



# PROVINCIAL STANDARDS & GUIDELINES



## Supporting Home Blood Pressure Monitoring

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Approved by the BC Renal Kidney Care Clinic Committee



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## 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](http://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 Scope

Home blood pressure (BP) monitoring is a significant component of the management and monitoring of patients with chronic kidney disease (CKD).

This guideline provides recommendations on:

- a. Patients appropriate for home BP monitoring
- b. Purchasing a BP device
- c. Educating patients on taking and recording their BP
- d. Checking the BP device
- e. Frequency and timing of taking BP
- f. Follow-up of out-of-range readings

This guideline applies to both adult and pediatric patient populations. It is as a companion to the patient information pamphlet on “Taking Your Blood Pressure at Home” at [BCRenal.ca → Health Info → Kidney Care → Kidney Care \(Non-Dialysis\) → Resources for Kidney Patients](https://www.bcrenal.ca/health-info/kidney-care/kidney-care-non-dialysis/resources-for-kidney-patients)

## 2.1 Rationale for Home Blood Pressure Monitoring

High BP is one of the major risk factors of kidney disease and the second leading cause of end-stage kidney disease (ESKD) in North America (diabetes is the leading cause). In the United States, 26% of newly diagnosed ESKD patients had a primary diagnosis of hypertension. <sup>1</sup>

More and more experts now recommend that patients with high BP regularly check their BP at home. Home BP monitoring has been shown to predict health outcomes better than office BP measurements.

Multiple readings are required for accurate risk prediction. <sup>2</sup>

Home BP monitoring helps with early recognition of changes and, if required, adjustments to the treatment plan. It also gives patients an idea where their BP stands between clinic visits and can motivate them to care more about their health.

The recommendations in this guideline are based on reviews of the literature and the experience of staff and physicians working at BC Kidney Care Clinics (KCCs).

## 2.2 Recommendations

### 2.2.1 Patients Appropriate for Home BP Monitoring

It is important that all patients with chronic kidney disease have their BP measured regularly. This can be done in the KCC, a physician’s office or a community pharmacy.

Most patients with chronic kidney disease can also benefit from monitoring their BP at home assuming they are willing and able to take their own BP or have a care giver who can take their BP. <sup>2</sup>

KCC patients who are a priority for home BP monitoring include:

- Patients who have chronic kidney disease (CKD); AND
- Hypertension or concerns about their BP; AND
- Are willing and able to take their own BP or have a care giver who can take their BP. <sup>2</sup>

## 2.2.2 Purchasing a BP Device

A detailed listing of BP devices recommended by Hypertension Canada is available at <https://hypertension.ca/bpdevices>.

### Key points: <sup>3</sup>

1. Devices can be purchased from most pharmacies and stores that sell health care equipment and on-line. A device does not have to be expensive to be good.
2. Choose a device that says “Recommended by Hypertension Canada” on the box or in the material supplied with the device. Both the gold and silver logos are accepted as accurate. If purchasing a device on-line, suggest patient check that the brand/model is listed on the Hypertension Canada website. Photos below from [hypertension.ca](https://hypertension.ca).



3. Devices that measure BP in the upper arm are the most accurate.
  - In patients with large arm circumferences, when standard upper arm measurement methods cannot be used, validated wrist devices (utilized with arm and wrist supported at heart level) may be used. For instructions on use, go to [https://targetbp.org/tools\\_downloads/using-a-wrist-cuff-to-measure-blood-pressure](https://targetbp.org/tools_downloads/using-a-wrist-cuff-to-measure-blood-pressure). In all other situations, wrist devices are discouraged as they are less reliable.<sup>2</sup>
  - Forearm or finger devices should not be used.<sup>4,5</sup>

4. It is important that the cuff fit properly (to prevent under or over estimation of the BP).

Measure the patient’s arm circumference (in the middle of the upper arm at the midpoint between the shoulder and elbow).

