Lab Work Follow-up Process And Timelines (Children)

BCRenal
Provincial Health Services Authority

Section 1: Initiating Screening/Follow-Up of Out-of-Range Lab Results for Children

Process Steps:

1	Check if there are multiple out-of-range lab values (e.g., high potassium; low bicarbonate; significant increase in creatinine).
2	Check if the out-of-range value(s) is consistent with previous values. i.e., known, pre-existing out-of-range value vs a new finding. • If out-of-range value(s) is consistent with previous values, has the patient received the relevant information/teaching? ◦ If NO, follow-up is required. ◦ If YES, follow-up may not be required.
3	Check when the patient is scheduled for their next appointment. • For example, if the initiation of follow-up/ screening window is "within 1 week"- (see suggested timeframes), consider holding off until the next appointment if the appointment is soon.
4	Decide within the team who will do the initial screening/follow-up with the patient. Whenever possible, limit to one KCC team member.
5	Contact patient for the initial screening/ follow-up. Refer to Sections 2 & 3 for guidance on information to collect during the initial screening/follow-up.
6	Based on screening/follow-up findings, involve other KCC team members, as appropriate (e.g., nephrologist, dietitian, pharmacist, etc).

Suggested Timeframes:

Test	Normal		Initial Screening/Follow-up Timelines (upon identification of out-of-range value)[a]			
			Lab will Call MD (Alert/Critical)	By Next Business Day	Within 1 Week [Note 1]	Next Appt (not urgent) [Note 2]
Creatinine (umol/L)		High		↑>30%	↑20% - 29%	↑<20%
Urea (mmol/L)		High			≥40	All abnormal values <40
Potassium (mmol/L)	3.5 – 5.0	Low	< 2.8	2.8 – 3.0	3.1 – 3.2	3.3 – 3.4
		High	> 6.2 [Note 3]	6.0 – 6.2	5.7 – 5.9 [Note 4]	5.1 – 5.6
Sodium (mmol/L)	135 – 145	Low	< 120	120 – 125	126 – 130	131 – 134
		High	> 160	150 – 160		
Phosphorus (mmol/L)	0.80 – 1.50	Low	< 0.32	0.32 – 0.50	0.5 – 0.8	All values except critical
		High	n/a	>3.0	n/a	<3.0
Bicarbonate	20 – 30	Low	<10	10 – 15	n/a	16 – 20
		High	>40	n/a	n/a	31 – 40
Ionized calcium (mmol/L)	1.15 – 1.40	Low	<0.80	0.80 – 0.90	0.91 – 1.00	1.01 – 1.14
		High	>1.61	1.50 – 1.60	n/a	1.41 – 1.49
Hemoglobin (g/L) [Note 5]	2.10 – 2.60	Low	<60 [Note 6]	60 – 80 or change of ≥20	81 – 90	>90

Non-critical out-of-range values which can generally be left until the next appointment for follow-up (not urgent):

- Chloride
- Albumin
- Hemoglobin A1c
- Hematology profile (CBC) other than hemoglobin
- Parathyroid hormone intact (iPTH)
- If not on ESA, iron studies (serum ferritin, iron, TIBC, iron saturation). If on ESA, see note 3 below.
- Albumin/creatinine ratio (ACR) if available; if not, urine protein/ creatinine ratio (PCR)
- Cholesterol tests (TChol, LDL, HDL, Non-HDL, Triglycerides), CRP, 25-OH Vit D, TSH, uric acid, magnesium

Note 1: *Consider holding off follow-up until the next appointment if the next appointment is less than 4 weeks away.*

Note 2: *Flag these results for the nephrologist to review at the patient's next appointment. If clinically indicated and/or the KCC staff member is concerned, contact the nephrologist sooner.*

Note 3: *For children aged < 3 months, the lab critical value is for a serum potassium of more than 6.5 mmol/L.*

Note 4: *Does not apply to neonates.*

Note 5: *Anemia management for those on ESA: Refer to BCCH Pediatric CKD Anemia Management for assessment, actions & timelines.*

Note 6: *For children aged < 30 days, the lab critical value is for a hemoglobin of less than 80 g/L.*

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Section 2: Screening/Initial Follow-up of Out-of-Range Results (All Out-of-Range Values)

1	**Illnesses & procedures**	• Does your child have any new health problems, or has your child been to hospital since we last saw them? • Has your child had any procedures or recent imaging? • Have your child been ill? (e.g., vomiting, diarrhea, fever)
2	**Eating & drinking**	• Has your child been eating and drinking as usual? (e.g., changes to their diet, staying hydrated, fasting prior to the lab test).
3	**Medications & supplements**	• What medications/supplements is your child currently taking? (compare with prescribed medications and, if accessible, compare with PharmaNet) • Has your child started any new medications/supplements, stopped any previous ones or had any changed? (e.g., ACEi, ARB, diuretic, NSAIDs, antibiotics)
4	**Symptoms**	• Is your child experiencing any of the symptoms listed in Section 3? If so, when did it start to bother them? How severe is it? Is it improving or getting worse?

Note: There may be little correlation between reported symptoms and out-of-range lab values.

