Home Blood Pressure Measurement: Ensuring Quality and Interpreting Results

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Running Title: Quality Home Blood Pressure Measures
Key words: Hypertension, blood pressure measurement, home, training

Summary
Home blood pressure measurement (HBPM) provides health care professionals with a quality tool to aid in the diagnosis and management of hypertension. Although HBPM is often recommended as a means to avoid ‘white coat’ effects on blood pressure, HBPM also offers health benefits to patients, especially those who wish to be more engaged in the management of their hypertension or those who can benefit from an adherence aid. In Canada, nearly half of the adults diagnosed with hypertension are measuring their blood pressure at home, but only half of these have been trained to do so by a health professional. Whatever the reason for measuring blood pressure at home, the results are beneficial only when the results are accurate and the health care professional is confident of the results. This paper briefly highlights the need for patient training and discusses some of the resources that are available to health care professionals and patients that can lead to quality HBPM and interpretable results.

Practice challenges:
- Training/advising patients in HBPM
- Managing and using HBPM data
- Knowing when to recommend HBPM
- Knowing who to recommend for HBPM

Objectives:
- Outline the opportunities for HBPM
- Discuss challenges in HBPM
- Present Canadian on-line resources on HBPM

Home blood pressure monitoring (HBPM) presents an opportunity to improve patient outcomes and involve patients in the management of their hypertension. Although HBPM is not suitable for all patients, it is appropriate for many (See Table 1). In Canada, 45% of hypertensive patients measure their blood pressure at home. Another 25% measure their blood pressure in other non-clinic settings, such as pharmacies or health clubs (Bancej et al, 2010). Having been shown how to measure blood pressure at home is strongly associated with regular use of home monitors, but only 30% of hypertensive patients have received training from a health care professional. Furthermore, although seven in ten hypertensive Canadians measure their own blood pressure outside the clinic, only 36% share those findings with a health care professional.
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Table 1. HBPM may be a good choice for hypertensive patients who:

- Are capable of performing and understanding home measurements
- Want to measure blood pressure at home
- Have regular heart rhythms
- Are not anxious

Clearly, for either the health care provider or the patient to benefit fully from HBPM, patients have to engage in HBPM and health care providers need to be aware of the results. Appropriate training in HBPM appears to be an essential component of the process (Bancej et al, 2010). Patient training may increase the confidence that health care professionals need to rely on HBPM data to make important diagnostic and management decisions.

Despite prospective studies that show the superior prognostic capability of HBPM over ‘casual’ office blood pressure taken by a physician (Niiranen et al, 2010; Ohkubo et al, 1998; Bobrie et al, 2004), some physicians may be unwilling to rely on HBPM data due to distrust in the readings of the patients’ data (Myers, 1998, Stergiou et al, 1996). Not surprisingly, insufficient training of patients, among other factors, contributes to inaccuracy of readings (Campbell et al, 2001), but training leads to higher quality readings (Stergiou et al, 1997).

A good training resource is available on the web at [http://hypertension.ca/video/](http://hypertension.ca/video/). The (English only) video, *Home Measurement of Blood Pressure*, in conjunction with the user manual for the specific device provides considerable guidance in many of the steps necessary to purchase and use a home blood pressure monitor. The video and many device manuals, however, stop short of providing advice on a number of other key topics that are important to the interaction of the patient and the health care professional.

Although the video and CHEP recommendations stress the importance of using devices that were independently shown to be clinically valid, this overarching endorsement of the device model does not guarantee suitability of any particular device on all individuals (O’Brien et al, 2002). A clinically validated device, may, in some individuals give inaccurate readings. An important step in determining device suitability requires confirmation by the health care professional. A practical approach to this is to have the patient bring the device to the clinic and through a series of test readings, determine that the device is giving reliable and reproducible results. In cases where the home device is not providing similar results to a series of standardized and careful measures in the clinic, the patient can be encouraged to try a different one until a suitable device is found. None of the above will happen, however, unless the health care professional knows whether the patient is monitoring blood pressure at home or elsewhere. Thus, asking all patients about their BP measuring practices is a good way to bring up the topic of device suitability.

