

Recognizing Early Warning Signs of Acute Hypertensive Crisis of the Postpartum Mother: An Important Role for Neonatal Nurses



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Learning Outcome. Upon completion of this activity, the learner will identify increased knowledge of the signs, symptoms, and management of maternal postpartum hypertensive crisis.

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ABSTRACT

A delay in detecting acute hypertensive crisis in postpartum mothers can exacerbate complications in the mother. Neonatal nurses are uniquely qualified to identify postpartum warning signs in mothers while they are in the NICU with their infants. Few research studies have explored the use of neonatal nurse screenings for acute hypertensive crisis in postpartum mothers. NICU nurses screening mothers for postpartum depression has yielded success in improving outcomes, and this model could be translated into screening for acute hypertensive crisis. Further education should be implemented for NICU nurses that include a review of adult blood pressure monitoring, early warning signs, and symptoms of preeclampsia that the mother should report. This article discusses the importance of the neonatal nurse's role in identifying early warning signs of maternal postpartum hypertensive crisis.

Keywords: eclampsia; hypertension; maternal; postpartum; preeclampsia

Hypertensive crisis in pregnancy is one of the leading causes of perinatal morbidity and mortality in the United States. It affects approximately 10–13 percent of pregnancies, and this rate is steadily increasing.^{1,2} An estimated 53 percent of mothers diagnosed with a severe maternal hypertensive crisis during pregnancy will experience a preterm delivery. However, the postpartum period sees the highest prevalence of acute hypertensive crisis in the setting of preeclampsia or eclampsia.^{3,4} Preeclampsia is a new-onset disorder that can be diagnosed during pregnancy, usually after 20 weeks gestation, and during the postpartum period.^{5,6}

Therefore, knowledge of the etiology, signs, and symptoms, and management of acute hypertensive crisis can help NICU nurses improve maternal and neonatal outcomes.

WHY NICU NURSES? THE NICU NURSE'S ROLE IN MATERNAL CARE

Researchers have indicated that NICU nurses are essential in detecting early warning signs of disease and complications in postpartum mothers. Neonatal nurses are often the care clinicians who have the most consistent contact with mothers and families with infants in the NICU.^{7–10} Trust

between the nurse and mother is established during each interaction and creates opportunities for the mother to be open about her personal life.^{11,12} Many mothers do not have follow-up appointments with their obstetric clinicians until 6 weeks postpartum; as a result, NICU nurses are often the most frequent healthcare providers to interact with the postpartum mother.^{13,14}

Many NICUs have successfully transitioned to implement family-centered care,¹⁵ with some using this model to maintain standards set by the baby-friendly initiative whereby mothers and families receive access to newborns 24 hours a day.¹⁶ This increased time spent with mothers can aid NICU nurses in better recognizing the early warning signs of acute hypertensive crisis. Recognizing these early signs can lead to early intervention and treatment on behalf of the mother–neonate dyad, potentially enhancing outcomes.^{17,18}

PATHOPHYSIOLOGY OF ACUTE HYPERTENSIVE CRISIS

The exact pathophysiology of postpartum acute hypertensive crisis remains unknown. Preeclampsia during pregnancy is thought to occur in two stages, with abnormal placentation leading to a maternal inflammatory response; however, most of this interaction occurs for unexplained reasons.^{5,19,20}

Cytotrophoblasts (CTBs) are cells that form on the outer layer of the blastocyst to provide nutrients to the embryo. During normal placental implantation, these cells migrate from the chorionic villi into the uterine walls, deeply invading the spiral arteries within the uterine walls. This causes major remodeling of the spiral arteries so that they attain the physiologic properties required to perfuse the placenta adequately.²¹

In preeclampsia, CTB invasion of the interstitial uterine compartment is inconsistent and frequently shallow, which leads to an incomplete remodeling of the spiral arteries.²¹ This inadequate spiral arteriolar remodeling results in narrow maternal vessels that are prone to atherosclerosis and fibrin deposits. Unlike a normal pregnancy, there are also markedly fewer endovascular CTBs, with some vessels retaining portions of their endothelial lining with relatively intact muscular coats while others are not modified.²¹ As a result, placental flow is compromised and can lead to placental ischemia. Doppler studies have shown that pregnant mothers with preeclampsia have a significant impairment of diastolic flow in the umbilical cord when compared with normal pregnancies.²¹ The combination of abnormal CTB formation of the maternal vessels coupled with the inadequate perfusion of the placenta and reduction in its surface area likely causes the development of preeclampsia.²¹ The mystery of what definitively causes these abnormalities still exists. Accordingly, there remains a critical need to determine and identify the instigating causes of preeclampsia.^{21,22}

