HYPERTENSION TOOL KIT

INDIANA PERINATAL QUALITY IMPROVEMENT COLLABORATIVE [IPQIC]

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Hypertensive disorders in pregnancy continues to be a growing concern for maternal mortality and morbidity. According to the pregnancy Mortality Surveillance System, 2007-2016, hypertensive pregnancy disorders count for 7.8% of pregnancy-related deaths.

Purpose:

The Indiana Perinatal Quality Improvement Collaborative (IPQIC) has partnered with The Alliance for Innovation on Maternal Health (AIM), a national data-driven maternal safety and quality improvement initiative[1], to improve perinatal outcomes. The Hypertension Toolkit is the second in a series of toolkits, developed by Indiana perinatal practitioners, that addresses a major issue in the care of pregnant women and is designed to establish protocols to be implemented statewide that are designed to standardize care and reduce variability. We have provided tools, algorithms, and checklists to facilitate recognition, rapid treatment, and escalation when needed. It is our goal to reduce the incidence of maternal mortality from preventable hypertensive disease and improve the health of women in Indiana.

Definitions:

Disorder	Definitions
Chronic hypertension	Hypertension diagnosed or present before pregnancy or before 20 weeks of gestation; or hypertension that is diagnosed for the first-time during pregnancy and that does not resolve in the postpartum period. Systolic blood pressure ≥140 mmHg, diastolic blood pressure ≥90 mmHg or both
Gestational hypertension	Systolic blood pressure ≥140 mm Hg or diastolic BP ≥90 mm Hg, or both, measured on two occasions at least 4 hours apart after 20 weeks of gestation in a woman with a previously normal blood pressure. No other symptoms

[1] www.savehealthcareforeveryone.org

Disorder	Definitions
Preeclampsia	New onset of Systolic blood pressure of 140 mm Hg or more or diastolic blood pressure of 90 mm Hg or more on two occasions at least 4 hours apart after 20 weeks of gestation in a woman with a previously normal blood pressure And Proteinuria: • 300 mg or more per 24-hour urine collection (or this amount extrapolated from a timed collection) or • Protein/creatinine ratio of 0.3 or more or • Dipstick reading of 2+ (used only if other quantitative methods not available In the absence of proteinuria, new onset hypertension with the new onset of any of the following: • Thrombocytopenia • Renal insufficiency • Impaired liver function • Pulmonary edema • New-onset headache unresponsive to medication and not accounted for by alternative diagnoses or visual symptoms
Preeclampsia with Severe Features	Systolic blood pressure ≥160 mm Hg or diastolic BP ≥110 mm Hg, or both, measured on two occasions at least 4 hours apart (severe hypertension can be confirmed within a short interval (minutes) to facilitate timely antihypertensive therapy) • Thrombocytopenia • Impaired liver function not accounted for by alternative diagnoses • Renal insufficiency • Pulmonary edema • New-onset headache unresponsive to medication and not accounted for by alternative diagnoses • Visual disturbances

Disorder	Definitions
Eclampsia	In a patient with preeclampsia, 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.
Chronic hypertension with superimposed preeclampsia	Preeclampsia in a woman with a history of hypertension before pregnancy or before 20 weeks of gestation
Chronic hypertension with superimposed preeclampsia with severe features	Preeclampsia in a woman with a history of hypertension before pregnancy or before 20 weeks of gestation and superimposed preeclampsia and... Systolic blood pressure ≥160 mm Hg or diastolic BP ≥110 mm Hg, or both, measured on two occasions at least 4 hours apart • Thrombocytopenia • Impaired liver function not accounted for by alternative diagnoses • Renal insufficiency • Pulmonary edema • New-onset headache unresponsive to medication and not accounted for by alternative diagnoses • Visual disturbances
HELLP	Presence of HELLP syndrome in a pregnant woman, hypertension may be present and is considered a variant of preeclampsia

Source: American College of Obstetricians and Gynecologists Practice Bulletin #203 and #222

A printable chart provided by UpToDate can be found at:
Definitions for the hypertensive disorders of pregnancy - UpToDate

Overview

Currently, the United States has a maternal mortality rate of 17.4 per 100,000 births. The Indiana Maternal Mortality Review Committee (MMRC) found that the rate of pregnancy-associated

death in Indiana was 77.2 per 100,000 live births, and the specific rate of pregnancy-related deaths was 12.2 per 100,000 live births.

