes	10%	No	Usually asymptomatic.
Diverticular disease	Possibly in association with ESRD	~20-50% in ESRD	No	Increased incidence in patients who have reached ESRD.
Abdominal hernias	Yes	Unknown	No	
Seminal vesicle cysts	Yes	~40%	No	Does not correlate with abnormal semen parameters.
Male infertility	Unknown	Unknown	No	Abnormal semen parameters reported.
Bronchiectasis	Possibly	37% in one series versus 13% controls	No	Mild, no clinical consequence.
Congenital hepatic fibrosis	Yes, case reports, usually affecting only one generation within a family with ADPKD	Rare	No	Rare but potentially life-threatening; early diagnosis in siblings with ADPKD can be lifesaving with appropriate monitoring and treatment.

Family screening

Given the genetic nature of ADPKD, this is an important topic to discuss with all patients. The suggested first test for screening is a renal ultrasound.

There are specific considerations for screening of young children.

- The negative predictive value of ultrasound imaging (the most commonly used test) is poor at young ages. A positive test can diagnose the disease but often a negative one cannot definitively rule it out.
- Screening results in asymptomatic children are unlikely to result in any change in management.

Suggested approach to screening of children [10]:

- Screening of children should be discussed with all parents.
- Children <18 should have routine physical examinations including measurement of blood pressure for children >5 years of age. If they are asymptomatic and normotensive, it is reasonable to defer screening as it is unlikely to change management. If they have symptoms/ complications or hypertension, testing should be offered.
- Children in their late teens/early 20s who are asymptomatic and normotensive should be offered screening. These young adults should participate in the decision to screen or not.
- When screening is performed, the test of choice is a renal ultrasound.
- Positive predictive values for ultrasound diagnosis of ADPKD are quite good at all ages (see tables 4 and 5), but negative predictive values are poor at young ages. If screening is performed early in life, it is important to recognize that a negative test does not definitively rule out the disease. In such an individual, testing should be repeated later in life.[11]
- All individuals with a positive screen should be offered referral for nephrologic assessment.

See below for the performance of ultrasound imaging in the diagnosis of ADPKD in patients with a known family history of the disease. Note that positive predictive values are quite good even early in life, but especially before age 30, negative predictive values are not sufficient to definitively exclude the disease.

Table 4: Ultrasound Criteria for Diagnosis of ADPKD[11]

AGE (YEARS)	PKD1	PKD2	UNKNOWN ADPKD GENE TYPE
15-30	≥3 cysts* PPV, 100% SEN, 94.3%	PPV, 100% SEN, 69.5%	PPV, 100% SEN, 81.7%
30-39	≥3 cysts* PPV, 100% SEN, 96.6%	PPV, 100% SEN, 94.9%	PPV, 100% SEN, 95.5%
40-59	≥2 cysts in each kidney PPV, 100% SEN, 92.6%	PPV, 100% SEN, 88.8%	PPV, 100% SEN, 90%

Table 5: Ultrasound Criteria for Exclusion of ADPKD[11]

AGE (YEARS)	PKD1	PKD2	UNKNOWN ADPKD GENE TYPE
15-30	No renal cysts seen NPV, 99.1% SPEC, 97.6%	NPV, 83.5% SPEC, 96.6%	NPV, 90.8% SPEC, 97.1%
30-39	No renal cysts seen NPV, 100% SPEC, 96%	NPV, 96.8% SPEC, 93.8%	NPV, 98.3% SPEC, 94.8%
40-59	No renal cysts seen NPV, 100% SPEC, 93.9%	NPV, 100% SPEC, 93.7%	NPV, 100% SPEC, 93.9%

5.2.4.3 Treatment Protocols/Guidelines for Patients with ADPKD

Treatment with tolvaptan

At present tolvaptan is the only disease specific treatment indicated in ADPKD indicated to slow the progression of renal enlargement and decline in kidney function in patients with ADPKD.

Patient selection

Tolvaptan is not indicated for all patients with ADPKD, but is reserved for those at higher risk of rapid renal progression or documented renal progression due to ADPKD. Guidelines for patient selection are well outlined in the Updated Canadian Expert Consensus on Assessing Risk of Disease Progression and Pharmacological Management of Autosomal Dominant Polycystic Kidney Disease: https://journals.sagepub.com/doi/10.1177/2054358118801589 and these guidelines are mirrored in the Application for Tolvaptan in ADPKD.

