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Time to Diagnosis and Treatment of Postpartum Hypertensive Disorders in the Emergency Department—A Single Retrospective Cohort Study

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Abstract: Background/Objectives: In the postpartum period, approximately 12% of patients seek care in the emergency department (ED), with a higher representation of Black patients. Hypertension is a common reason for ED visits during this period, often leading to dangerously delayed diagnosis and treatment. *Objective:* This study aims to assess the time to diagnosis and treatment of hypertensive disorders in the postpartum period in the ED, focusing on potential disparities in care, to identify areas for quality improvement. *Design:* Retrospective cohort study. *Setting:* A multi-centered large medical institution in the metro Detroit area. **Methods:** Postpartum patients (day 2 through day 28) presenting to the ED from November 2015 to December 2022. Exposures: none. *Main Outcome Measures:* Primary analysis assessed the time elapsed between severe-range blood pressure readings (greater than/equal to 160 systolic and/or 110 diastolic) and the administration of antihypertensives. Secondary analyses assessed the presence of essential laboratory workups such as complete blood counts, complete metabolic panels, and urine protein and creatinine. **Results:** Among the 430 women who presented to the ED during the postpartum period with hypertension, 372 (86.5%) exhibited severe-range blood pressure (greater than/equal to 160 systolic and/or 110 diastolic). Patients presented on average on postpartum day 6. Of the patients with severe hypertension, only 72% received a complete blood count, 66% underwent evaluation of creatinine and liver profile, and 4% had a urine protein and creatinine test ordered. The average time from severe-range blood pressure reading to antihypertensive administration was 189 min for Black patients and 370 min for White patients. There were no statistically significant differences in the time of the first blood pressure reading, laboratory evaluation, or treatment of severe-range blood pressure between racial groups. **Conclusions:** This study identifies the most significant area for improvement in the timely administration of antihypertensive medication following severe-range blood pressure readings. Additional areas for improvement were observed in ordering essential laboratory tests to assess the severity of preeclampsia. The institution demonstrated delayed yet equitable care for White and Black patients, contrary to the existing literature indicating potential racial disparities. A targeted quality improvement plan has been implemented to improve the identified areas of concern to adhere to the ACOG's treatment recommendations for hypertensive disorders of pregnancy. The impact on patient care will be reassessed at the 1-year mark.

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Academic Editor: Paolo Ivo Cavoretto

Received: 4 November 2024
Revised: 16 December 2024
Accepted: 24 December 2024
Published: 3 January 2025

Citation: Ezell, G.J.; Smith, N.; Condon, M.; Joyce, K.; Joseph, J.; Springer, K.; Pitts, D.S. Time to Diagnosis and Treatment of Postpartum Hypertensive Disorders in the Emergency Department—A Single Retrospective Cohort Study. *Reprod. Med.* **2025**, *6*, 2. https://doi.org/10.3390/reprodmed6010002

Keywords: disparities; emergency; emergency department; healthcare; hypertension; preeclampsia; postpartum

1. Introduction

Hypertensive disorders represent a significant challenge in obstetric care, affecting roughly 10–20% of pregnancies in the United States and frequently resulting in postpartum hospital readmissions [1–4]. These disorders, encompassing chronic hypertension, gestational hypertension, preeclampsia, and eclampsia, are leading contributors to maternal morbidity and mortality [5–7]. They often necessitate intensive management to prevent life-threatening complications such as stroke, pulmonary edema, heart failure, and renal impairment [5–8]. However, despite medical advancements, Black birthing individuals face disproportionately high rates of hypertensive complications and maternal mortality, with their maternal death rate being 2.9 times higher than that of their White counterparts [9–13]. Additionally, there is an increased risk of cardiovascular disease in mothers affected by metabolic syndrome or reduced fetal growth in pregnancy, also unequally affecting Black birthing individuals [14,15]. These alarming disparities are rooted in systemic inequities, including limited access to quality prenatal care, implicit bias in healthcare settings, and higher exposure to adverse social determinants of health, such as economic instability and inadequate housing [11,13].

The postpartum period is an especially vulnerable time for individuals with hypertensive disorders and risk factors, as the risk of severe complications can persist well beyond delivery [16]. Research shows that blood pressure levels measured during the first six weeks postpartum are predictive of future cardiovascular health, and elevated postpartum blood pressure is associated with increased hypertension risk three to four years after delivery [8]. This long-term risk highlights the broader cardiovascular implications of hypertensive disorders during pregnancy, underscoring the need for vigilant postpartum monitoring. Additionally, studies reveal that women with a history of hypertensive complications in pregnancy are twice as likely to develop cardiovascular disease later in life [5]. This association has far-reaching implications, particularly as cardiovascular disease is the leading cause of death among women in the United States [17].

Many postpartum patients, especially those affected by adverse social determinants of health, rely on the emergency department for urgent postpartum care [18]. This dependence on the emergency department is often due to limited access to primary care and the traditionally scheduled postpartum follow-up at six weeks, which may be insufficient for those experiencing acute symptoms in the immediate postpartum period [19].

Hypertensive disorders in pregnancy encompass a spectrum of conditions, each with its own risks and complications. The most severe forms, including preeclampsia with severe features, eclampsia, and HELLP syndrome (hemolysis, elevated liver enzymes, and low platelet count), present the highest risk of adverse outcomes not solely related to the mother. Some possible fetal effects of uncontrolled hypertensive disease in pregnancy include premature delivery due to placental or iatrogenic perfusion dysfunction, stillbirth, organ development issues, and low birth weight. There is a clear disparity in infant mortality in Black infants, in which the rate is 1.6 times higher than in White infants, and the leading cause of mortality is pre-term delivery. This directly correlates to the aforementioned racial disparities in hypertension disorders of pregnancy, affecting the same population at a higher rate.

Current treatment options for HELLP syndrome include delivery planning, magnesium sulfate, corticosteroids, blood pressure medication, and blood transfusions. Corti-

costeroids are used to help to protect the fetus from neurological deficits as well as to promote lung development. Blood pressure management includes those medications that are safe in pregnancy (i.e., nifedipine, hydralazine, labetalol). If thrombocytopenia is severe, blood transfusions can aid in replenishing platelets and decreasing the risk of disseminated intravascular coagulation (DIC). While many of these treatment modalities are relatively safe for mother and fetus, there are risks to receiving blood transfusions. These risks include bloodborne infections, red cell alloimmunization, and volume overload.

Hypertensive disorders of pregnancy may manifest within the first week after delivery but can appear as late as six weeks postpartum [20]. This variability in presentation complicates diagnosis and highlights the importance of understanding the unique pathophysiology underlying postpartum hypertension. For instance, some cases may be related to an acute or delayed mobilization of fluids into the intravascular space, leading to volume overload, elevated blood pressure, and renal dysfunction, which complicate diagnosis and management [20]. The non-specific nature of these symptoms, including headache, epigastric pain, and visual disturbances, can further delay appropriate treatment, as they may mimic other conditions, thus necessitating a high index of suspicion from healthcare providers [2].

Current management protocols for postpartum hypertensive disorders recommend using the aforementioned antihypertensive agents that are safe in pregnancy (labetalol, nicardipine, and hydralazine). Additionally, laboratory evaluations for liver and kidney function, platelet counts, and proteinuria are essential to guide treatment and assess disease severity [21]. However, limited data exist on adherence to these guidelines within emergency department settings, and disparities in protocol application may result in suboptimal outcomes for marginalized groups. Furthermore, research on emergency department practices has indicated that, while protocols exist, adherence to these evidence-based recommendations can be inconsistent, often varying by facility and region [22].

This study aims to address these gaps by examining deficiencies in the prompt evaluation, diagnosis, and management of postpartum hypertensive disorders within emergency department settings. Timely intervention is critical for preventing severe complications. According to ACOG guidelines, severe hypertension (defined as a blood pressure > 160/110 mmHg confirmed within 15 min) requires immediate treatment initiation within 30–60 min to mitigate risks of stroke, heart failure, and renal damage [22]. Despite these recommendations, delays in initiating antihypertensive treatment are common, particularly among Black and other non-White patients. This study hypothesized that treatment initiation would frequently exceed the recommended 60 min window, with treatment delays more pronounced among non-Hispanic Black patients compared to White patients. Such disparities reflect broader systemic challenges in achieving equitable healthcare access and outcomes [22,23].

Secondary objectives included evaluating the accuracy and timeliness of laboratory testing, the dosing of antihypertensive medications, and the administration of magnesium sulfate. While the use of magnesium sulfate as a neuroprotective measure remains contentious in the postpartum period, our institution's standard practice includes its administration to decrease the risk of eclampsia [21].

Through a comprehensive evaluation of current practices, this study seeks to identify areas for improvement in the management of hypertensive disorders in postpartum patients within emergency department settings. Findings from this research could inform the development of standardized protocols that prioritize rapid evaluation, prompt treatment initiation, and equitable care for all patients, particularly for those from historically underserved populations. By implementing evidence-based practices, identifying potentiating comorbidities, and addressing existing health disparities, this study aims to reduce mater-

nal morbidity and mortality, ultimately improving the standard of care for hypertensive disorders during and beyond the postpartum period [24–26].

This research has implications for public health and healthcare policy, as it underscores the need for increased resources, provider training, and policy reform to ensure equitable and high-quality postpartum care. Additionally, addressing the social determinants of health, such as improving access to timely postpartum follow-up, providing culturally competent care, and enhancing continuity of care, could lead to improved outcomes and help bridge the maternal mortality gap. Continuing efforts to promote health equity will be essential in reducing preventable complications related to hypertensive disorders, safeguarding the health of mothers during the critical postpartum period and beyond.

2. Methods

This retrospective study was conducted across multiple emergency departments within one large medical enterprise in metropolitan Detroit, encompassing a range of patient demographics and settings to enhance the generalizability of the findings. Institutional review board approval for study No. 15887 through our main health system was obtained with a waiver of consent, given this study's retrospective nature, ensuring ethical compliance while maintaining the study's feasibility. Data were collected over an extensive seven-year period, from 1 November 2015 to 31 December 2022, using the EPIC electronic medical record system (Epic Systems Corporation, Verona, WI, USA), a widely used, standardized data platform that ensures consistency in documentation and data extraction. We decided upon a 7-year study period to solely utilize ICD-10 codes, as opposed to both ICD-9 and ICD-10 codes.

This study focused on postpartum emergency department visits occurring within 28 days of delivery, specifically including encounters where patients presented with blood pressure readings of 140/90 mmHg or higher, indicating potential hypertensive complications. By targeting this patient population, this study aimed to capture a crucial period in the postpartum timeline where hypertensive disorders are prevalent yet often undermonitored, thus presenting an opportunity to address significant care gaps.

The primary outcome of interest was the time interval from the initial sustained severe-range blood pressure reading to the administration of antihypertensive medications. Severe-range blood pressure was defined as readings of $\geq$160/110 mmHg, reflecting the threshold at which immediate medical intervention is typically required to prevent complications such as stroke, seizure, and organ damage [5]. Sustained severe-range blood pressure is the continued presence of the above values within 15 min of remeasuring. While there are many reasons for elevated blood pressure, such as cuff malfunction or anxiety, the likelihood of sustained severe-range blood pressure in this setting is low. This outcome was chosen due to its relevance in mitigating adverse maternal outcomes associated with delayed treatment in hypertensive crises and per the ACOG's recommendation for treating severe-range blood pressures within 60 min of diagnosis [5].

Secondary outcomes included the timing of laboratory evaluations relative to the onset of severe-range blood pressure and the administration of magnesium sulfate for neuroprotection. Magnesium sulfate is essential in this context for seizure prophylaxis, particularly in patients with preeclampsia or eclampsia, making it a critical measure of adequate emergency department management. Key laboratory tests analyzed included complete blood counts, comprehensive metabolic panels, and urine protein-to-creatinine ratio, as these tests aid in diagnosing preeclampsia and assessing the severity of hypertensive disorders [5]. The timing of these laboratory assessments relative to the identification of severe hypertension provided insight into the efficiency of emergency department processes and adherence to ACOG diagnostic guidelines. Timely laboratory testing is also integral

to expeditious diagnosis, and due to the scope of practice of our emergency department colleagues, many times they do not recognize that the patient is postpartum and, further, possibly preeclamptic.

Timing was measured by timestamps generated by the collection of vitals and administration of medication on the electronic medical record. The differences between these times were computed via our statistical analysis. Diagnostic criteria for inclusion were based on the International Classification of Diseases, Tenth Revision (ICD-10) codes, covering chronic hypertension, gestational hypertension, and various forms of preeclampsia, in alignment with guidelines from the American College of Obstetrics and Gynecology (ACOG) [5,27]. These codes ensured that the patients were accurately categorized, allowing for more precise analysis and comparison across hypertensive subtypes.

Demographic data collected included patient age, race, body mass index (BMI), insurance type, and final disposition following the emergency department encounter (e.g., admission, discharge, observation, transfer). Collecting these demographic factors allowed for subgroup analysis to determine whether certain populations experienced differences in treatment timing, laboratory processing, or medication administration, thus identifying any potential disparities in postpartum care. We specifically stratified for race, given the historical systemic racism that affects care in minority populations, to identify any possible disparities within our system. This study's methodology aimed to deliver comprehensive insights into current practices and guide future quality improvement initiatives for managing hypertensive disorders in postpartum patients in the emergency department setting.

This study involved a comprehensive analysis of 430 pregnancies affected by hypertensive disorders, all managed within the emergency department. Data reporting was meticulous: continuous data, including means, standard deviations, counts, medians, interquartile ranges, and ranges, offered a detailed view of variability, while categorical data were expressed as counts and column percentages. Group comparisons by race were performed using univariate tests; for normally distributed continuous variables, analysis of variance (ANOVA) was used, while the Kruskal–Wallis test was applied to non-normally distributed continuous variables. Chi-squared tests or Fisher's exact tests were employed for categorical data where cell counts were less than five, ensuring statistical rigor across variable types. Statistical analysis was conducted using SAS version 9.4 (SAS Institute, Cary, NC, USA), with statistical significance set at $p < 0.05$.

3. Results

Table 1 outlines the demographic and clinical characteristics of the participants. The average age of the study population was 29 years, with racial distribution as follows: 105 patients (25%) identified as White, 267 (63.3%) as Black, and 48 (11.4%) identified under other racial categories, which included Asian, Middle Eastern, Hispanic, and American Indian/Alaska Native backgrounds. An additional 10 patients had no documented racial identification. The mean body mass index (BMI) of the participants was 36.5 kg/m^2 (obese), with the majority of patients presenting to the ED approximately six days postpartum. Hypertensive disorder diagnoses varied: 60 patients (14%) had chronic hypertension with superimposed preeclampsia, 118 (27.4%) had preeclampsia without severe features, and 312 (72.6%) presented with preeclampsia with severe features. Other diagnoses included 1 case (0.2%) of gestational hypertension, 6 cases (1.4%) of chronic hypertension, and 15 cases (3.5%) of HELLP syndrome. Insurance coverage was predominantly government-provided, with 279 patients (65%) on government insurance and 150 (35%) on private insurance.

Table 1. Patient demographics.

Mean Demographic	Total (*N* = 430)
Age, mean (SD)	29 years old (6.07)
Body mass index, mean (SD)	36.5 kg/m^2 (8.85)
Days postpartum at presentation, mean (SD)	6.10 days (8.62)
Race, *n* (%)	
Black	267 (63.6%)
Other	48 (11.4%)
White	105 (25%)
Chronic HTN with superimposed preeclampsia, *n* (%)	
No	370 (86.0%)
Yes	60 (14.0%)
Preeclampsia, *n* (%)	
Without severe features	118 (27.4%)
With severe features	312 (72.6%)
Gestational HTN, *n* (%)	
No	429 (99.8%)
Yes	1 (0.2%)
Chronic HTN, *n* (%)	
No	424 (98.6%)
Yes	6 (1.4%)
HELLP, *n* (%)	
No	415 (96.5%)
Yes	15 (3.5%)
Insurance *, *n* (%)	
Private	150 (35.0%)
Non-private	279 (65.0%)

HELLP, hemolysis, elevated liver enzymes, and low-platelet syndrome; HTN, hypertension. * Private insurance: Blue Cross Blue Shield, HAP, commercial; non-private: Tricare, Medicare, Medicaid.

An analysis of the time from severe-range blood pressure onset to antihypertensive administration revealed significant delays, with a mean treatment time of 370 min for White patients and 189 min for Black patients, as presented in Table 2. Although this delay was substantial across groups, no statistically significant difference was observed between racial groups ($p = 0.17$), suggesting that the issue of delayed care may stem from systemic factors affecting all patients rather than disparities based on race alone.

A significant portion of the study population, 372 patients (86.5%), exhibited severe-range blood pressure upon ED admission, underscoring the high acuity level of this cohort. Despite the critical need for rapid intervention, only 15 patients (4.03%) received the correct magnesium sulfate dose, which per institutional protocol consists of a 6 g bolus followed by a 2 g/h maintenance infusion. This low rate of correct dosing raises concerns regarding both adherence to institutional protocol and provider familiarity and comfort with managing obstetric hypertensive emergencies in the ED.

Table 2. Time from severe-range blood pressure to antihypertensive administration by race.

	Race			
	White	**Black**	**Other**	***p*-Value**
Time from severe BP to medication given (minutes)				0.17
N	89	262	39	
Mean (SD)	370.08 (817.25)	189.93 (817.89)	198.53 (303.10)	
Median (IQR)	97.00 (43.25–186.50)	116.50 (48.00–249.00)	108.00 (43.00–241.00)	
Range	−72.57 to 4936.00	−10,235.00 to 3859.00	9.00–1543.00	

BP, blood pressure; IQR, interquartile range; SD, standard deviation.

Figure 1 provides an illustration of the duration from the onset of severe-range blood pressure to the initial laboratory collection. The appropriate laboratory workup was notably varied: 311 patients (72.33%) underwent a complete blood count, 246 (66.13%) received either a comprehensive metabolic panel or a basic metabolic panel with liver function tests, only 15 patients (4.03%) had a urine protein analysis, and 146 patients (39.25%) underwent urine creatinine testing, as depicted in Figure 2. This variability in laboratory testing reflects potential gaps in standardized workup, especially considering the critical role of laboratory findings in managing hypertensive complications.

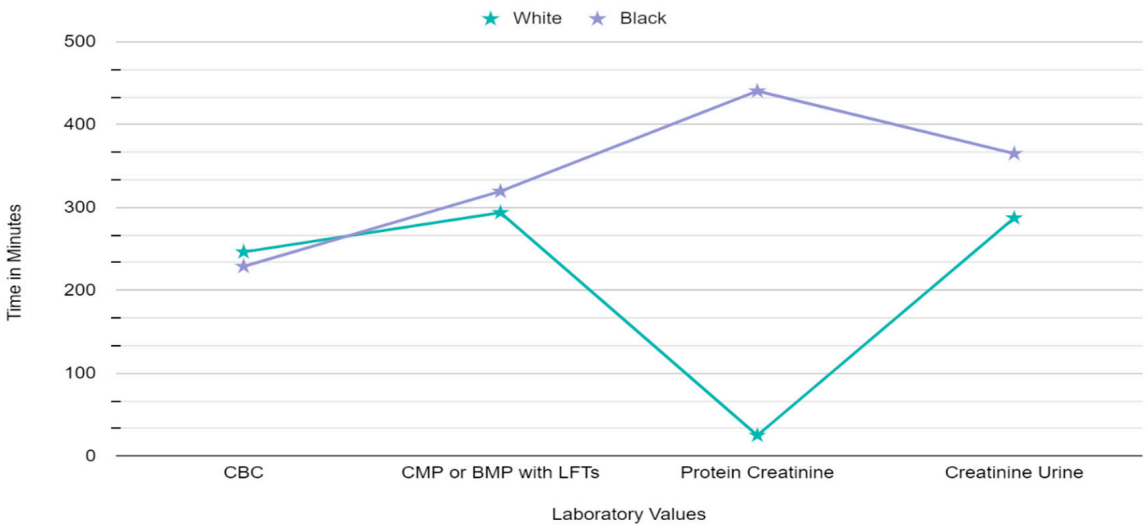

Figure 1. Time from severe-range blood pressure to laboratory orders by race.

Final patient disposition following emergency department encounters revealed a high rate of hospital admissions, with 348 patients (80.9%) being admitted. Other outcomes included 5 patients (1.2%) who were discharged directly from the emergency department, 15 (3.5%) placed under observation, 46 (10.7%) transferred to higher-level facilities, and 5 patients (1.2%) who left the emergency department against medical advice. These disposition data reflect the high acuity of this patient population, with the majority requiring intensive monitoring or escalated care. The findings underscore the need for enhanced protocols and clinical pathways within the emergency department to manage hypertensive disorders in pregnancy efficiently and safely.

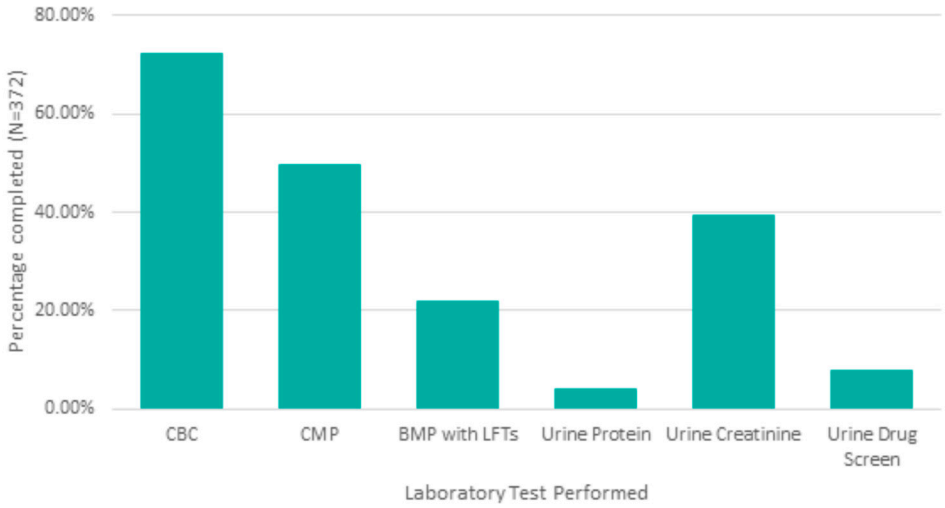

Figure 2. Laboratory workup performed after severe-range blood pressure. Abbreviations: BMP, basic metabolic panel; CBC (complete blood count); CMP (comprehensive metabolic panel); LFT (liver function test).

4. Discussion

This study revealed significant delays in treatment, with times ranging from 189 to 370 min across different racial groups ($p = 0.17$). Such prolonged delays substantially exceed the recommended 60 min treatment window needed to effectively mitigate morbidity and mortality risks in emergent cases. Recognizing this gap in timely care allowed the institution to conduct a comprehensive internal audit, focusing on pinpointing the underlying causes of these delays and addressing disparities across patient demographics.

Following these findings, a multidisciplinary quality improvement initiative was launched, with collaborative efforts between the emergency department and the obstetrics team. This partnership underscores the importance of quality improvement measures in healthcare settings, where identifying areas of deficiency is only the first step. By implementing targeted improvements, institutions can foster systemic change, streamline processes, and ensure more equitable, efficient patient care. In this case, the quality improvement efforts aim not only to reduce treatment times but also to establish a framework for ongoing assessment, ultimately promoting a culture of continuous improvement that can adapt to evolving patient needs.

While improvements in treatment timing are necessary, our findings indicate no statistically significant difference in the time from initial severe blood pressure reading to the administration of antihypertensive medication between Black and White patients ($p = 0.1665$). This contrasts with prior literature suggesting racial disparities and higher mortality rates among Black patients [6].

We also examined the interval between severe blood pressure readings and completion of preeclamptic laboratory testing. Despite an overall delay surpassing the recommended 60 min timeframe, we found no significant racial differences. However, there were substantial variations in the timeliness of different laboratory tests, highlighting inconsistencies in testing initiation. Although most patients underwent some components of the preeclamptic workup, notable delays were observed. These labs are important for the triaging of patients; without a full laboratory workup, further delays can occur, including consulting with the obstetrics team or possibly transferring the patient to a hospital that can admit or observe for hypertensive disorders of pregnancy.

Our analysis also examined the administration of magnesium sulfate for seizure prophylaxis in patients experiencing hypertensive emergencies. Although no significant

differences were observed across racial groups, a concerning finding emerged: only a small percentage of patients received the correct dosage of magnesium sulfate. This dosage inconsistency raises significant risks for future complications, underscoring the critical importance of accurate magnesium dosing in preventing severe maternal morbidity and mortality.

Magnesium sulfate, when administered in appropriate doses, effectively elevates serum magnesium levels to a therapeutic range, reducing the risk of eclamptic seizures in hypertensive patients. However, inadequate dosing may leave the patient with insufficient magnesium levels, failing to protect against seizures and putting them at risk of further complications associated with severe hypertension in pregnancy. Conversely, an excessive dose of magnesium sulfate can lead to magnesium toxicity, with potentially life-threatening consequences such as respiratory depression, cardiac arrhythmias, and even cardiac arrest. The Magpie Trial, a seminal study, found no significant benefit of magnesium sulfate in reducing postpartum eclampsia among high-risk women compared to a placebo group. However, the study's design limited its power to detect benefits in patients with late-onset severe hypertension, such as with our study group, highlighting a need for further research on the role of magnesium sulfate in preventing postpartum eclampsia [21,28].

