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Emergency Department Visits for Postpartum Hypertension

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Abstract

Objectives: To describe the characteristics of women diagnosed with postpartum hypertension in an emergency department (ED) to better inform postpartum care.

Methods: Women with an ED diagnosis of hypertension were compared to women with all other ED diagnoses.

Results: Among 252 postpartum women who presented for ED care, 52 were given a diagnosis of hypertension. Women with hypertension had some recognizable risk factors and presented on average within one week of delivery. Readmission rate was high, and many women seemed aware of their hypertension.

Conclusion: Postpartum surveillance may not prevent readmission for hypertension, future focus should be in prevention interventions.

Keywords

postpartum; hypertension; readmission; emergency department

I. Introduction

Hypertensive disorders affect up to ten percent of pregnancies.¹ Women with hypertensive disorders during pregnancy are at increased risk for hypertensive episodes postpartum. However, there are many women diagnosed with a postpartum hypertensive disorder that had no antepartum or intrapartum issues with elevated blood pressure.^{2,3} Antenatal management and delivery timing for pregnancies complicated by hypertension have been a frequent focus of clinical research, but there is no evidence-based standard for postpartum surveillance that might prevent postpartum hypertension.^{4,5}

Hypertension is a leading cause for postpartum complications and hospital readmissions.^{6,7} Postpartum hypertension is associated with readmission to the hospital which is costly to the medical system, and disruptive to the family unit adapting to a new baby. Furthermore, the maternal health risks of postpartum hypertension include such diagnoses as seizure and intracerebral hemorrhage.⁸ It is imperative that we increase our understanding of the

postpartum hypertensive disorders to better serve our patients after their delivery hospitalization.

The objective of this study was to examine the characteristics of postpartum women who were diagnosed with a hypertensive disorder in an emergency department (ED). Utilizing ED data, we can gain a better knowledge of the postpartum complications occurring in women who are diagnosed with hypertension. This data will add to the existing literature that has identified the complications associated with postpartum hypertension by readmission data.³ Women presenting to an ED during the postpartum period represent a population of women whose needs are not being met by our current system. Given the potentially severe complications associated with postpartum hypertension, it is important that we learn more about the symptoms and characteristics that might better predict the complication of hypertension. This is information that could facilitate the development of strategies to better deliver individualized postpartum care to prevent postpartum hypertensive morbidity and readmission.

II. Methods

We performed a retrospective cohort study of all postpartum women who presented to the Women & Infants Hospital Emergency Department during a six-month period (December 2013-May 2014). We compared the medical records of women diagnosed with postpartum hypertension to women given any other diagnosis. This study was approved by the Institutional Review Board at Women & Infants Hospital in Providence, Rhode Island (14-0064). A postpartum emergency department visit was defined as any presentation to the emergency department (ED) during the first 42 days after delivery.

We abstracted demographic and clinical information from the electronic medical record. All available medical records were reviewed including the ED documentation, admission records, antenatal records, delivery and operative reports, postpartum hospitalization, and discharge documentation. Maternal co-morbidities and obstetric complications were abstracted directly from the documentation provided in the medical records. All delivery records were reviewed for delivery type and complications.

We collected data on postpartum medical complications that occurred during the delivery admission. Additionally, we collected detailed information on postpartum blood pressures, which were reviewed in all cases and blood pressures of 140/90 and 130/80 were noted, as well as the number of times this occurred. We excluded from the count elevated postpartum blood pressure during the two hours immediately post-delivery.

The chief complaint and final diagnosis in the ED were recorded directly as documented within the medical chart. All presenting symptoms were included. Similarly, all final diagnoses were recorded. Additionally, we recorded blood pressure at ED presentation for each woman.

We compared demographic and medical characteristics between women with a postpartum ED diagnosis of hypertension and postpartum women with all other ED diagnosis. Additionally, we compared the groups in terms of the timing of presentation to the ED, the

chief complaint, and resource utilization. Groups were compared using chi-square or t-tests, as appropriate. Risk ratios (RR) with 95% confidence intervals (CIs) were obtained from log binomial regression models. We calculated risk ratios because hypertensive disorders were not rare among women seeking care in the ED (~20%), and so an odds ratio would not approximate the risk ratio. Two tailed values of $P < 0.05$ were considered to indicate statistical significance.

III. Results

Two hundred fifty two women presented for at least one postpartum visit to the ED and 52 (20.6%) were given the diagnosis of hypertension at the ED visit. Women with a diagnosis of hypertension were older (31.1 ± 6.2 years compared to 28.5 ± 6.1 , $p = 0.007$) and had higher pre-pregnancy body mass indices (31.0 ± 8.3 kg/m² compared to 28.1 ± 7.8 , $p = 0.018$) compared to women with all other diagnoses. There were no differences between the women diagnosed with hypertension and the women with other diagnoses with respect to race, smoking status, parity, gestational age, delivery type or number of postpartum days in the hospital (Table 1). Women who received a postpartum ED diagnosis of hypertension were more likely to have had an induction of labor than those women who did not receive a postpartum ED diagnosis of hypertension (56% compared to 32%, $p = 0.002$).