Monitoring

There is mandatory hepatic monitoring for patients on tolvaptan. This is outlined in the lab requisitions for patients on tolvaptan (lab requsitions 1, 2, 3). This

monitoring occurs monthly for the first 18 months of treatment and every three months thereafter.

Additional considerations

- Treatment with tolvaptan can be complex; there are multiple considerations regarding patient selection, initiation, monitoring and dose adjustments. Patients on tolvaptan can benefit from the expertise of all providers on the KCC team (nephrologist, RN, dietitian, social worker and pharmacist).
- Refer to the summary of tools below for more detailed information around tolvaptan use.

Summary of tools with detailed information around tolvaptan use for use in BC:

- Application for Tolvaptan in ADPKD
- Tolvaptan: Frequently Asked Questions for Patients
- Tolvaptan: Frequently Asked Questions for Prescribers
- Tolvaptan: Pharmacy Information Sheet
- Diet Changes for Adults with Polycystic Kidney Disease Taking Tolvaptan (to reduce frequent urination)
- Lab Requisition for ADPKD Patients not on Tolvaptan
- Lab Requisition for ADPKD Patients on Tolvaptan: First 18 Months
- Lab Requisition for ADPKD Patients on Tolvaptan: After 18 Months.

Blood pressure management in ADPKD

For a more detailed review, refer to Supporting Evidence: Blood Pressure Monitoring and Targets in ADPKD and Supporting Evidence: Antihypertensive Agents in ADPKD.

The following approach is suggested for patients with ADPKD:

Blood pressure monitoring

- We suggest that, whenever possible, ADPKD patients should be taught to self-monitor blood pressure.
- 24-hour ambulatory blood pressure monitoring is a useful tool to diagnose hypertension early, to identify masked hypertension, and to detect any diminution of the normal fall in overnight blood pressure.

Blood pressure targets

- Patients with ADPKD who are younger than 50 years with eGFR > 60 mL/min/1.73 m^2 and without significant cardiovascular morbidities should have a target blood pressure ≤ 110/75 mm Hg (as measured by home blood pressure monitoring), recognizing that in some patients, an individual target may be needed.
  - ➔ In HALT-PKD Study A, most patients required ≥ 3 antihypertensive medications to reach the lower target blood pressure.
- For older patients or patients with more advanced CKD, limited data is available. Although evidence suggests that achieving blood pressures < 130/80 mm Hg (as measured using various methods in studies) is associated with lower left ventricular mass indices compared to higher blood pressures, further studies are needed to establish blood pressure targets in these populations.
- In all cases, blood pressure targets should be individualized. Considerations when making decisions about blood pressure targets should include patient-specific risks of adverse events and pill burden.

Choice of antihypertensive agent

- RAAS blockade with ACE-inhibitors or ARBs is generally recommended as first-line therapy for hypertension in ADPKD patients.
  - ➔ This recommendation is based on the postulation that RAAS activation plays a major role in the pathogenesis of hypertension in ADPKD.
  - ➔ There is limited evidence to support that RAAS blockade is superior to other antihypertensive classes for reducing ADPKD progression.
    - ○ However, findings from low-quality studies collectively do suggest that CCBs are associated with more rapid decline in renal function compared to RAAS blockade.
    - ○ Compared to other antihypertensive classes, RAAS blockade may be more effective in reducing proteinuria; however, the clinical relevance of proteinuria reduction in ADPKD is unclear.
  - ➔ ACE-inhibitors have been most commonly used than ARBs in studies and are the preferred first-line agents, but ARBs may be used if ACE-inhibitors are not tolerated.
- Based on the HALT-PKD studies, there is no role for dual RAAS blockade with an ACE-inhibitor and ARB.
- There are concerns that diuretics and CCBs may increase ADPKD progression based on their mechanisms of action. However, due to the absence of studies comparing them to placebo or to no treatment, there is currently no data to inform on whether these agents are harmful.
- There is limited data available to guide the choice of antihypertensive if RAAS blockade is not tolerated or if additional antihypertensive(s) are needed to achieve BP targets.
  - ➔ Due to the theoretical concerns about diuretic and CCB use in ADPKD, some experts suggest beta-blockers as the second-line agent of choice. However, there is limited data to support this.
  - ➔ In HALT-PKD Study A, thiazide diuretics and beta-blockers were added to RAAS blockade as second- and third-line agents, respectively. For patients who meet HALT-PKD Study A inclusion criteria (15-49 years old with eGFR > 60 mL/min/1.73m2), this may be a reasonable approach until further data is available.
- In all cases, antihypertensive regimens should be individualized. Considerations when making decisions about regimens should include the presence of comorbidities that are indications for specific antihypertensives, medication side effect profiles, CKD stage, and pill burden.

Lipid management in ADPKD

For a more detailed review, refer to Supporting Evidence: Lipid-Lowering Therapy in ADPKD.

The following approach is suggested for patients with ADPKD:

Until further evidence is available, we do not recommend statin therapy in ADPKD patients for the purpose of renoprotection. This recommendation is in line with those of several published ADPKD reviews/ guidelines.

However, statin or statin/ezetimibe therapy may be recommended to select ADPKD patients for prevention of cardiovascular disease. For this indication, general recommendations regarding lipid lowering therapy in CKD patients should be applied to patients with ADPKD. We favour using the 2013 KDIGO Clinical Practice Guideline for Lipid Management in Chronic Kidney Disease recommendations (https://kdigo.org/wp-content/uploads/2017/02/KDIGO-2013-Lipids-Guideline-English.pdf[9]) to guide lipid-lowering therapy in this population. Accordingly, we recommend statin or statin/ezetimibe therapy for primary prevention in

all ADPKD patients ≥ 50 years of age who do not have contraindications, regardless of serum lipid levels.

Lab work & lab follow-up protocols

The following 3 tables include general guidelines for lab work to be ordered, and frequency of tests. These are meant as general guidelines and can be modified as needed for individual patients.
As there is specified, mandatory monitoring that needs to occur for patients treated with tolvaptan, separate lists have been included for patients on this drug. Note that with tolvaptan the mandatory hepatic monitoring must occur monthly for the first 18 months, and thereafter can be done every 3 months; at this point a new requisition can be provided to the patient. This testing is outlined in Lab Requisition for ADPKD Patients not on Tolvaptan, Lab Requisition for ADPKD Patients on Tolvaptan: First 18 Months and Lab Requisition for ADPKD Patients on Tolvaptan: After 18 Months.

Table 6: Suggested Lab Tests and Frequency for ADPKD Patients Not on Tolvaptan

GFR (ml/min/1.73m^2)	≥ G3a ≥ 45	G3b 30-44	G4 15-29	GFR <15 or unstable
Na+, K+, Cl-, HCO3-, urea, creatinine	Q6 month	Q3 month	Q2 month	monthly
CBC (No ESA)	Q6 month	Q3 month	Q2 month	monthly
CBC, retic count (on ESA)	monthly	monthly	monthly	monthly
Ferritin, serum iron, TIBC, iron saturation (no ESA)	Q6 month	Q3 month	Q4 month	Q3 month
Ferritin, serum iron, TIBC, iron saturation (on ESA)	Q3 month	Q3 month	Q4 month	Q3 month
Albumin, Ca2+, PO4	Q6 month	Q3 month	Q2 month	monthly
AST, ALT, ALP, GGT, bilirubin, uric acid	Q6 month	Q6 month	Q4 month	Q3 month
iPTH	Q12 month	Q12 month	Q6month	Q3 month
Urine ACR, urine osmolality	Q6 month	Q3 month	Q4 month	Q3 month
HgbA1c (if diabetic)	Q6 month	Q3 month	Q4 month	Q3 month
24-hour urine for sodium, protein, creatinine, urea, osmolality. NOTE: Provide containers up to 6 L	Q12 month	Q12 month	Q12 month	Q12 month

Table 7: Suggested Lab Tests and Frequency for ADPKD Patients on Tolvaptan: First 18 Months

GFR (ml/min/1.73m²)	≥ G3a ≥ 45	G3b 30-44	G4 15-29	GFR <15 or unstable
Na+, K+, Cl-, HCO3-, urea, creatinine	monthly	monthly	monthly	monthly
CBC (No ESA)	Q6 month	Q3 month	Q2 month	monthly
CBC, retic count (on ESA)	monthly	monthly	monthly	monthly
Ferritin, serum iron, TIBC, iron saturation (no ESA)	Q6 month	Q3 month	Q3 month	Q3 month
Ferritin, serum iron, TIBC, iron saturation (on ESA)	Q3 month	Q3 month	Q3 month	Q3 month
AST**, ALT**, ALP**, GGT**, bilirubin**	monthly	monthly	monthly	monthly
uric acid	Q3 month	Q3 month	Q3 month	Q3 month
Albumin, Ca2+, PO4	Q3 month	Q3 month	Q2 month	monthly
iPTH	Q12 month	Q12 month	Q6 month	Q3 month
Urine osmolality	monthly	monthly	monthly	monthly
Urine ACR	Q6 month	Q3 month	Q3 month	Q3 month
HgbA1c (if diabetic)	Q3 month	Q3 month	Q3 month	Q3 month
24-hour urine for sodium, protein, creatinine, urea, osmolality. NOTE: Provide containers up to 6 L	Q6 month	Q6 month	Q6 month	Q6 month

