Editorial

Accurate Blood Pressure Measurements and the Other Arm

The Doctor is Ultimately Responsible

"When duty calls, some people are never at home."
Anonymous

Herbert L. Fred, MD, MACP

The examiner, a nationally prominent cardiologist, began my ordeal with a simple question: "What is the blood pressure in both arms of your patient?"

The scene was Charity Hospital in New Orleans, where I took my oral examination for board certification in internal medicine 51 years ago. Fortunately, I answered his question easily, because in those days, doctors routinely took their patients' blood pressure (BP) in both arms and checked the pulses in all 4 extremities at the initial examination. It was a standard of practice.

Sadly, that practice is no longer standard. Most doctors today—be they trainees, teachers, or private practitioners—don't routinely take their patients' BP, even at the first examination. Moreover, they rarely consider taking the BP in both arms. They rely instead on someone else to take the BP. Yet ordinarily, they don't know exactly who that someone is or how well-trained he or she might be, whether the person can see and hear adequately,[1,2] what type of measuring device the individual uses, and when, if ever, the device was last validated or calibrated. In addition, doctors usually don't know whether that person has made more than one BP determination after finding the initial measurement to be abnormal. These uncertainties prevail in most hospital settings, in many outpatient clinics, and in some doctors' offices. Nevertheless, doctors typically accept the other person's BP recordings as truth and treat their patients accordingly. Issues pertaining to ambulatory[3-5] and home[2,3,5] monitoring of BP are also important but will not be discussed in this editorial.

Some doctors tell me that they don't have time to take their patients' BP. Others claim that checking a patient's BP is elementary and that practically anybody can do it. Still others, especially house officers and young private practitioners, say that questions regarding who took the patient's BP and how it was taken virtually never came up during their training.

I believe that our current training programs lack sufficient emphasis on basic clinical skills,[6] including emphasis on accurate BP measurements. I also believe that a responsible doctor is never too busy to take a patient's BP. And measuring the BP accurately is, in fact, vitally important and cannot be done by just anybody. Consider the following.

First, measurement and treatment of the BP is among the most common and important reasons why patients visit physicians.[7] Second, the American Heart Association (AHA) emphasizes that accurate measurement of the BP is essential for classifying individuals, for ascertaining BP-related risks, and for making correct diagnostic and therapeutic decisions.[1] The AHA also recommends, as do others,[8-12] that the BP be measured in both arms at the initial visit. In addition, the AHA stresses the importance of properly trained observers, correct positioning of the patient, use of appropriate cuff size, and a period of rest along with abstinence from smoking and caffeine intake just before measuring the BP. Third, oscillometric (automated) devices are somewhat less accurate than auscultory (manual) devices but sufficient for clinical use—except perhaps for hypertensive patients, trauma patients, and those

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with arrhythmias.[13] Fourth, errors in BP measurement characteristically result from variation and bias among observers,[14,15] from faulty equipment,[15] or from failure to standardize the techniques of measurement.[15,16] Fifth, white-coat hypertension,[17] masked hypertension,[18] and pseudohypertension[19] require more than entry-level medical knowledge to detect. Sixth, having the doctor measure the BP—at least initially—is a subtle but powerful way to initiate the all-important patient-doctor bond. Holding the patient's arm during application of the measuring device adds intimacy to the physical examination[20] and conveys a sense of warmth, sensitivity, compassion, and empathy.[21]

When doctors do take patients' BP, the results are not necessarily accurate or reliable. In a study to determine the extent to which physicians follow recommended techniques for BP measurement, not one of the 114 participants followed the recommendations completely.[22] On initial examination, 96% of them did not allow a pre-test resting period, 77% did not measure the BP in both arms, and 97% used an inappropriate cuff size.

There is more to be said about measuring the BP in both arms. In several thousand adult men and women without evident disease of the aorta or vessels in an upper extremity, studies have shown variable differences in the interarm BP.[9-11,23,24] Measurements of BP were made sequentially or simultaneously in both arms, using indirect or direct techniques. The results of those studies indicate that a disparity between the BP of both arms is relatively common (it was present, for example, in roughly half of 755 subjects in one series[9]), follows no clear-cut pattern, varies widely in degree, and shows no consistent relationship with age, sex, race, arm circumference, handedness, mean arterial pressure, or cardiovascular risk factors. Higher pressures are more frequent in the right arm and range in most individuals from 10 to 20 mmHg or greater in systole, and to a similar extent but less often in diastole.

A BP difference between the left and right arms—even when large—is statistically a normal variant and need not necessarily cause concern. When the disparity is persistent, however, the arm with the higher pressure should be used for all subsequent BP measurements.[1,11,12,24] In addition, the disparity can be vitally important to individuals who are applying for life insurance, industrial employment, or military service, particularly when only a single arm—the one with the higher pressure—is used for BP measurement.[9] Conversely, a misdiagnosis of hypotension can occur if the arm with the lower pressure is the only site of measurement.

One other point merits emphasis. Any disparity between interarm BP—especially when large and persistent—should prompt consideration of diseases known to be the cause: coarctation, dissection, or aneurysm of the thoracic aorta; Takayasu (pulseless) disease; and various types of intra- and extra-arterial obstruction in an upper extremity.[1,9,11,23,24] These diagnostic considerations become much more likely if the arm with the lower BP also has a grossly diminished radial pulse.

Failure to compare the BP and pulses in both arms can have serious consequences, as the following case summary illustrates.

A 69-year-old woman was admitted to the surgical service of my hospital for management of acute cholecystitis. Her initial BP as determined by a nurse was 130/80 mmHg. Three days later, when the patient's condition was improving, a different nurse recorded the BP as 70/40 mmHg. This new finding prompted the patient's transfer to the intensive care unit (ICU) with a presumed diagnosis of sepsis.

During the next 2 days, the patient received intravenous antibiotics, underwent 2 computed tomographic scans of her chest and abdomen, and was seen by 4 board-certified specialists—a general surgeon, a cardiologist, a pulmonologist, and a critical-care physician. Her BP in the ICU as determined by the nurses ranged between 130/80 and 140/90 mmHg.

Because the patient looked well and no cause for her "hypotension" surfaced, she was transferred to the medical service for further observation. There, the resident found her left radial pulse to be barely palpable and the BP in that arm to be 70/40 mmHg. By contrast, her right radial pulse was strong and the BP in that arm was 130/80 mmHg. A subsequent magnetic resonance angiogram revealed stenosis of the left subclavian artery.

In conclusion, those of us directly involved in patient care must be ever-mindful that faulty BP measurements and failure to measure the BP in both arms can lead to erroneous diagnoses, unnecessary testing, and inappropriate therapy. We must also recognize that the responsibility for accurate BP measurements and for interarm BP determinations ultimately rests with us, the doctors in charge. The best way to meet that responsibility is to take the patients' BP ourselves, particularly at the initial examination, and in both arms, using correct techniques with validated measuring instruments. If, however, we delegate that responsibility, we must be certain that our surrogates and the equipment they use are reliable. Anything less is unacceptable.

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