Maternal co-morbidities, obstetric complications, and characteristics of postpartum hospitalization are presented in Table 2. Women diagnosed with postpartum hypertension were more likely to have preexisting hypertension (RR 5.24, 95%CI 2.56–10.73), gestational hypertension (RR 2.61, 95%CI 1.59–4.29), preeclampsia (RR 3.85, 95%CI 2.11–7.00), gestational diabetes (RR 2.16, 95%CI 1.01–4.61) or obesity (RR=1.89, 95%CI 1.32–2.70) compared to postpartum women seen in the ED without hypertension. Of all postpartum women who presented to the ED during this study, women without any documented co-morbidities were about half as likely to receive a diagnosis of hypertension postpartum compared to the women with at least one documented maternal medical co-morbidity (RR=0.49, 95%CI 0.27–0.92). Examining postpartum clinical findings, women with postpartum hypertension were 2.85 times more likely to have had a blood pressure of 140/90 during postpartum hospitalization (95%CI 2.12–3.83) when compared to other postpartum ED patients.

The most common overall chief complaints upon presentation to the ED included obstetric wound complication (18%), fever (17%), abdominal pain (16%), headache/syncope/dizziness (12%), vaginal bleeding (11%) and breast problems (11%) (Table 3). Of all these common complaints, only headache and dizziness were significantly associated with a diagnosis of hypertension during postpartum ED presentation (RR=4.8, 95%CI 3.22–7.25). Women presenting with a chief complaint of hypertension (RR=7.45, 95%CI 5.18–10.72) or stating they were sent in to the ED by their provider (RR=4.52, 95%CI 3.02–6.71) were more likely to be diagnosed with postpartum hypertension than women without these chief complaints.

The mean postpartum day of presentation to the ED was 11.5 ± 9.4 days and the overall readmission rate of all the postpartum women who presented to the ED was 21.5% (Table 4). Women with postpartum hypertension presented earlier than women in the ED without

hypertension (7.0 days $\pm$ 4.3 compared to 12.7 $\pm$ 10.0, $P<0.001$) and were more likely to be readmitted (58% compared to 12%, $P<0.001$). In the ED, women with hypertension utilized more resources, specifically intravenous access, intravenous medications and labwork, but did not have increased utilization of imaging.

IV. Discussion

Postpartum hypertension is a common finding in women who present to the ED for evaluation during the first week after delivery, and increased post-delivery surveillance of women at risk does not appear to prevent readmission for this diagnosis. The women diagnosed with hypertension were older and, similar to other studies,^{9–12} we found an association between certain maternal co-morbidities and postpartum hypertension. The women diagnosed with postpartum hypertension were more likely to have chronic hypertension and obesity than those women who were not hypertensive at their ED visit. Obstetric complications of gestational hypertension, preeclampsia and gestational diabetes were more likely in those postpartum women in the ED who had a diagnosis of hypertension. Conversely, those women presenting to the ED without any co-morbidities were at half the risk of being diagnosed with postpartum hypertension.

In addition to those known risk factors mentioned above, we found a significant association between elevated postpartum blood pressure after delivery and a postpartum ED diagnosis of hypertension. This includes non-severe, mild elevations in blood pressure that often are deemed clinically insignificant. This indicates that non-severe elevations in blood pressure during postpartum hospitalization may also be predictive of an elevated risk for post discharge complications.

Almost half of the women diagnosed with postpartum hypertension presented with a chief complaint of hypertension. This suggests that these women may already be identified as high risk for postpartum hypertensive morbidities and a provider may be performing postpartum blood pressure monitoring in the office. However, this cohort of women with postpartum hypertension in the ED had a readmission rate of almost 58% suggesting that close monitoring may help identify hypertension, but not prevent readmission.

In conclusion, postpartum women with an ED diagnosis of hypertension represent a high-risk population with a high readmission rate. Diagnoses such as chronic hypertension, obesity, hypertensive disorders of pregnancy, and elevated postpartum blood pressures are associated with postpartum hypertension. In our study population, many women presented to the ED with an awareness of an elevated blood pressure, suggesting that these women were being monitored by a provider after hospital discharge. O'Meara and Lepic reviewed the literature on interventions to reduce postpartum readmissions for hypertension and found no reliable evidence to guide management, although postnatal furosemide was noted to show potential in reduction of severity of postpartum hypertension.^{4,5} Therefore, we recommend that future studies should focus on interventions, such as antihypertensive medications or furosemide in addition to close monitoring, to investigate protocols that better manage the immediate postpartum care in these women to decrease readmission.