These findings emphasize the need for standardized dosing protocols, such as order sets or clinical decision-support tools, to help guide providers, particularly those who may be less familiar or less comfortable with magnesium sulfate dosing in obstetric emergencies. Implementing these tools can support providers in delivering accurate and safe care, thereby minimizing the risks of both under-dosing and over-dosing. Ultimately, standardized tools contribute to the institution's quality improvement goals by promoting consistent, evidence-based practices that protect patient safety and enhance clinical outcomes.

Factors such as understaffing, inadequate knowledge of diagnostic laboratory studies, and desensitization to hypertensive-range blood pressures in the emergency department likely play a substantial role in the observed treatment delays. Understaffing in the emergency department, a common issue in many healthcare facilities, can lead to significant bottlenecks in patient care. With fewer available staff members, patient triage, diagnostics, and treatment initiation can all be delayed. Limited staffing resources mean that providers may have to prioritize more visibly urgent cases, inadvertently causing delayed care for patients with conditions like hypertension, which can initially appear less critical but hold serious risks if left untreated.

Inadequate familiarity with diagnostic laboratory studies relevant to hypertensive emergencies is another important factor. When emergency providers lack a deep understanding of the necessary labs or their clinical implications in obstetrics cases, they may not prioritize or correctly interpret these tests, slowing the decision-making process. This knowledge gap can result in missed opportunities to identify and treat high-risk conditions early, ultimately increasing the risk of severe outcomes in maternal hypertensive emergencies.

Additionally, a phenomenon known as "desensitization" to hypertensive blood pressure readings within the emergency department may contribute to these delays. In a high-pressure environment where staff frequently see patients with elevated blood pressures due to various causes, providers may become accustomed to or less responsive to hypertensive readings. This desensitization could lead to delays in recognizing that pregnant or postpartum patients with severe-range blood pressures are at a uniquely high risk for complications such as eclampsia, stroke, or placental abruption. Without prompt intervention, these patients are at risk of rapid deterioration, which underscores the need for heightened vigilance.

Collectively, these factors highlight the need for targeted quality improvement efforts, such as increased staffing, specialized training on hypertension in obstetrics patients, and

protocols that prioritize hypertensive emergencies in pregnancy. Addressing these issues can help to reduce treatment delays, ensure more consistent responses to hypertensive readings, and improve patient outcomes.

Looking ahead, implementing initiatives like patient banners for recent deliveries, electronic medical record order sets, and prioritization protocols for postpartum hypertensive patients in the emergency department offers a proactive approach to standardize and expedite care for this vulnerable group. Each of these measures addresses key points in the care process where delays or missteps are most likely to occur, thereby enhancing overall patient safety and treatment efficiency.

Introducing banners or visual indicators within the patient's medical record to signify recent deliveries can immediately alert emergency department staff to a patient's postpartum status, even if they present with symptoms unrelated to pregnancy. This simple alert could have profound impacts, ensuring that providers remain aware of the unique physiological risks that postpartum patients face, particularly with respect to hypertensive disorders. This real-time alert can trigger further investigation into symptoms that might otherwise be overlooked, such as severe headaches or abdominal pain, which could be early signs of postpartum preeclampsia. By increasing awareness, patient banners can reduce misdiagnoses and accelerate time-sensitive care.

Standardized electronic medical record order sets specifically tailored for postpartum hypertension allow providers to order necessary tests and medications with a few clicks, minimizing the variability in care and ensuring consistency. These pre-built order sets can include recommended lab tests, imaging studies, and medications for hypertensive emergencies, reducing the cognitive load on providers who may not be accustomed to managing postpartum complications. Moreover, order sets help prevent common dosing errors in medications such as magnesium sulfate, thereby safeguarding patients from potential under-dosing or toxicities. Streamlining orders in this way ensures that essential treatments are not omitted and that patients are managed in line with best practices and evidence-based guidelines.

Prioritizing postpartum hypertensive patients in the triage system of the emergency department can significantly reduce the time to treatment. This prioritization protocol, tailored to identify postpartum patients with elevated blood pressures as high-priority cases, could involve flags in the electronic medical record and specific pathways that fast-track these patients for physician evaluation and treatment initiation. Such a protocol would address the problem of desensitization to hypertensive-range blood pressures by ensuring that these cases receive the urgency that they warrant. It could also include rapid-access points for consultations with obstetrics teams, further expediting appropriate care.

Together, these initiatives hold the potential to greatly improve the speed, safety, and quality of care for postpartum hypertensive patients in the emergency department. By standardizing care through clear visual markers, electronic medical record-guided order sets, and prioritization protocols, hospitals can reduce variability, enhance provider awareness, and ultimately improve maternal health outcomes.

