

Differences in blood pressure readings in pregnancy based on method of measurement

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Background

In the United States, cardiovascular conditions and preeclampsia/eclampsia are among the leading causes for maternal mortality. Unfortunately, around 2 out of 3 maternal deaths in the United States were determined to be preventable. As such, accurate diagnosis and effective management of hypertensive disorders of pregnancy is of critical importance for maternal health. White coat hypertension (WCH)

is defined as having elevated blood pressure measurements in the office, but normotensive blood pressures at home.

Objective

To examine the use of a Bluetooth-enabled home blood pressure monitoring system in a pregnant patient population. We compared home blood pressure measurements to measurements taken with a manual

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sphygmomanometer following the AHA guidelines and to a recent clinic visit. We also measured patient satisfaction with the home blood pressure monitoring system.

Methods

This study was conducted as part of the POSTURE study (IRB# 201811779) at the University of Iowa Hospitals and Clinics (UIHC). At the time of consent, the participant's blood pressure was measured using a manual blood pressure cuff and stethoscope. Two measurements were collected in the manner recommended by the American Heart Association (AHA) Guidelines, and the mean of the two blood pressure measurements was recorded. Participants were then asked to measure their blood pressure using the Bluetooth enabled blood pressure device twice (Withings) daily for 14 days, giving 28 total measurements. Blood pressure measurement data was obtained from the Withings advanced programming interface (API). Satisfaction with the home device and app was assessed using a REDCap survey sent to participants 15 days after signing informed consent.

Results

Forty-four pregnant women were enrolled in our study between October 2020 and September 2021. Systolic blood pressure (SBP) measured by the home device was noted to be significantly higher than the standardized AHA blood pressure (median home SBP 110 mmHg; median AHA SBP 105 mmHg; comparison $p=0.009$). The most recent clinic systolic

BP was noted to be the highest value of the three, with median of 117 mmHg (home comparison $p=0.021$; AHA comparison $p=0.003$). Similarly, diastolic blood pressure (DBP) measured with the home device was noted to be significantly higher than the standardized AHA blood pressure (median home DBP 69.5 mmHg; median AHA DBP 65.75 mmHg; comparison $p=0.002$). The clinic diastolic BP was also higher than the AHA blood pressure, though this difference was not statistically significant (median clinic DBP 70.5 mmHg; home comparison $p=0.947$; AHA comparison $p=0.078$). Overall, though we observed statistically significant differences among the blood pressure measurements, we can conclude that in the context of this study, blood pressures measured using the Bluetooth home device closely approximate blood pressures measured using the standardized AHA guidelines. Survey results were generally favorable towards the home BP measurement device. Most respondents also answered favorably to questions regarding the utility of the app for managing their health and wellbeing. Ninety-seven percent of respondents agreed that they would recommend the BP app and cuff system to friends. Overall, the majority of survey respondents answered favorably to survey questions regarding the ease of use, utility, and satisfaction with the home BP device and app.

Conclusion

Home blood pressure measurement devices like the device used in our study will give providers more tools for accurate diagnosis and management of

their patients' health throughout pregnancy.

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