Pregnancy-associated mortality is the death of a woman while pregnant or within one year of the end of pregnancy, regardless of the cause of death. Pregnancy-related mortality is specifically the death of a woman during pregnancy or within one year of the end of pregnancy from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiological effects of pregnancy. Maternal mortality is a key indicator for maternal health quality in Indiana. Each maternal death represents not just the loss of a woman's life, but also, the impact of that loss on her family and community. Instances of severe maternal morbidity can also be associated with poor pregnancy outcomes, which in turn can result in higher fetal and infant mortality rates. Overall, the United States maternal health has shown great improvement, however, the increase in pregnancy-related and pregnancy-associated deaths in Indiana shows the need for an efficient improvement plan for mothers and pregnant women.

Two of the top causes of pregnancy-related deaths are hemorrhage and hypertensive disorders such as preeclampsia. Indiana's MMRC found that mortality from these conditions may often be preventable with timely recognition and aggressive treatment. The Indiana MMRC found in 2018 that 87% of pregnancy associated deaths were preventable. Chronic conditions that exist before pregnancy can worsen during pregnancy, especially if not managed.

According to the data available from the Centers for Disease Control and Prevention (CDC), hypertension/preeclampsia contributes to this higher maternal mortality rate in the United States including Indiana (ISDH 2020). The California Maternal Quality Care Collaborative identified major themes among preeclampsia deaths, including delay in diagnosis, medical evaluation, treatment, and transfer difficulties (CMQCC Preeclampsia Toolkit Preeclampsia Care Guidelines, 12/20/2013). Pregnant women may present to the physician office, Inpatient Obstetric Units, and Emergency Departments (ED's) with signs and symptoms of a hypertensive emergency. Data from the California Maternal Mortality review from 2002-2004 confirms the importance of timely treatment of severe hypertension as it relates to death from stroke in the setting of preeclampsia.

When pregnancy hypertension guidelines were instituted in the United Kingdom, care of maternity patients with preeclampsia or eclampsia improved significantly, and maternal mortality rates decreased because of a reduction in cerebral and respiratory complications. The American College of Obstetricians and Gynecologists recommends that individuals and institutions should have mechanisms in place to initiate the prompt administration of medication when a patient presents with a hypertensive emergency (ACOG CO 767).

Therefore, there is need to facilitate standardized, evidence-based clinical guidelines for the management of patients with preeclampsia and eclampsia that have been demonstrated to reduce the incidence of adverse maternal outcomes in all these settings.

Emergency Departments in the United States treat approximately 750,000 patients annually for chief complaints related to gynecology and obstetrics. Therefore, emergency setting providers are expected to provide competent care and manage some emergent obstetrical situations, particularly the presentation of symptoms and/or signs of hypertension/preeclampsia (https://www.ena.org/docs/default-source/resource). The Emergency Department may be a first opportunity to implement standard protocols related to hypertension in pregnancy and postpartum and to reduce morbidity and mortality. However, Emergency Department healthcare providers might not possess adequate resources and personnel to care for obstetrical patients or may not have policies and procedures in place to facilitate quick access and the appropriate management of this patient population. (ENA 2020)

Ambulatory settings may be the first place a woman presents with severe hypertension or preeclampsia, especially during the postpartum period. The staff may identify severe hypertension but may not have standardized protocols in place to expedite transfer of the patient to an obstetrical unit for prompt treatment. Women in hypertensive crisis have better outcomes if intravenous medications are initiated 30-60 minutes after recognition of severe range blood pressures (Bernstein et al 2017).

Inpatient Obstetrical units may recognize the signs and symptoms for severe hypertension or preeclampsia, but staff may not have appropriate protocols to implement immediate interventions. Checklists and protocols that include immediate bedside evaluation by a provider and allow for immediate implementation of medication and treatment should be in place. Every unit should have a coordinated and practiced response to this event. Simulation training that involves all who participate in the care of the patient (MDs, RNs, CNMWs, Pharmacists) should be conducted, at a minimum, on an annual basis. This would promote teamwork and protocol adherence while improving outcomes.

