

Medical Students Fail Blood Pressure Measurement Challenge: Implications for Measurement

Kenneth Royal, PhD¹

¹North Carolina State University

Rakotz and colleagues (2017) recently published a paper describing a blood pressure (BP) challenge presented to 159 medical students representing 37 states at the American Medical Association's House of Delegates Meeting in June 2015. The challenge consisted of correctly performing all 11 elements involved in a BP assessment using simulated patients. Alarming, only 1 of the 159 (0.63 %) medical students correctly performed all 11 elements.

According to professional guidelines (Bickley & Szilagyi, 2013; and Pickering et al, 2005), the 11 steps involved in a proper BP assessment include: 1) allowing the patient to rest for 5 minutes before taking the measurement; 2) ensuring patient's legs are uncrossed; 3) ensuring the patient's feet are flat on the floor; 4) ensuring the patient's arm is supported; 5) ensuring the sphygmomanometer's cuff size is correct; 6) properly positing cuff over bare arm; 7) no talking; 8) ensuring the patient does not use his/her cell phone during the reading; 9) taking BP measurements in both arms; 10) identifying the arm with the higher reading as being clinically more important; and 11) identifying the correct arm to use when performing future BP assessment (the one with the higher measurement).

All medical students involved in the study had confirmed that they had previously received training during medical school for measuring blood pressure. Further, because additional skills are necessary when using a manual sphygmomanometer, the authors of the study elected to provide all students with an automated device in order to remove students' ability to use the auscultatory method correctly from the testing process. The authors of the study reported the average number of elements correctly performed was 4.1 (no SD was reported).

While the results from this study likely will raise concern among the general public, scholars and practitioners of measurement may also find these results particularly troubling. There currently exists an enormous literature regarding blood pressure measurements. In fact, there are even academic journals devoted entirely to the study of blood pressure measurements (e.g., *Blood Pressure Monitoring*), and numerous medical journals devoted to the study of blood pressure (e.g., *Blood Pressure, Hypertension, Integrated Blood Pressure Control, Kidney & Blood Pressure Research, High Blood Pressure & Cardiovascular Prevention*, etc.) Further, a considerable body of literature also discusses the many BP instruments and methods available for collecting readings, and various statistical algorithms used to improve the precision of BP measurements. Yet, despite all the technological advances and sophisticated instruments available, these tools likely are of only limited utility until health care professionals utilize them correctly.

Inappropriate inferences about BP readings could result in unintended consequences that jeopardize a patient's health. In fact, research (Chobanian et al, 2003) indicates most human errors when measuring BP result in higher readings. Therefore, these costly errors may result in misclassifying prehypertension as stage 1 hypertension and beginning a treatment program that may be both unnecessary and harmful to a patient. This problem is further exacerbated when physicians put a patient on high blood pressure medication, as most physicians are extremely reluctant to take a patient off the medication, as the risks associated with stopping are extremely high. Further, continued usage of poor BP measurement techniques could result in

patients whose blood pressure is under control to appear uncontrolled, thus escalating therapy that could further harm a patient. Until physicians can obtain accurate BP measurements, it is unlikely they can accurately differentiate those individuals who may need treatment from those that do not.

So, I wish to ask the measurement community how we might assist healthcare professionals (and those responsible for their training) to correctly practice proper blood pressure measurement techniques? What lessons from psychometrics can parlay into the everyday practice of healthcare providers? Contributing practical solutions to this problem could go a long way in directly improving patient health and outcomes.

References

Pickering T, Hall JE, Appel LJ, et al. Recommendations for blood pressure measurement in humans and experimental animals part 1: blood pressure measurement in humans – a statement for professionals from the Subcommittee of Professional and Public Education of the American Heart Association Council on High Blood Pressure Research. *Hypertension*. 2005;45:142-161.

Bickley LS, Szilagyi PG. Beginning the physical examination: general survey, vital signs and pain. In: Bickley LS, Szilagyi PG, eds. *Bates' Guide to Physical Examination and History Taking*, 11th ed. Philadelphia, PA: Wolters Kluwer Health/ Lippincott Williams and Wilkins; 2013:119-134.

Chobanian AV, Bakris GL, Black HR, et al. Seventh report of the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure. *Hypertension*. 2003;42:1206-1252.

Rakotz MK, Townsend RR, Yang J, et al. Medical students and measuring blood pressure: Results from the American Medical Association Blood Pressure Check Challenge. *Journal of Clinical Hypertension*. 2017;19:614–619.