Editorial

Should Doctors Still Measure Blood Pressure?

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A patient I have been treating for many years who has systolic hypertension recently went to see a new doctor, who recorded a blood pressure (BP) of 240/90 mm Hg. Not surprisingly, the doctor was concerned and was unimpressed when the patient explained to the doctor that she measured her BP at home and it was usually much lower than that. She told the patient that she could not let her go home, and that she should go to the emergency department. The patient, who up to that time had been feeling quite well, now also became anxious, and when her BP was next measured it was still high; she was admitted to the hospital. She remained there overnight, and her BP gradually decreased. When she was discharged home she was given a prescription for additional medication, but before she filled it she checked her BP; it was 136/64 mm Hg. This case is an extreme example of the white coat effect and how misleading BP measurements made by doctors can be. Old habits die hard, however. The measurement of BP is without doubt the commonest quantitative measurement in the clinical examination of patients. It has acquired a symbolism of its own. When the media feature a news item on hypertension or cardiovascular disease, more often than not they will show a clip of a doctor recording the BP of a patient. The intimate contact between doctor and patient symbolizes the humanistic side of medicine—quite literally, the laying on of hands while the numbers on the mercury column represent its scientific side. Historically, the measurement has served us well, and has provided a wealth of information about the risks of hypertension and the benefits of its treatment. But the increasing use of automated devices has made it quite clear that readings taken by doctors may be poorly representative of BP measured at other times.

Perhaps the biggest limitation of the traditional method of measuring BP is the white coat effect, which is conceived as the transient rise of BP that occurs in the medical setting. It was recognized by Ayman and Goldshine[1] in 1940 that BP recorded at home either by the patient or a family member might be 20 mm Hg or more lower than the doctors' readings. At that time, of course, no one knew how to interpret these differences. The quantification of the white coat effect has been a matter of debate.[2] The simplest and most practical way of measuring it is as the difference between the clinic BP and the average daytime pressure, measured by ambulatory monitoring, although the average home BP has also been used.[2] Purists have argued that a better measure would be the difference between the doctor's measurement and a reading taken in the same setting without a doctor present,[3] on the grounds that the daytime average is confounded by numerous factors such as the level of physical activity during the day. While this is certainly true, it is also clear that readings taken in the clinic setting without a doctor present may still show an elevation when compared with readings taken in a nonmedical setting.[4] Thus, not all of the white coat effect is due to the presence of the doctor. In an experimental study of the white coat effect, BP was measured on two successive days. On the first, in a nonmedical setting (a laboratory), and then on the second in the medical

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clinic, which included measurements taken in the waiting room, in the examination room without a doctor, and then in the examination room taken by a doctor.[5,6] The readings were mostly higher on the second day, and patients who had previously been given a diagnosis of hypertension showed a further increase in the presence of the doctor. Another example is a study performed in family practice centers in England,[4] where different methods of measuring BP were compared. The daytime average pressure, measured by ambulatory monitors, was used as the reference level. Readings taken by the patients at home and by nurses in the clinic were quite close to this level (within 5 mm Hg), but the readings taken by the doctors stood out like a sore thumb from all the other measurements: they were on average 19/11 mm Hg higher than the daytime pressure.

Although it is commonly stated that the main justification for continuing to rely on doctor-measured BP as the gold standard is that this is the technique used in the clinical trials that have documented the risks of hypertension and the benefits of treatment, this is only partly true. The initial Framingham study and the first Veterans Administration trial did use readings taken by doctors, but later trials have used nurses or "trained human observers," who almost certainly were not doctors.[7] Why this matters is that doctors record consistently higher values than other observers, including nurses,[8,9] presumably because they elicit a greater white coat effect. It has also been documented with depressing consistency that doctors rarely follow the established guidelines for BP measurement. McKay found that only 3% of doctors used the correct cuff size, 18% used the correct deflation rate, and 23% initially checked the pressure in both arms.[10]

The good news is that the increasing availability of relatively inexpensive automated BP monitoring devices has enabled these limitations to be overcome. While not necessarily as accurate as the well-trained human observer taking readings in accordance with standard guidelines (a condition rarely achieved in reality), automated devices working on the oscillometric principle eliminate observer error, and can easily provide large numbers of readings, which compensate for the inherent variability of BP. Ambulatory monitoring may now be regarded as the gold standard for BP measurement, because there are numerous prospective studies showing that it gives the best prediction of risk.[11] It is grossly underutilized, however, and not suitable for the routine tracking of BP changes. Home monitoring is cheap, convenient, and quite reliable. There is now extensive evidence (reviewed previously in this journal[12] and elsewhere[13]) that home BPs taken by patients give as good or better predictions of risk than conventional clinic readings. It is not reimbursed at the present time, because it is not regarded as being "medically necessary" by insurers such as Medicare. Hopefully, this will change in the near future.

The fact that there is often a huge discrepancy between the patients' and the doctors' readings (as in the patient described above) may paradoxically reinforce the doctors' mistrust of patients' readings. When patients bring in their monitors and take readings in the presence of the doctor, however, the readings are usually very similar to those taken by the doctor (often to the patients' great surprise). Another reason why doctors tend to disregard patients' readings may be that it threatens the traditional paternalistic doctor–patient relationship ("me doctor, you patient"). In this relationship, the evaluations and decisions are all made by the doctor, and the patient is merely the passive recipient of the doctor's recommendations. Hence, only doctors know how to measure BP. While this approach works fine for managing acute illness in the hospital setting, it falls short for treating chronic diseases such as hypertension. When my patient was in the hospital because her BP had been so high, there is no doubt that the doctors were in charge, but from the moment she walked out of the hospital there is equally no doubt that she was in charge: it was her decision not to fill the new prescription. Patients actually find home monitoring quite acceptable. In the study quoted above in which the different methods for measuring BP in family practices were compared, home monitoring was the most acceptable overall.[14] The readings taken by doctors made the patients anxious, and ambulatory monitoring was rated as uncomfortable.

Another option that is gaining acceptance is to replace or supplement doctors' readings with automated measurements taken in the clinic setting. There are several devices now available that can be programmed to take a series of readings while the patient is sitting quietly without anyone else present. Such devices give readings that are consistently lower than the doctors' readings, and thus reduce the impact of the white coat effect, although it appears that they do not eliminate it completely.[15]

There is a new development on the horizon that may have a major impact on how we record BP during a clinic visit, and that is "pay for performance," which Medicare is actively promoting.[16] Doctors

are going to be reimbursed not just for doing procedures, but also according to how many of their patients meet target levels of treatment. This will include the numbers of patients whose BPs are below the target of 140/90 mm Hg. For those doctors who measure the BP themselves, it can be safely predicted that a new phenomenon of terminal digit preference will emerge—instead of reading to the nearest 10 mm Hg (e.g., 140/90), doctors will read to the nearest 8 (e.g., 138/88). Getting these numbers together will require chart searches, which are expensive and time consuming, so there will be a new incentive to use automated methods that can store readings electronically. The real incentive, however, to use the automated monitors for measuring clinic pressure is that the readings will be consistently *lower* than the doctors' readings, so there will be a direct financial incentive to make wider use of these methods. This may be the death knell for the routine measurement of BP by doctors. Having said this, I must confess that I still routinely record clinic BP on my patients using a mercury sphygmomanometer. It would be regarded both by the patient and by the health care system as medical negligence if this procedure was omitted, but I have limited confidence in the validity of the BP values. One of the essential uses of the mercury technique in the future will be the validation of devices that measure BP by other methods, which should be done on every patient who uses such devices.

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