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Table 1.

Characteristics of Women with Postpartum ED Visit, by Hypertensive Diagnosis. Mean $\pm$ standard deviation with t-test for continuous variables and N(%) with chi-square for categorical variables.

Characteristic	Overall (N=252)	HTN (N=52)	No HTN (N=200)	RR (95%CI) or p-value
Maternal age (years)	29.0 $\pm$ 6.2	31.1 $\pm$ 6.2	28.5 $\pm$ 6.1	0.007
BMI (kg/m ²)	28.7 $\pm$ 8.0	31.0 $\pm$ 8.3	28.1 $\pm$ 7.8	0.018
<u>Race</u>				
Caucasian	132 (52.4)	32 (61.5)	100 (50.0)	0.396
Black	27 (10.7)	6 (11.5)	21 (10.5)	
Hispanic	34 (13.5)	3 (5.8)	31 (15.5)	
Asian	13 (5.2)	4 (7.7)	9 (4.5)	
Other	12 (4.8)	1 (1.9)	11 (5.5)	
Mixed	9 (3.6)	2 (3.9)	7 (3.5)	
Unknown	25 (9.9)	4 (7.7)	21 (10.5)	
Tobacco Use	25 (9.9)	2 (3.9)	23 (11.5)	0.100
<u>Parity</u>				
0	116 (46.0)	23 (44.2)	93 (46.5)	0.923
1	72 (28.6)	16 (30.8)	56 (28.0)	
2+	64 (25.4)	13 (25.0)	51 (25.5)	
Gestational age at delivery (weeks)	38.5 $\pm$ 2.4	38.1 $\pm$ 1.9	38.6 $\pm$ 2.5	0.187
Induction of labor	93 (36.9)	29 (55.8)	64 (32.0)	0.002
<u>Delivery type</u>				
SVD	132 (52.4)	29 (55.8)	103 (51.5)	0.886
Operative vaginal	10 (4.0)	2 (3.9)	8 (4.0)	
C-section, planned	67 (26.6)	14 (26.9)	53 (26.5)	
C-section, unplanned	43 (17.1)	7 (13.5)	36 (18.0)	
<u>Discharge Day</u>				
1	17 (6.8)	3 (5.8)	14 (7.0)	0.705
2	112 (44.4)	24 (46.2)	88 (44.0)	
3	40 (15.9)	6 (11.5)	34 (17.0)	
4	80 (31.8)	19 (36.5)	61 (30.5)	
5	3 (1.2)	0 (0.0)	3 (1.5)	

Table 2.

Maternal co-morbidities, obstetric complications, and postpartum characteristics of women with postpartum ED visit, by Hypertensive Diagnosis

	Overall (N=252)	HTN yes (N=52)	HTN no (N=200)	RR (95%CI) or p-value
<u>Co-morbidities</u>				
None	79 (31.4)	9 (17.3)	70 (35.0)	0.49 (0.27–0.92)
Asthma	39 (15.5)	4 (7.7)	35 (17.5)	0.44 (0.16–1.18)
Diabetes	4 (1.6)	1 (1.9)	3 (1.5)	1.28 (0.14–12.07)
Hypertension	26 (10.3)	15 (28.9)	11 (5.5)	5.24 (2.56–10.73)
Anemia	38 (15.1)	8 (15.4)	30 (15.0)	1.03 (0.50–2.10)
Anxiety	54 (21.4)	10 (19.2)	44 (22.0)	0.87 (0.47–1.62)
Depression	56 (22.2)	8 (15.4)	48 (24.0)	0.64 (0.32–1.27)
Obesity	79 (31.4)	26 (50.0)	53 (26.5)	1.89 (1.32–2.70)
Thyroid disorder	16 (6.4)	6 (11.5)	10 (5.0)	2.31 (0.88–6.06)
<u>Ob complications</u>				
None	87 (34.5)	15 (28.9)	72 (36.0)	0.80 (0.50–1.28)
Preterm labor	8 (3.2)	0 (0.00)	8 (4.0)	—
PROM	14 (5.6)	3 (5.8)	11 (5.5)	1.05 (0.30–3.62)
Gestational diabetes	25 (9.9)	9 (17.3)	16 (8.0)	2.16 (1.01–4.61)
Gestational hypertension	47 (18.7)	19 (36.5)	28 (14.0)	2.61 (1.59–4.29)
Preeclampsia	34 (13.5)	17 (32.7)	17 (8.5)	3.85 (2.11–7.00)
IUGR	7 (2.8)	3 (5.8)	4 (2.0)	2.88 (0.67–12.49)
Thrombophilia	6 (2.4)	0 (0.00)	6 (3.0)	—
IUFD	3 (1.2)	1 (1.9)	2 (1.0)	1.92 (0.18–20.80)
Multiple gestation	8 (3.2)	3 (5.8)	5 (2.5)	2.31 (0.57–9.34)
Malpresentation	17 (6.8)	2 (3.9)	15 (7.5)	0.51 (0.12–2.17)
<u>PP clinical findings</u>				
PP hemorrhage	15 (6.0)	3 (5.8)	12 (6.0)	0.96 (0.28–3.28)
Fever	6 (2.4)	1 (1.9)	5 (2.5)	0.77 (0.09–6.44)
Blood transfusion	7 (2.8)	2 (3.9)	5 (2.5)	1.54 (0.31–7.71)
Voiding difficulty	7 (2.8)	1 (1.9)	6 (3.0)	0.64 (0.08–5.21)
BP 140/90	87 (34.5)	37 (71.2)	50 (25.0)	2.85 (2.12–3.83)
BP 130/80	134(53.2)	44 (84.6)	90 (45.0)	1.88 (1.55–2.28)