Table 8: Suggested lab tests and frequency for ADPKD patients on Tolvaptan: after 18 months

GFR (ml/min/1.73m²)	≥ G3a ≥ 45	G3b 30-44	G4 15-29	GFR <15 or unstable
Na+, K+, Cl-, HCO3-, urea, creatinine	Q3 month	Q3 month	monthly	monthly
CBC (No ESA)	Q6 month	Q3 month	Q2 month	monthly
CBC, retic count (on ESA)	monthly	monthly	monthly	monthly
Ferritin, serum iron, TIBC, iron saturation (no ESA)	Q6 month	Q3 month	Q4 month	Q3 month
Ferritin, serum iron, TIBC, iron saturation (on ESA)	Q3 month	Q3 month	Q4 month	Q3 month
Albumin, Ca2+, PO4	Q3 month	Q3 month	monthly	monthly
AST**, ALT**, ALP**, GGT**, bilirubin**	Q3 month	Q3 month	Q3 month	Q3 month
uric acid	Q3 month	Q3 month	Q3 month	Q3 month
iPTH	Q12 month	Q12 month	Q6 month	Q3 month
Urine osmolality	Q3 month	Q3 month	Q3 month	Q3 month
Urine ACR	Q6 month	Q3 month	Q3 month	Q3 month
HgbA1c (if diabetic)	Q3 month	Q3 month	Q3 month	Q3 month
24-hour urine for sodium, protein, creatinine, urea, osmolality. NOTE: Provide containers up to 6 L	Q6 month	Q6 month	Q6 month	Q6 month

These are general guidelines for lab monitoring that can be modified when appropriate for individual patients. The exception are the tests marked with **. These hepatic monitoring tests are mandatory and as such the frequency cannot be modified; for patients on tolvaptan they must be performed monthly for the first 18 months on treatment and every 3 months thereafter.

5.2.4.4 KCC Clinic Resources/ Documentation for Patients with ADPKD

Links to all resources are on the BC Renal website at BCRenal.ca ▶ Health Info ▶ Kidney Care ▶ Polycystic Kidney Disease:

Patient/family information pamphlets:

- Your Genes, Your Kidneys and You
- Polycystic Kidney Disease: What Every Family Needs to Know
- Diet Changes for Adults with Polycystic Kidney Disease
- Diet Changes for Adults with Polycystic Kidney Disease Taking Tolvaptan (to reduce frequent urination)
- Tolvaptan: Frequently Asked Questions for Patients
- Tolvaptan: Pharmacy Information Sheet

Patient assessment form:

- Learning Needs Questionnaire for New Patients with ADPKD

New clinic forms:

- Information at a Glance (addendum to KCC Kardex)
- Clinic Visit Form for Patients with ADPKD
- PROMIS Monthly Lab Results Summary/Flowsheet
- Lab Requisition for ADPKD Patients not on Tolvaptan
- Lab Requisition for ADPKD Patients on Tolvaptan: First 18 Months
- Lab Requisition for ADPKD Patients on Tolvaptan: After 18 Months.
- Application for Tolvaptan in ADPKD

Staff resources:

- Staff Guide: Dietary Recommendations for Patients with ADPKD
- Tolvaptan: Frequently Asked Questions for Prescribers

5.2.5 Modality Choices Education and Selection

Refer to *Best Practices: Kidney Care Clinics* document; for all of the following sections, the approach well outlined in this document also applies to patients with ADPKD.

5.2.6 Transition to Selected Modality

Refer to *Best Practices: Kidney Care Clinics* document.

5.2.4 KCC team member roles

Refer to *Best Practices: Kidney Care Clinics* document.

6.0 Recommended Allocation of Resources for KCCs

Refer to Best Practices: Kidney Care Clinics document.

7.0 References

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