

The Utility of Repeating Automated Blood Pressure Measurements in the Primary Care Office

To the Editor:

Accuracy of blood pressure (BP) measurements has significant implications for the diagnosis and management of hypertension. The U.S. Preventive Services Task Force (USPSTF) released a draft recommendation statement advocating the use of ambulatory BP monitoring (ABPM) to confirm hypertension, partly given concern for limited reliability of office BP measurements.¹ While automated methods of determining BP are common in the outpatient setting, data on the effect of repeating BP and heart rate (HR) measurements with this technique are scarce. We aimed to evaluate the utility of obtaining a second set of automated BP and HR readings during an office appointment.

We retrospectively studied 73 primary care clinic patients with a diagnosis of hypertension. These patients had received care plans as part of a quality improvement effort to provide education about managing high BP. Patients with regularly scheduled appointments received automated BP and HR measurements, performed by clinic nurses with Dinamap XL 9300 monitors (GE Healthcare, Waukesha, WI) using standard techniques. As part of care plan delivery, measurements were repeated using the same methods during the same appointment.

The primary endpoint was change in BP between the two measurements. The secondary endpoint was change in HR. Generalized estimating equations (GEEs) were used to address the correlation between the initial and repeat measurements. Univariate analyses were performed to determine the difference between measurements taken at the two time points, and backward model selection was applied to select models for multivariate analyses, which assessed potential predictors for the change.

Our sample presented with an average age of 63 ± 16 years and consisted of 45 (62%) women and 65 (89%) African Americans. There were 48 (66%) obese individuals and 36 (49%) with diabetes mellitus. The total number of patients taking three or more antihypertensive medications was 33 (45%). The average initial systolic BP was 143 ± 14 mm Hg, while the average initial diastolic BP was 77 ± 12 mm Hg. Average initial HR was 79 ± 14 beats per minute (bpm). The time between repeat measurements was a median of 16 minutes (mean 18 ± 7).

Univariate analyses showed significant decreases in BP and HR with repeat assessment (Figure). Systolic BP decreased by a mean of 11 mm Hg (95% confidence interval [CI], 8.4–13.7, $P < .01$) with 63 (86%) patients experiencing a lower systolic reading. Similarly, diastolic BP decreased by a mean of 5.2 mm Hg (95% CI, 3.3–7.1, $P < .01$) as 54 (74%) patients developed a lower diastolic reading. Reduction in both systolic and diastolic BPs was observed among 48 (66%) patients. In addition, there were 36 (49%) patients whose initial reading of systolic BP > 140 mm Hg or diastolic BP > 90 mm Hg was reclassified to systolic BP < 140 mm Hg or diastolic BP < 90 mm Hg upon repeat measurement. Obtaining a second HR measurement similarly showed a reduction in the pulse reading by a mean of 6.2 bpm (95% CI, 4.7–7.8, $P < .01$), with 61 (84%) patients experiencing lower HR.

Our multivariate analyses showed that age and body mass index were associated with BP changes. Patients older than 60 years, relative to younger patients, showed greater reduction in systolic BP ($P = .014$). In relation to patients with healthy weight, obese patients showed greater reduction in systolic ($P = .03$) as well as diastolic ($P = .02$) BP.

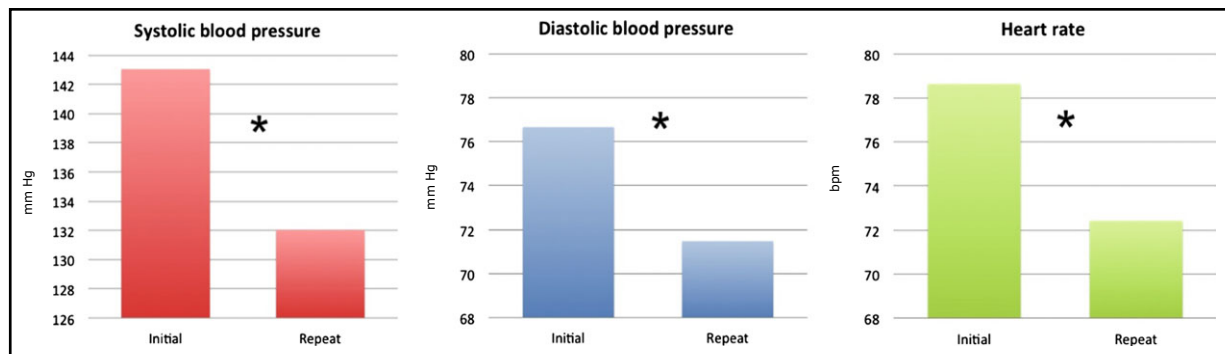


FIGURE. Changes in mean blood pressure and heart rate with repeat measurement during the same office visit. bpm indicates beats per minute. * P value $< .01$.

Among a high-risk population of hypertensive patients, repeating the automated measurement during the same office visit leads to lower BP and HR readings. Patients older than 60 years and obese patients are more likely to experience decreased BP readings. Reduction of BP during an individual primary care appointment illustrates a component of the white-coat effect that may be unrecognized in common practice. We thus propose the concept of “first-pass” white-coat hypertension to refer to the difference between first and second BP readings during an individual office visit; “second-pass” white-coat hypertension may then refer to the phenomenon of persistently high BP readings in the office but normal readings at home. Our findings suggest that obtaining a second BP during the same

appointment provides data more representative of hypertensive status and potentially offers confirmation when cost, availability, or convenience of ABPM are barriers.

Usama A. Daimee, MD; Douglas Done, MPH; Wan Tang, PhD; Xin M. Tu, PhD; John D. Bisognano, MD, PhD; William H. Bayer, MD
From the University of Rochester Medical Center, Rochester, NY

Reference

1. U.S. Preventive Services Task Force. Draft Recommendation Statement: High Blood Pressure in Adults: Screening. December 2014. <http://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementDraft/hypertension-in-adults-screening-and-home-monitoring>