Background. The common assumption is that blood pressure (BP) will decrease on subsequent readings, however this has not been proven true for every patient. The objective of this study is to examine the prevalence and direction of BP classification change with repeat clinic measurements and compare common clinical characteristics of groups that do and do not change BP classification.

Methods: A nationally representative subsample of 1,725 adolescents representing 31,193,305 adolescents aged 13-18 years from the National Health and Nutrition Examination Survey (NHANES) 2005-2008 were analyzed. Three systolic and diastolic BP measurements were obtained. Subjects were classified based on the first and the average of three BP measurements as having normal BP, hypertension, and pre-hypertension. Participants were divided into three groups based on the direction of BP change from first to average of three readings: up, down, or no change.

Results: Of the 1,725 adolescents, 1,569 (90.9%) maintained BP classification between the first measurement and the average of three, 6.2% (n=107) classified in the BP up group, 6.2% (n=107) classified in the BP down group, and 6.6% (n=112) classified in the BP no change group.

Conclusion: With repeat measurements, the majority of adolescents (91%) did not change classification. Obesity was a significant predictor of the 9% that changed classification. Repeat BP measurements, especially for obese adolescents, may lead to more accurate classification of BP status.


discussion

• Hypertension guidelines recommend using the average of two or more blood pressure measurements for clinical purposes yet most patients have only one BP measurement in the usual routine office encounter.

• It is generally believed that with repeat blood pressure measurements, especially after a brief period of rest, blood pressure readings tend to go down. The practice of obtaining multiple BP readings is widely accepted to help reduce the likelihood of the white coat effect and classifying anxious and active children with hypertension. Very little is known about a small group of children whose BP readings go up with repeat BP measurements.

• In this study we examined the 2.9% of our study population for whom BP went up with repeat measurements and found that those adolescents had higher BMI and CRP levels.

• While most children calm down after a brief period of rest, it is possible that some get more anxious from the process of obtaining multiple measurements. Another possible explanation comes from the statistical phenomenon called "regression to the mean," where with repeat measurements, readings tend to converge towards the mean (low read/ go up with repeat measurements). Although regression to the mean is a possible explanation, a noteworthy observation was that a higher percentage of adolescents in that group were in the pre-hypertension range and were overweight and significantly different CRP levels. This raises the possibility that this group represents a high risk group with a more labile BP compared to their lean counterparts.

conclusions

• With repeat measurements, the vast majority of pediatric patients (91%) do not change classification.

• BP classification went down for 6.2% of adolescents.

• A smaller percentage of adolescents have a higher BP classification with repeat testing and maybe missed with single BP measurement.

• Higher BMI was significantly associated with change in BP classification.

• Further studies to compare cardiovascular risk and target organ damage in groups that change BP classification are needed.