There is also room for improvement in discharge planning for our patients before they leave the hospital. Studies suggest that hypertensive complications can emerge up to six weeks or beyond, particularly in individuals with inadequate follow-up care [29]. This trend highlights a critical gap in postpartum management, as individuals with delayed presentations are often at greater risk of severe outcomes, necessitating earlier and more proactive care. As noted in our results, the mean BMI of our study population was in the obese range, increasing the likelihood of developing metabolic syndrome of pregnancy. As aforementioned, there is minor evidence suggesting a risk of developing sequelae of maternal metabolic syndrome, including cardiovascular disease in the fourth trimester

of pregnancy. Thus, there is room for shared decision-making discussions with patients to perform home blood pressure monitoring upon discharge. The goal is to provide precautionary limits and symptoms for patients to seek care for in a timely manner, in hopes of decreasing the time barrier to seeking care in the emergency department and reducing long-term cardiovascular sequelae, not limited to left ventricular dysfunction, atrial fibrillation, and stroke [24,30,31].

This study has limitations, including the sample size and its retrospective nature. Nonetheless, it underscores opportunities for quality improvement within our department. Addressing these issues aims to improve patient care and outcomes, particularly in the prompt diagnosis and treatment of hypertensive emergencies. It is encouraged that individual institutions should analyze their own metrics and data in a similar manner to target specific strengths and weaknesses.

This study provides a foundation for future investigations and quality improvement endeavors aimed at reducing treatment delays for hypertensive disorders in postpartum patients presenting to the emergency department. Specific analysis of racial differences should also be prioritized in future evaluations of timely care, given the widespread health disparity crisis that affects people of color with many different medical conditions in pregnancy and beyond. By addressing these delays, healthcare providers can potentially reduce associated morbidity and mortality risks.

5. Conclusions

In conclusion, this study highlights critical gaps in the management of hypertensive disorders during pregnancy within the emergency department, particularly concerning treatment delays and variability in care. Despite a high incidence of severe-range blood pressure among the patient population, the mean treatment times significantly exceeded the recommended benchmarks, reflecting systemic issues that necessitate urgent attention. While racial disparities in treatment times were not statistically significant, the overall findings underscore a need for enhanced awareness and responsiveness to hypertensive emergencies in postpartum patients across all demographic groups. The low adherence to magnesium sulfate dosing protocols raises further concerns about provider familiarity and comfort with managing obstetric emergencies, reinforcing the need for standardized protocols and decision-support tools. Factors such as understaffing, knowledge gaps, and desensitization to elevated blood pressure readings have been identified as contributing to these delays. Moving forward, implementing targeted quality improvement initiatives—such as the introduction of patient alerts, streamlined electronic medical record order sets, and prioritization protocols for postpartum patients—offers a promising strategy to enhance care delivery and patient outcomes. By fostering a culture of continuous improvement and adopting evidence-based practices, healthcare institutions can address identified shortcomings and ensure that patients receive timely, equitable, and effective care in the face of hypertensive disorders during pregnancy. Future research should continue to explore and evaluate these interventions to optimize maternal health outcomes in diverse clinical settings.

Author Contributions: G.J.E.: Writing of manuscript, editing of manuscript. N.S.: Conceptualization of project, writing of manuscript, manuscript editing, statistical analysis. M.C.: Data collection, conceptualization of project, manuscript editing. K.J.: Conceptualization of project, manuscript editing. J.J.: Conceptualization of project, manuscript editing. K.S.: Biostatistical analysis, manuscript editing. D.S.P.: Conceptualization of project, manuscript editing, and supervision. All authors have read and agreed to the published version of the manuscript.

Funding: This study was unfunded.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of Henry Ford Health System project number 15887-01, date of approval: 16 February 2023.

Informed Consent Statement: This retrospective study was approved by Henry Ford Health System Institutional Review Board and conducted across multiple medical centers in metropolitan Detroit and approved by the institutional review board, with a waiver of consent due to its retrospective nature.

Data Availability Statement: D'Angela S. Pitts, Nicolina Smith, Mary Condon, and Kylie Springer had full access to all of the data in this study and take responsibility for the integrity of the data and the accuracy of the data analysis. We are happy to share the data if needed.

Conflicts of Interest: The authors of this study do not have any conflicts of interest to disclose.

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