- a. Multiply by 40% to get the right width of the bladder cuff.
- b. Multiply by 80% to get the right length of the bladder cuff (bladder length should cover 80% - 100% of arm circumference).



photo credit - TargetBP.org

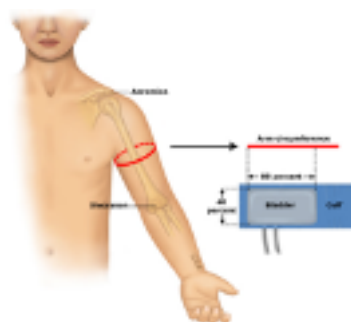


photo credit - UpToDate.com:

[Definition and Diagnosis of Hypertension in Children and Adolescents](#)

For larger arms that are significantly wider near the shoulder than the elbow, consider a cone-shaped or “contour” cuff (specialized cuffs are more expensive than standard cuffs). Standard cylindrical cuffs can produce inaccurate measurements.<sup>5</sup>



Photo from Medline.com

5. Blood pressure devices are available for patients who have special needs.
  - a. Patients with visual impairments:
    - Suggest a device with easily identifiable buttons and a large/bright visual display.
    - Canadian National Institute for the Blind website ([cnib.ca](http://cnib.ca)) has examples of talking BP monitors.
  - b. Patients with limited hand strength/dexterity:
    - Suggest a device with a pre-formed cuff for easy placement on the upper arm.
  - c. Patients with irregular heart rhythms:
    - Automated BP monitors may not work properly in patients with irregular heart rhythms.
    - Suggest to these patients to alert the sales staff to ensure the chosen device takes proper readings.
    - If unable to find a suitable device, discuss options with the nephrologist/nurse practitioner (NP) (e.g., 24-hour monitor).
  - d. Patients requiring financial assistance:
    - Some extended health insurance plans may cover all or a portion of the cost. Suggest

patient explore this option with their insurance provider prior to purchase. Otherwise suggest patients keep their receipt as they may be eligible for a credit on their income tax (after a specific threshold is reached).

- Kidney Foundation of Canada, BC & Yukon Branch has a short-term financial assistance program that may be accessed when other options have been exhausted. Patients must meet a low-income financial criterion. KCC Social Worker can apply for the purchase of a BP monitor on behalf of the patient. Patients cannot apply directly.

6. Some blood pressure machines can track readings from multiple people. These machines may be shared with other members of the patient’s household. If the cuff size is the same, the cuff may also be shared, but cleaning with a disinfectant wipe is important between uses. Remind patients to track their own BP measurements (vs measurements of others using the machine).

### 2.2.3 Educating Patients on How to Take & Record Their BP and Heart Rate

- Review pamphlet on “Taking Your Blood Pressure at Home” [BCRenal.ca](http://BCRenal.ca) → [Health Info](#) → [Kidney Care](#) → [Kidney Care \(Non-Dialysis\)](#) → [Resources for Kidney Patients](#) with patient.
- Teach patient how to take their sitting BP:
  - Take patient’s BP, once in each arm.
  - Instruct patient on which arm to use for measuring their BP at home. Use the same arm each time.
    - Adults with no vascular access in place: Use non-dominant arm unless difference between arms is >10 mm Hg. If >10 mm Hg, use arm with higher BP.
    - Adults with vascular access in place: Use