Risk Factors for Acute Hypertensive Crisis

It is imperative that clinicians are aware of the risk factors that predispose a pregnant or postpartum woman to develop an acute hypertensive crisis. The highest risk factor for developing preeclampsia is having a history of preeclampsia. Other risk factors include a family history of preeclampsia; chronic hypertension; women who have not given birth to a child previously; having multiples; mothers over 35 years of age; pregnancy originating from an egg donation; lower socioeconomic status; African American race; and a diagnosis of diabetes, kidney disease, thrombophilia, systemic lupus, obstructive sleep apnea, and overweight or obesity.^{4,6}

Knowing these risk factors can help the clinician to better detect a postpartum acute hypertensive crisis. Bernstein and colleagues¹⁸ published a consensus bundle on severe hypertension during pregnancy and postpartum as part of the National Partnership for Maternal Safety. This bundle addresses the readiness of every hospital unit to identify and deal with warning signs of severe hypertension in pregnant and postpartum women. In 2021, the California Maternal Quality Care Collaborative also published a quality improvement toolkit for improving the healthcare response to hypertensive disorders of pregnancy.²³

Presentation of Hypertensive Crisis—Pregnancy Versus Postpartum

During pregnancy, women with an acute hypertensive crisis present to the emergency department or labor and delivery complaining of a headache, vision problems, or decreased fetal movement. At that time, the woman's blood pressure is monitored, blood is drawn for laboratory studies, and fetal surveillance studies are done.²⁴ During the postpartum period, the signs and symptoms are less clear because the mother may be sleep deprived, has pain or discomfort because of her delivery, and/or is solely focused on her neonate's health and not her own.

As postpartum preeclampsia can occur unexpectedly after childbirth, clinicians face the challenge of properly identifying patients at risk for this complication. Diagnosis of maternal acute hypertensive crisis may be delayed in the postpartum woman because studies such as fetal well-being can no longer be assessed to aid in the diagnosis.

Little research has been conducted on the distinction between presentation during pregnancy and presentation of preeclampsia during the postpartum period. Both periods have the same symptoms; however, Vilchez and colleagues found that mothers who were diagnosed with postpartum preeclampsia tended to have more severe symptoms (e.g., headache, nausea and vomiting, and higher blood pressure) than those who were diagnosed during pregnancy (Table 1).⁴ Boakye and associates²⁵ found a specific demographic profile of mothers most at risk of developing postpartum preeclampsia and recommended that clinicians consider this profile while caring for women during the postpartum period.²⁵

TABLE 1. ■ Signs and symptoms of postpartum hypertension or postpartum preeclampsia⁶

Postpartum hypertension: SBP \geq 140 mmHg and DBP \geq 90 mmHg for 2 or more occasions at least 4 hours apart.

Severe postpartum hypertension: SBP \geq 160 mmHg and DBP \geq 110 mmHg for 2 or more occasions at least 15 minutes apart.

What are the symptoms?

- Severe headache that is typically not resolved by over-the-counter medications
- Visual disturbances, such as seeing spots or blurred vision
- Facial swelling
- Bilateral extremity swelling
- Nausea and vomiting
- Decreased urination
- Dizziness
- Shortness of breath
- Abdominal pain specifically in the upper middle abdomen

Abbreviations. DBP = diastolic blood pressure; SBP = systolic blood pressure.

Signs and Symptoms of Acute Hypertensive Crisis

Hypertensive pregnancy disorders in the United States are the most common diagnoses associated with

postpartum readmissions and are one of the top six causes of maternal mortality.^{2,26} An acute hypertensive crisis involves a severe increase in blood pressure that can lead to a stroke or organ damage; it can also embody several diagnoses.¹⁸ Maternal hypertension, including preeclampsia, severe preeclampsia, and eclampsia, can be diagnosed up to 6 weeks after delivery (Table 2).⁶ Each of these diagnoses involves elevated blood pressure that necessitates immediate intervention. Postpartum preeclampsia symptoms include headache, visual disturbances, swelling, nausea and vomiting, dizziness, and abdominal pain, and clinicians use these symptoms in addition to laboratory studies to determine a diagnosis. Proteinuria is usually a sign of preeclampsia, but some women will present with multisystemic signs and the absence of proteinuria. The presence of multisystemic signs usually indicates disease severity.²¹ A delay in timely intervention can increase maternal morbidity and mortality.^{27,28}

Early Identification and Management of Acute Hypertensive Crisis

Maternal hypertensive disorders can manifest without warning and worsen during postpartum, but if recognized

TABLE 2. ■ Types of maternal hypertension^{6,29}

	Features
Gestational hypertension	<ul style="list-style-type: none"> • Systolic blood pressure of 140 mmHg or higher and/or a diastolic blood pressure of 90 mmHg or higher • The high blood pressure first happens after 20 weeks of pregnancy • Normal blood pressure before pregnancy
Preeclampsia	<ul style="list-style-type: none"> • Systolic blood pressure of 140 mmHg or higher and/or a diastolic blood pressure of 90 mmHg or higher • Develops after 20 weeks of pregnancy, often in the third trimester. It can also develop weeks after childbirth, during the postpartum period • Severe headache • Visual disturbances • Facial swelling • Bilateral extremity swelling • Nausea and vomiting (in the second half of pregnancy) • Decreased urination • Dizziness • Shortness of breath • Abdominal pain
Preeclampsia with severe features	<ul style="list-style-type: none"> • A systolic pressure of 160 mmHg or a higher or diastolic pressure of 110 mmHg or higher • A low number of platelets in the blood • Abnormal kidney or liver function • Pain in the upper abdomen • Changes in vision • Fluid in the lungs • Headache that will not go away
Eclampsia	<ul style="list-style-type: none"> • Caused by untreated, persistent hypertension, and significant proteinuria • New-onset tonic-clonic, focal, or multifocal seizures (in the absence of other causative conditions such as epilepsy, cerebral arterial ischemia and infarction, intracranial hemorrhage, or drug use) • Can occur before, during, or after labor • Preceded by severe and persistent headaches, blurred vision, photophobia, and altered mental status, or sometimes no warning signs or symptoms

early, they are treatable.^{6,30,31} Maternal blood pressure usually peaks 3–6 days after delivery, typically after mothers have already been discharged home.^{32–34} Because mothers with infants in the NICU visit after they are discharged from the delivery hospital, the NICU nurse may recognize signs of hypertension, or a mother may discuss her symptoms while visiting with her neonate.

Untreated postpartum hypertension can lead to seizures, stroke, or death.^{35,36} Eclampsia, seizures because of maternal hypertensive disorders, are usually preceded by severe headaches, blurry vision, and altered mental status but also can present without any warning signs.³⁷ Postpartum preeclampsia calls for the same treatment recommendations as preeclampsia during pregnancy, with the addition of antihypertensives that are contraindicated during pregnancy.²³ Management of acute hypertensive crisis involves readmission to the Labor & Delivery Unit, away from the neonate, and typically includes magnesium therapy to prevent and treat seizures in pregnant and postpartum mothers.⁶

Impact on the Neonate

Many things can impact the mother's ability to be present with her hospitalized newborn, such as distance from the NICU, other children at home, transportation issues, and visiting policies. Rehospitalization of a mother compounds those issues and further increases time away from her newborn.³⁸ Many NICUs encourage maternal presence for skin-to-skin contact and bonding with the neonate as well as to facilitate breastfeeding. The neonate's development while in the NICU is positively impacted during maternal bonding. Separation, while the mother is treated for acute hypertensive crisis, can impact bonding and duration of breastmilk pumping and feedings.^{15,39–43} Any opportunity for the NICU nurse to screen mothers may serve to reduce maternal morbidity and mortality and thus prevent undue hardship for the neonate and family.

Nursing Implications

Complications caused by hypertensive disorders in pregnant and postpartum women are leading causes of maternal morbidity and mortality. Several next steps are critical in supporting the health and well-being of postpartum mothers and their infants:^{8,44}

1. Increase maternal awareness of the potential for acute hypertensive crisis in postpartum mothers.
2. Teach neonatal nurses to recognize early warning signs of this complication.
3. Implement standardized screening protocols for postpartum hypertensive crisis that are similar to those currently used to screen for postpartum depression.
4. Implement family-centered care, which may also improve early detection of maternal postpartum

hypertension. With more time spent with families, nurses are better able to ascertain what the postpartum mother is experiencing because warning signs and symptoms may be downplayed because of lack of instruction or, perhaps, prioritizing the infant's health over her own. If a mother reports a continued headache, epigastric pain, vision changes, and lingering fatigue, for example, an assessment of her blood pressure would be appropriate.

Normal postpartum changes may be similar to those of postpartum hypertensive crisis. Mothers can experience fatigue, weight gain, anxiety, difficulty urinating after vaginal birth, overall achiness from childbirth, lack of sleep, stress, or abdominal pain (Office of the Assistant Secretary for Health).^{23,45,46} Communication is essential among the NICU team, the mother, and the obstetrical team to ensure that further assessment of the mother occurs as needed and that there is continuity of care. Sharing maternal findings in the NICU nurses' change-of-shift report can also be very beneficial in ensuring that every nurse is aware of the high-risk mother and that continuity of care has been established.