- Many patients, even with significantly out-of-range results, do not report any of the symptoms listed in Section 3.
- Some patients will report one or more of the symptoms listed in Section 3, but the corresponding lab value is normal.

Section 3: Potential Symptoms Associated with Significantly Out-of-Range Values & Questions Relevant for Initial Follow-Up/Screening

Value	Value	Potential Symptoms	Examples of Questions to Assess for Potential Causes of Lab Abnormality[a]
Creatinine	High	• Urinating less or more, passing bloody or foamy urine • Swelling in feet, ankles or face • Nausea and vomiting or diarrhea • Other: High BP, muscle cramps, chest pain, confusion, SOB	• Has your child noticed changes in their voiding habits? (e.g., difficulty voiding, pain).
Potassium Refer to Appendix 2 in lab work guideline for factors influencing potassium levels	High	• Muscle weakness, tingling, numbness • Severe: chest pain, heart palpitations, SOB • Nausea and vomiting	• Has your child been prescribed a potassium binder? If so, are they taking it as prescribed? • Are they prescribed any medications that can increase potassium levels (potassium supplement, ACEis, ARBs, MRA), or any dosage change for these medications? • Where did your child have their labs drawn? (if accuracy of test is in doubt, repeat at hospital lab as per nephrologist's order). • High potassium levels can be due to high blood sugars. Does your child have diabetes? If so, how are their blood sugars? • Constipation can cause high potassium levels. Has your child had any issues with constipation?
	Low	• Heart palpitations • Muscle weakness and spasms • Tingling and numbness	• Has your child been prescribed a potassium binder? If so, are they taking it as prescribed? • Has your child been prescribed a potassium supplement? If so, are they taking it as prescribed? • Is your child taking a diuretic or fludrocortisone?

Sodium	High	• Excessive thirst
		• Decreased energy, lethargy
		• Urinating very little or lots of dilute urine
		• Vomiting
			• High sodium levels can be due to dehydration.
			  • How much fluid are they drinking daily?
			  • Is your child taking a nutritional supplement/formula? Have there been any changes to the way the formula is being mixed?
			  • Is your child taking a diuretic or fludrocortisone?

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Value	Value	Potential Symptoms	Examples of Questions to Assess for Potential Causes of Lab Abnormality[a]

Sodium	Low	• Confusion
		• Nausea and vomiting
		• Headache
		• Restlessness and irritability
		• Muscle weakness, spasms or cramps
			• Low sodium levels can be due to too much fluid in your body or salt losses..
			  • Have they experienced any vomiting, diarrhea or changes to their urine output?
			  • Any change in swelling or body weight?
			  • How much fluid are they drinking daily? Is your child taking a nutritional supplement/formula? Have there been any changes to the way the formula is being mixed?
			• Are they taking any diuretics or fludrocortisone?

Bicarbonate	High	• Confusion • Muscle twitching/cramps • Tingling and numbness • Abnormal heart rhythm • Seizures	• Are they taking diuretics or fludrocortisone? • Has your child been prescribed sodium bicarbonate? If so, are they taking it as prescribed?
	Low	• Rapid and deep breathing • Fast heart rate • Confusion or dizziness • Nausea and vomiting	• Has your child been prescribed sodium bicarbonate? If so, are they taking it as prescribed? • Poorly controlled blood sugars can cause a condition called diabetic ketoacidosis, leading to low bicarbonate levels. • Does your child have diabetes? If so, how are their blood sugars?
Phosphorus	Low	• Muscle weakness • Confusion, irritability • Respiratory or heart failure	• Is your child eating less than before?

Calcium	High	• Nausea, vomiting, constipation, stomach pain
		• Bone pain, muscle weakness
		• Confusion, difficulty thinking
		• Increased thirst or frequent urination
			• Was your child prescribed any calcium or vitamin D supplements? If so, are they taking them as prescribed?
			• Are they taking any extra supplements or Tums? Do they contain calcium or vitamin D?
			• Dehydration can be both a cause and symptom of high calcium levels.
			  • Are they dehydrated or have they experienced vomiting or diarrhea, which can cause dehydration?
			  • Are they drinking less fluid than usual?
			  • Are they feeling thirstier or urinating more than usual? If so, do they have diabetes, and how are your blood sugars?

	Low	• Muscle cramps, spasms or stiffness • Tingling in the lips, tongue, fingers and toes • Dry, scaly skin, coarse hair and brittle nails • Irregular heartbeat or heart failure	• Was your child prescribed or taking any calcium or vitamin D supplements? Are they taking them as per previous or as prescribed?
Hemoglobin, iron studies	Low	• SOB • Pale skin • Weakness • Dizziness	• For low hemoglobin: Was your child prescribed an ESA (darbepoetin alfa or epoetin alfa)? If so, are they taking as prescribed? • Were they prescribed iron supplements? If so, are they taking as prescribed? • Has your child noticed unusual bleeding (e.g., change in stool colour, recent surgery)?

[a] These questions are in addition to the initial questions asked to assess any out-of-range lab result (i.e., recent illnesses & procedures and changes in eating & drinking and medications & supplements).