- arm without the access.
  - Children: Use right arm.
  - If unsure, discuss with nephrologist/NP.
  - Demonstrate to the patient how to take a sitting BP. Ask for return demonstration.
- If the nephrologist also requests a standing BP (to examine for postural or orthostatic hypotension), demonstrate and provide patients with these additional instructions: <sup>6</sup>
  - After measuring the sitting BP (as above), measure BP after standing 1 and 3 minutes and record both values
  - Contact kidney care team if: (1) drop in systolic BP of  $\geq 20$  mmHg; (2) drop in diastolic BP of  $\geq 10$  mmHg; or (3) experiencing lightheadedness or dizziness with standing
- Discuss how best to track and share BP and heart rate results with KCC team
  - Manual tracking:
    - Track using a printed calendar or BP log.
    - Fax or e-mail log to KCC or ask to bring to in-person appointment.
  - Automatic tracking:
    - Many BP devices store a week's worth of readings, or more. Patients can manually record the results on a printed calendar or BP log OR download to an app.
    - If printed version, ask the patient to fax or e-mail (if HA policy allows) it to KCC or ask the patient to bring to in-person appointment.
    - If electronic version, ask the patient to e-mail (if HA policy allows) the file to KCC (or, if device able, send directly from BP device) or ask the patient to bring to in-person appointment.
    - If using stored readings, remind the patient to send/bring only their own BP measurements (vs measurements of others using the machine).
- Note: If the device battery(ies) runs out, past BP readings will be deleted. Suggest to patient to keep a manual record of readings as “back up” and to change the battery(ies) in the device every 6 months.
- Review with patient what to do in the event of illness, especially medications to temporarily stop. Provide patient pamphlet “Medication Changes When You Are Sick at [BCRenal.ca](https://www.bcrenal.ca) → [Health Info](#) → [Managing My Care](#) → [Medication](#) → [What to do if you are sick](#)

## 2.2.4 Checking the BP Monitor

Blood pressure devices require checking:

- Before first use; AND
- At least once per year (more if the manufacturer recommends); AND
- If it gets dropped or damaged.

Machines may be checked in Kidney Care Clinics, doctor's office or community pharmacies. The process takes about 10 minutes. <sup>6</sup> (with adaptations)

Process for checking the patient's BP device:

1. Have the patient sit down with his or her bare arm at heart level. The arm should be relaxed.
2. Allow the patient to rest for five minutes.
3. Avoid any conversation during the measurements to prevent an increase in BP.
4. Take a total of 3 sequential same-arm BP readings, no more than 30 seconds apart, all using the arm used by the patient at home.
  - Reading 1: Patient to take with his or her own device. Use this as a time to check technique and cuff size. Discard reading.
  - Reading 2: Patient to take with his or her own

- device. Record reading.
- Reading 3: Provider to take with clinic device. Record reading.
- If the difference between reading 2 and 3 is less than 5 mm Hg (systolic or diastolic), the comparison is acceptable.
- If the difference is 5 mm Hg or more, take 2 more sequential same arm BP readings (Note: BP readings will usually decline as the number of measurements increases):
  - Reading 4: Patient to take with his or her own device.
  - Reading 5: Provider to take with clinic device.
- If the difference (systolic or diastolic) between reading 4 and 5 is:
  - Less than 5 mm Hg: Acceptable.
  - 5 – 10 mm Hg: Acceptable but make a note of the difference in the patient record.
  - More than 10 mm Hg: Not acceptable. Suggest patient take device for servicing (warranty may apply) or purchase a new one.

**Table 1: Sample BP Readings and Suggested Actions**

Patient	Reading	Home Device	Clinic Device	Conclusion	Action
Mr B	1	145/90			Discard reading
	2	140/85			
	3		140/90	Acceptable	
Mrs J	1	135/80			Discard reading
	2	140/85			
	3		135/80	Not acceptable	
	4	135/75			
	5		125/80	Acceptable but note the difference in the patient record	
Ms Z	1	125/80			Discard reading
	2	130/85			
	3		150/90	Not acceptable	
	4	125/80			
	5		145/90	Not acceptable	Suggest patient take BP device for servicing (warranty may apply) or purchase a new one

## 2.2.5 Frequency and Timing of Taking BP and Heart Rate

These are **general guidelines** and require modification for each patient. Nephrologist/NP to advise.