If a mother presents with or reports any hypertensive symptoms, the NICU nurse should ask if she has been

TABLE 3. ■ Steps for performing a manual blood pressure in an adult⁴⁷

1. Have the patient relax, sitting in a chair with feet flat on the floor, legs uncrossed, and back supported. The patient should be seated for 3–5 minutes without talking or moving around before recording the first BP reading.
2. Neither the patient nor the observer should talk during the rest period or during the measurement.
3. The blood pressure should be taken on the patient's bare arm.
4. Use an upper-arm cuff BP measurement device that has been validated and ensure that the device is calibrated periodically.
5. Support the patient's arm (e.g., resting on a table surface).
6. Select the correct cuff size. BP cuff bladder length should be 75%–100% of the patient's measured arm circumference.
7. Use either the stethoscope diaphragm or bell for auscultatory readings.
8. For auscultatory determinations, use a palpated estimate of radial pulse obliteration pressure to estimate SBP. Inflate the cuff 20–30 mmHg above this level for an auscultatory determination of the BP level.
9. For auscultatory readings, deflate the cuff pressure by 2 mmHg/s and listen for Korotkoff sounds.
10. Record SBP and DBP. If using the auscultatory technique, record SBP and DBP as the onset of the first of at least two consecutive beats and the last audible sound, respectively.
11. Record SBP and DBP to the nearest even number.
12. If the BP reading is outside of the normal range, you must repeat using a proper technique.

Abbreviations. BP = blood pressure; DBP = diastolic blood pressure; SBP = systolic blood pressure.

TABLE 4. ■ Example protocol for triaging maternal acute hypertensive crisis in the NICU

1. **Mother complains of warning signs of acute hypertensive crisis (Table 1).**
2. **NICU nurse questions the mother regarding her signs and symptoms.**
 - a. Mother inpatient
 - i. Ask the mother if she has talked about her symptoms with the postpartum or L&D nurse?
 - b. Mother outpatient
 - i. Do you have a headache that will not go away with over-the-counter meds?
 - ii. Do you have upper abdominal pain that will not go away?
 - iii. Are you having vision changes like seeing spots or blurred vision?
 - iv. Are you having any shortness of breath?
 - v. Have you had your first postpartum appointment?
3. **Assess maternal blood pressure or have another nurse assess maternal blood pressure. Depending on the severity of the blood pressure, the urgency varies.**
 - a. Severe or high blood pressure along with warning signs of acute hypertensive crisis
 - i. Notify per your NICU protocol
 1. Mother inpatient—notify L&D or postpartum nurse and NICU charge nurse
 2. Mother outpatient—NICU charge nurse, Emergency Department, other medical personnel
 - b. Normal blood pressure along with warning signs of acute hypertensive crisis (Table 1)
 - i. Notify per your NICU protocol
 1. Mother inpatient—notify postpartum or L&D nurse and NICU charge nurse
 2. Mother outpatient—advise her to call her obstetrician for a thorough assessment and evaluation, ideally within the next 1–3 days.

to her first postpartum appointment with her clinician, screen her for additional signs and symptoms, and assess her blood pressure. Ideally, NICU units should store one adult-sized cuff for screening. Using the American Heart Association (AHA) guideline steps for obtaining blood pressure in Table 3 will help the NICU nurse obtain an accurate blood pressure.⁴⁷ The nurse should ensure the mother is seated with feet flat on the floor, relaxed, and quiet for at least 5 minutes. After removing clothing from the arm and selecting the correct size cuff, the nurse should use a properly calibrated blood pressure monitoring device to check the mother's blood pressure. Proper blood pressure measurement technique involves supporting the mother's arm and positioning the cuff at the level of the right atrium.⁴⁷ For blood pressure readings $\geq 160/110$ mmHg, along with severe signs of

distress such as shortness of breath, the NICU nurse should follow the hospital's policy for emergency response.⁴⁵ Depending on hospital protocol, the emergency response may include notifying the emergency response team and transporting the mother to the emergency department or to the Labor & Delivery Unit for an immediate evaluation. Following these recommendations helps ensure the postpartum mother is properly diagnosed and treated. Table 4 provides an example of a protocol to triage postpartum hypertensive crisis in mothers.

CONCLUSION

Early detection of postpartum hypertension in mothers is crucial for the well-being of the mother and the neonate. By capitalizing on new initiatives being instituted that encourage family-centered care for the neonate and postpartum mother, NICU nurses can contribute a unique role in caring for the newborn while advocating for the mother's most appropriate care.

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