PROM, premature rupture of membranes; IUGR, intrauterine growth restriction; IUFD, intrauterine fetal demise, PP, postpartum

Table 3:

Chief complaints overall and by presence of hypertensive disorder diagnosis. P-value for chi-square or Fisher's Exact Test. Risk Ratio (RR) from log binomial regression for risk of a hypertensive disorder diagnosis with each chief complaint.

Characteristic	Overall(N=252)	HTN yes (N=52)	HTN no (N=200)	P-value	RR (95% CI) or p-value
Chief Complaint					
Vaginal bleeding	27 (10.7)	1 (1.9)	26 (13.0)	0.021	0.16 (0.02–1.14)
Vaginal discharge	6 (2.4)	0 (0.0)	6 (3.0)	0.350	0.00
Obstetric	44 (17.5)	2 (3.9)	42 (21.0)	0.004	0.18 (0.05–0.75)
woundcomplication	43 (17.1)	4 (7.7)	39 (19.5)	0.044	0.41 (0.15–1.06)
Fevers	31 (12.3)	21 (40.4)	10 (5.0)	<0.001	4.83 (3.22–7.25)
Headache, syncope, dizzy	15 (6.0)	5 (9.6)	10 (5.0)	0.203	1.68 (0.79–3.59)
Chest pain, palpitations	12 (4.8)	4 (7.7)	8 (4.0)	0.277	1.67 (0.72–3.86)
Shortness of breath, cough	19 (7.5)	1 (1.9)	18 (9.0)	0.136	0.24 (0.04–1.65)
Gastrointestinal complaints	19 (7.5)	2 (3.9)	17 (8.5)	0.380	0.49 (0.13–1.86)
Voiding difficulty, dysuria	6 (2.4)	2 (3.9)	4 (2.0)	0.606	1.64 (0.52–5.22)
Psychiatric complaints	27 (10.7)	0 (0.0)	27 (13.5)	0.005	0.00
Breast problem	26 (10.3)	24 (46.2)	2 (1.0)	<0.001	7.45 (5.18–10.72)
Hypertension or eclampsia	40 (15.9)	6 (11.5)	34 (17.0)	0.337	0.69 (0.32–1.51)
Pain, abdominal	19 (7.5)	14 (26.9)	5 (2.5)	<0.001	4.52 (3.04–6.71)
Told to come in by provider	4 (1.6)	0 (0.0)	4 (2.0)	0.584	0.00
Vaginal/rectal pain	12 (4.8)	4 (7.7)	8 (4.0)	0.277	1.67 (0.72–3.86)
Back pain	10 (4.0)	2 (3.9)	8 (4.0)	1.000	0.97 (0.27–3.43)
Edema/swelling					

Table 4.

Timing of presentation to the ED, readmission rate and ED resource utilization of postpartum ED visits, by hypertension diagnosis

	Overall (N=252)	HTN yes (N=52)	HTN no (N=200)	RR (95%CI) or p-value
Timing of presentation (Days pp)	11.5 [9.4]	7.0 [4.3]	12.7 [10.0]	<0.001
<u>Outcome from ED (N=251)</u>				
Admitted	54 (21.5)	30 (57.7)	24 (12.1)	
Discharged	194 (77.3)	22 (42.3)	172 (86.4)	
Transferred	3 (1.2)	0 (0.00)	3 (1.5)	<0.001
<u>Resources</u>				
IV	102 (40.5)	38 (73.1)	64 (32.0)	2.28 (1.76–2.96)
IV medication	67 (26.6)	28 (53.9)	39 (19.5)	2.76 (1.89–4.03)
Labs	174 (69.1)	51 (98.1)	123 (61.5)	1.59 (1.42–1.79)
Cultures	27 (10.7)	3 (5.8)	24 (12.0)	0.48 (0.15–1.53)
Imaging	55 (21.8)	7 (13.5)	48 (24.0)	0.56 (0.27–1.17)