**Table 2: Guidelines for Frequency and Timing of Taking BP**

Monitoring	Frequency	Situations	Instructions to Patient	Instructions to KCC Staff Upon Review of Readings
More frequent  (may be requested by any member of the KCC team)	<ul style="list-style-type: none"> <li>• Everyday</li> <li>• Morning (before breakfast); &amp; evening (2 hours after supper), before taking BP medication(s). If taking BP medications, take at least one hour after medications (this is ideal, if possible).</li> <li>• 2 readings per session, one minute apart.</li> <li>• Continue for 7 days (total of 28 measurements)</li> </ul>	<ul style="list-style-type: none"> <li>• When starting home BP monitoring</li> <li>• Before each KCC appointment</li> <li>• After changes in treatment</li> <li>• After hospitalization, illness or other change in clinical status</li> </ul>	If consistently out-of-target range (range as specified on patient pamphlet), contact the KCC at the end of the 7 days.	<p>Average the results, excluding the readings from the first day</p> <p>Assess usual BP range &amp; note whether BP readings differ by time of day</p> <p>If consistently out-of-target range, refer to section 2.2.6</p>
Standard	<ul style="list-style-type: none"> <li>• Same time of day, unless otherwise directed. If taking BP medications, take at least one hour after medications (if possible).</li> <li>• Twice a week</li> <li>• 2 readings per session, one minute apart</li> </ul>	<ul style="list-style-type: none"> <li>• All other times</li> </ul>	If consistently out-of-target range (range as specified on patient pamphlet), contact the KCC.	<p>Average the 2 readings taken per session</p> <p>Assess usual BP range</p> <p>If consistently out-of-range, refer to section 2.2.6</p>



## 2.2.6 Follow-up of Out-of- Range BP Readings

The nephrologist/NP will establish the patient’s BP target, as well as “thresholds” for when to contact the kidney care team and when to seek medical assistance immediately. Once established, review with the patient (including who to call and when) and write the values on the pamphlet “Taking Your Blood Pressure at Home” [BCRenal.ca](http://BCRenal.ca) → [Health Info](#) → [Kidney Care](#) → [Kidney Care \(Non-Dialysis\)](#) → [Resources for Kidney Patients](#). Review targets annually and after significant changes in patient status such as serious illnesses or hospitalizations.

A single high reading is not an immediate cause for alarm. Instruct patient if reading is unusually high or low to wait 5 minutes and test again. Refer to Table 1 for further instructions.

**Table 3: Instructions to Patients for Out-of-Range BP Readings**

Monitoring	Frequency	Instructions to Patient	Instructions to KCC Staff Upon Review of Readings
BP is higher or lower than target <b>AND</b> patient is experiencing chest pain, shortness of breath or sudden onset back pain, numbness/weakness, light headedness/dizziness, change in vision, difficulty speaking	<b>Urgent</b>	Contact nephrologist/ NP for guidance; if not available, call 911.	
BP is above 180/110 (top or bottom number) even if patient is not experiencing symptoms	<b>Urgent</b>	Contact nephrologist/ NP for guidance; if not available, call 911.	
BP is more than 10 mm Hg above or below target (systolic or diastolic) <i>over several readings and days</i>	Not urgent	Do not wait for your next appointment. Contact your kidney care team or primary care provider.	
BP is less than 10 mm Hg above or below target (systolic or diastolic) <i>over several readings and days</i>	Not urgent	Bring this up at your next appointment with your kidney care team or Primary care provider.	<p>A single high reading is not an immediate cause for alarm. If a patient consistently gets readings higher or lower than target, check the patient’s technique, cuff size and machine. Review lifestyle measures. For continued high or low readings, contact nephrologist/ NP for possible adjustment to medication (each KCC to identify own process for review and titration of patients with out-of-range BP readings).</p> <p>For patients with BP out-of-target range, recommend visits every 1 – 2 months with a patient-specific medication titration plan (visits may be to the KCC or the patient’s primary care provider (PCP)).<sup>7</sup></p> <p>Once BP is in target, recommend visits every 3 – to 6 months to the KCC or patient’s primary care provider. Shorter intervals between visits may be required depending on the patient’s clinical status.<sup>7</sup></p>

## 2.0 References

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## 3.0 Sponsors

### Developed by:

Working Group of KCC patient partners and multidisciplinary care providers (nephrologists, registered nurses, dietitians and pharmacists) from across BC.

### Approved by:

- BC Renal (BCR) Kidney Care Clinic (KCC) Committee (December 2020)
- BC Renal Medical Advisory Committee (January 2021)

This guideline is based on scientific evidence available at the time of the effective date; refer to [www.bcrenal.ca](http://www.bcrenal.ca) for most recent version.