Opening the dialogue on HBPM may lead to a number of questions being asked by the patient. Some of the more common questions, for which health care professionals need to have answers can be found in Hypertension Canada’s *Brief Hypertension Action Tools – Instructions*
for Health Care Professionals. For example, when and for how long should HBPM continue? The answer to that question depends on the particular needs of the patient. When HBPM is being used as a tangible aide-mémoire for adherence to therapy, then daily monitoring in advance of planned medications or alternate therapies can be suggested to the patient. In other circumstances, a seven-day schedule of duplicate morning and evening readings is often appropriate. This schedule is commonly recommended for the week preceding a clinic visit whereas some might suggest it for one week per month when clinic visits are less frequent. A seven-day schedule of HBPM may also be recommended following a clinic visit when therapies are adjusted or when diagnosing hypertension. The particular schedule of HBPM greatly depends on the circumstances, following the general rule that more readings (up to a maximum) are better than fewer readings (Johansson et al, 2010; Stergiou et al 2010). Many of the specific ‘how to’s’ are addressed in the one-page Hypertension Canada document entitled: Take Control and Measure Your Blood Pressure at Home, which can be found on the web at: http://hypertension.ca/bpc/resource-center/educational-tools-for-health-care-professionals/.

Discussing HBPM with a patient, and advising the patient on appropriate equipment and measurement schedules, implies that the data from the HBPM will be used in patient management. To be useful, the readings need to be recorded and shared with the patient and the health care professional. Although CHEP recommends that devices used for HBPM have either a printout or a data ‘memory’, regular patient logs are also encouraged in the absence of more advanced or automated transmission of data to a health care professional. Data logs provide a visual record to the patient. Sample data logs are obtainable from Hypertension Canada at the same site mentioned in the preceding paragraph. The log is available either in portable document format or as a spreadsheet. For those patients who are computer users, the spreadsheet confers the advantage that the averages over the seven day measurement period are computed somewhat automatically, although this particular spreadsheet neither takes into account the CHEP recommendation to discard readings from the first of the seven days, nor does it compute the overall average of morning and evening values over the six days. Whether or not the readings from the first day need to be discarded continues to be a debated topic (Johansson et al, 2010), but discarding them appears to do no harm (Stergiou et al, 2010).

By encouraging patients to bring their HBPM devices with to each clinic visit, health care professionals may be able to verify the patient log against the device memory and attempt to reconcile differences between the memory and the log. Health care professionals need to keep in mind that the patient’s friends or family members may use the HBPM device (Waugh et al, 2003). When this happens, it can lead to discrepancies between the log and memory. Some manufacturers of HBPM devices have recognized that multiple users may share the same device. At least one validated device available in Canada provides two different activation buttons, so that readings from one patient will be stored separately from another user. In this same device, there is a special ‘guest’ mode, so that readings taken in this mode are not stored in the memory. Friends, family or other occasional users can be asked to use the guest mode.

Another advantage in having patients bring the monitoring device to each clinic visit is that patient measuring technique and device accuracy can be determined or refined. Although
most patients are able to use automated BP measuring devices with minimal training, some patients need repeated revision to master the technique (unpublished data).

To date, therapeutic goals based on HBPM have not been determined. Despite this, HBPM can be used to diagnose hypertension. As an ‘out of office’ blood pressure measurement, it is useful when ‘white coat’ effect is an issue, and it can be useful in detecting masked hypertension, inadequate hypertensive therapy in patients already diagnosed with hypertension, or in determining the BP response to changes in medications. On a regular basis, HBPM is known to be useful in diabetic patients or those with chronic kidney disease, even those undergoing dialysis. Hypertension Canada and many of its partner organizations make materials available that inform health care professionals and the public on the proper use and benefits of HBPM. With this information, the benefits of HBPM can accrue to those hypertensive patients already engaged in HBPM and others who have yet to try.

References:


