



Evaluation different blood pressure interpretation strategies and cutoff values to predict postpartum hypertension-related readmissions.



N. MUKHTAROVA¹, Y. CHEN², O. ALAGOZ², K. HOPPE¹

1. Department of Obstetrics & Gynecology, University of Wisconsin School of Medicine and Public Health, Madison, Wisconsin, USA
2. Department of Industrial & Systems Engineering, University of Wisconsin-Madison, Madison, USA

Introduction

- ACOG suggests initiation of postpartum antihypertensive treatment if systolic blood pressure (BP) ≥ 150 mmHg, diastolic BP ≥ 100 mmHg, on two occasions at least 4-6 hours apart in the first 4 days postpartum.¹
- For a population with increasing rates of medical comorbidities predisposing to hypertensive disorders of pregnancy, reassessment of current recommendations will likely help to optimize individualized postpartum hypertension care.^{2,3}

Hypothesis

We hypothesized that BP interpretation strategies different from the currently recommended with lower BP thresholds can predict postpartum hypertension-related readmissions with higher specificity and/or sensitivity.

Methods

- A retrospective cohort of 24,917 women who delivered between 1/2009 and 6/2015.
- BPs measured postpartum were used to evaluate three different BP interpretation strategies:
 - Strategy 1** – mean systolic and/or diastolic BP exceeding the threshold,
 - Strategy 2** – maximum systolic and/or diastolic BP exceeding the BP threshold on one occasion,
 - Strategy 3** – maximum systolic and/or diastolic BP exceeding the BP threshold on two occasions at least 4 hours apart.
- ROC curves and the AUC were used to measure the predictive performance of these strategies.

Results

- The difference between the AUC of Strategy 2 and 3 was statistically significant ($p < 0.0001$), while the differences between the AUC for strategy 1 vs 2 and between AUC for strategy 1 vs 3 were insignificant ($p > 0.05$).
- The BP threshold of 150/100 mmHg with the Strategy 3 (currently recommended threshold for postpartum antihypertensive treatment initiation) had sensitivity of 38% and specificity of 95%.
- The BP threshold of 140/90 mmHg with the same strategy had sensitivity of 71% and specificity of 84%.

Figure 1. ROC curves of the three strategies for prediction of postpartum hypertension-related readmissions.

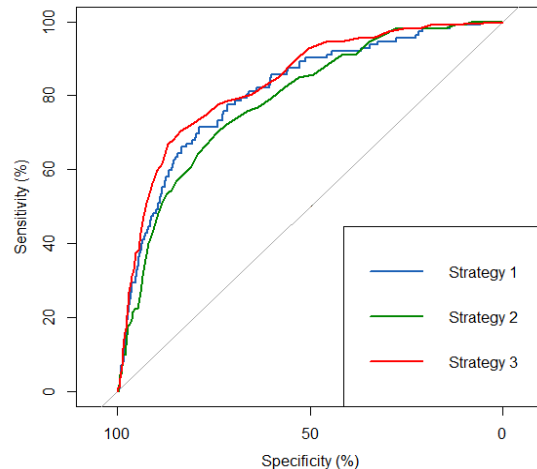


Table 1. Maternal demographics.

Characteristics	All participants
Maternal age (years)	29.9 ± 5.4
Body mass index (kg/m ²)	26 ± 9.1
Race/ethnicity, n (%)	
African American	1,860 (7.5)
White	20,262 (81)
Hispanic	2,325 (9.3)
Parity, n (%)	
0	14,055 (56)
1+	10,532 (42)
Gestational age at delivery (weeks)	38.9 ± 2.73
Estimated blood loss (ml)	441 ± 316.7
Mode of delivery, n (%)	
Spontaneous vaginal delivery	16,137 (65)
Operative vaginal	1,330 (5)
Cesarean	7,009 (28)
Maternal postpartum hospital stays (days)	2.3 ± 3.7
Pregnancy outcomes, n (%)	
Gestational diabetes	1,929 (7.7)
Gestational hypertension	989 (4)
Pre-eclampsia	523 (2.1)
Pre-eclampsia with severe features	484 (1.9)
Chronic hypertension with SIPE	125 (0.5)
Eclampsia	7 (0.03)

Data are expressed as mean ± SD or n (%).

Table 5. AUC for prediction of readmissions, with each of the three different BP interpretation strategies.

BP interpretation strategy	AUC (95% CI)	SE
Strategy 1	0.8097 (76.95-85.08)	0.12
Strategy 2	0.7875 (74.7-82.81)	<0.01
Strategy 3	0.8347 (79.83-87.24)	0.33

AUC, area under the curve; BP, blood pressure; CI, confidence interval; SE, standard error.

Conclusion

- The strategy of using maximum BP exceeding the BP threshold on two occasions at least 4 hours apart at lower BP thresholds can predict postpartum hospital readmissions with higher sensitivity and/or specificity.
- If the threshold for the postpartum antihypertensive treatment initiation were lowered to BP $\geq 140/90$ mmHg compared to currently recommended $\geq 150/100$ mmHg it would significantly reduce postpartum readmissions.
- Women with BP $\geq 140/90$ on two occasions at least 4 hours apart in the postpartum period are at risk of BP exacerbation in the following days and may need a more aggressive antihypertensive treatment or a close postpartum monitoring which could be done either by home BP monitoring or moving postpartum visits to the earlier date.

References

- Hypertension in pregnancy. Report of the American College of Obstetricians and Gynecologists' Task Force on Hypertension in Pregnancy. *Obstet Gynecol* 2013;122:1122-31.
- ANANTH CV, DUZYI CM, YADAVA S, SCHWEBEL M, TITA ATN, JOSEPH KS. Changes in the Prevalence of Chronic Hypertension in Pregnancy, United States, 1970 to 2010. *Hypertension* 2019;74:1089-95
- WALLIS AB, SAFTLAS AF, HSIA J, ATRASH HK. Secular trends in the rates of preeclampsia, eclampsia, and gestational hypertension, United States, 1987-2004. *Am J Hypertens* 2008;21:521-6.