AMERICAN DIAGNOSTIC CORPORATION

Accurate Blood Pressure Measurement:
The Trouble with Traditional Automated Monitors - The Need for Something New

According to the American Heart Association, nearly one third of adults have hypertension (defined as sustained high blood pressure of 140 /90 mmHg and above). Uncontrolled high blood pressure greatly increases the risk of heart disease and stroke - the first and third leading causes of death in developed nations. Because there are no symptoms, many people with hypertension do not know they have it. The only way to tell is to have an accurate check of your blood pressure. This sounds simple but in actuality, accurate blood pressure (BP) is not so easy to obtain. Most people assume that BP measurements in a hospital or doctor's office are reliable. However, it has been shown that some of the most popular automated monitors provide results that are questionable at times [1]. There are a number of reasons for this. A key reason is that automated monitors generally do not measure blood pressure the same way as a physician. A physician (or nurse) typically measures blood pressure by placing a cuff around the patient's arm, inflating the cuff enough to close off the brachial artery, and then listening to the sounds (the Korotkoff sounds) with a stethoscope as the air pressure is released from the cuff. Manufacturers learned in the 1970s that this technique could be duplicated by placing a microphone in the blood pressure cuff. However, there were so many problems with proper cuff placement (i.e. - getting the microphone correctly positioned over the artery) that other, more "user-friendly" methods were sought. Researchers eventually developed the oscillometric approach to automated blood pressure measurement. If you have ever noticed how the pointer of a blood pressure gauge bounces (or "oscillates") with every beat of the pulse during a manual blood pressure reading, then you already understand the concept behind oscillometry. Instead of using a microphone to sense when the blood is flowing through the artery, automated monitors sense the oscillations of the pulse to establish the average or mean arterial pressure (MAP). Once MAP has been determined, each manufacturer uses its own algorithms for calculating systolic and diastolic BP. Some manufacturers base their calculations on the rise or falling amplitudes of the pulse. Others determine the peak of the pulse and use a formula based on the MAP and empirical data to calculate a result. The key point is that each manufacturer is doing something unique and that some technology may be better than others. In a recent study [2], 18 different blood pressure monitors were compared using a blood pressure simulator device. Readings were taken at seven blood pressure settings. For a simulated BP of 120/80, estimates of systolic pressure ranged from 112.6 to 126.6 mmHg. Diastolic readings ranged from 74.8 to 86.9 mmHg. These results - based on a simulator providing a constant, clear oscillometric signal – are a good indication of the differences in the algorithms employed by the various devices. When one adds in the additional complexity of human subjects with physiological

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conditions such as arrhythmias, hardened arteries, or congestive heart failure, results can vary even more [3]. Equally complex is the problem of obtaining data for the development of blood pressure algorithms. 2 Manufacturers take widely differing approaches to this issue. Some base their algorithms on data taken from comatose patients that have indwelling pressure catheters inside an artery (intra-arterial blood pressure measurement). Other manufacturers base their calculations on manual readings taken by clinicians using a mercury column sphygmomanometer and stethoscope. Still others compare their devices to aneroid blood pressure gauges. Does it matter? Yes, it does. In a study from the Royal Infirmary of Edinburgh [4], researchers described the differences that resulted from algorithms based on different standards in the same monitor from one manufacturer. In one version of the monitor, intraarterial developed algorithms were used. Another version of the same product employed algorithms based on manual blood pressure data. The study reported higher systolic and diastolic readings from the monitor with intra-arterial based algorithms with “differences in diastolic pressures were up to 15 mmHg.” In conclusion, the study noted, “it is interesting that each revision passed clinical validation studies”. Confused? You are not alone. The American Heart Association recommends manual readings and the use of the mercury column sphygmomanometer as the “gold standard” for blood pressure measurement [5] while the American Hospital Association recommends eliminating mercury products from hospitals due to environmental concerns [3]. Does that seem contradictory? Here is more. The largest US monitor manufacturer continues to rely upon indwelling catheters to provide source data for algorithm development but recently introduced a new model with an algorithm based on manual readings. Their monitors no longer agree with one another! With all of this conflicting information, what should a physician’s office or hospital do for blood pressure? Fortunately, SunTech Medical (www.SunTechMed.com) - a company with a twenty-year history of creating unique blood pressure solutions - has come up with a pragmatic approach to address these issues. The new Adview 9000 Diagnostic Station combines the efficiency of an automated monitor with the convenience of a manual mode that allows the clinician to take a BP reading with a stethoscope whenever it is desirable to do so. In healthcare settings, the time saving efficiency of an automated reading is highly desirable. However, there are patient conditions (i.e. – arrhythmias), patient groups (i.e. – pediatrics), and environments (i.e. – moving vehicles) where automated monitors do not always function well [3]. In these situations, having a manual mode built into the automated device is eminently practical. The new Adview 9000™ Diagnostic Station for blood pressure measurement is available in three mounting configurations: wall, tabletop, or mobile stand. Optional plug-and-play temperature and pulse oximetry modules can be added at any time to create a diagnostic workstation. Additional modules for EMR interface and other vital signs parameters are in development.

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