Patients play an important part in improving outcomes in severe hypertensive crises. Patients need to be provided information and education regarding warning signs they need to be alert for. They need access to monitor their blood pressure if resources are available. Patients also need information on when to seek medical care appropriately during the antepartum and postpartum periods. Providing patient education is important for all patients, not just patients in high-risk populations or those with a history of hypertensive diseases. Utilizing an educational handout that is at an appropriate reading level for the public with the opportunity to discuss the material, so the patient can ask questions can ensure that the patient comprehends the education provided.

Clinical Risk Assessment for Preeclampsia and Risk Reduction Strategy with Low Dose Aspirin Therapy

Low-dose aspirin has been used during pregnancy, most commonly to prevent or delay the onset of preeclampsia. The American College of Obstetricians and Gynecologists (ACOG) issued the Hypertension in Pregnancy Task Force Report recommending daily low-dose aspirin beginning in the late first trimester for women with a history of:

- Early-onset preeclampsia and preterm delivery at less than 34 0/7 weeks of gestation; or
- More than one prior pregnancy complicated by eclampsia.

The US Preventive Services Task Force published a similar guideline although the list of indications for low-dose aspirin use was more expansive. Daily low-dose aspirin use in pregnancy is considered safe and is associated with a low likelihood of serious maternal or fetal complications or both related to use. ACOG and the Society of Maternal-Fetal Medicine support the US Preventive Services Task Force guideline criteria for prevention of preeclampsia.

Low-dose aspirin (81mg/day) prophylaxis is recommended for women at high risk for preeclampsia and should be initiated between 12- and 28-weeks' gestation (optimally before 16 weeks) and continued daily until delivery. Low-dose aspirin prophylaxis should also be considered for women with more than one of several moderate risk factors for preeclampsia.

Women at risk of preeclampsia are defined based on the presence of one or more high-risk factors (history of preeclampsia, multifetal gestation, renal disease, autoimmune disease, type 1 or 2 diabetes, and chronic hypertension) or more than one of several moderate risk factors (first pregnancy, maternal age of 35 years or older, a body mass index greater than 30, family history of preeclampsia, sociodemographic characteristics, and personal history factors). In the absence of high-risk factors for preeclampsia, current evidence does not support the use of prophylactic low-dose aspirin for the prevention of early pregnancy loss, fetal growth restriction, stillbirth, or preterm birth.

The following table is from the ACOG Committee Opinion (Number 743) titled *Low-Dose Aspirin Use During Pregnancy*[2]

Table 1. Clinical Risk Assessment for Preeclampsia*

[2] ACOG Committee Opinion (Number 743) Low-Dose Aspirin Use During Pregnancy

Risk Level	Risk Factors	Recommendation
High†	• History of preeclampsia, especially when accompanied by an adverse outcome • Multifetal gestation • Chronic hypertension • Type 1 or 2 diabetes • Renal disease • Autoimmune disease (systemic lupus erythematosus	Recommend low-dose aspirin if the patient has one or more of these high-risk factors
Moderate‡	• Nulliparity • Obesity (body mass index greater than 30) • Family history of preeclampsia (mother or sister) • Sociodemographic characteristics (African American, low socioeconomic status) • Age 35 years or older • Personal history factors (e.g., Low birthweight or small for gestational age, previous adverse pregnancy outcome, more than 10-year pregnancy interval)	Consider low-dose aspirin if the patient has more than one of these moderate risk factors§
Low	Previous uncomplicated full-term delivery	Do not recommend low-dose aspirin

*Includes only risk factors that can be obtained from the patient's medical history. Clinical measures such as uterine artery doppler ultrasonography are not included.

†Single risk factors that are consistently associated with the greatest risk of preeclampsia. The preeclampsia incidence rate would be approximately 8% or more in a pregnant woman with one or more of these risk factors.

‡A combination of multiple moderate risk factors may be used by clinicians to identify women at high risk of preeclampsia. These risk factors are independently associated with moderate risk of preeclampsia, some more consistently than others.

§Moderate risk factors vary in the in their association with increased risk of preeclampsia.

Equity Issues in Hypertensive Disorders

Hypertensive disorders in pregnancy continue to be a leading cause of maternal mortality and morbidity. According to the Healthcare Cost Utilization Project (HCUP), African American/ Black women are 60% more commonly affected by preeclampsia during pregnancy (2017). Cardiomyopathy, thrombotic pulmonary embolism, and hypertensive pregnancy disorders contribute to a significantly higher proportion of pregnancy-related deaths among African American/Black women than among white women. (Peterson, et al., 2019)

Many studies reveal that being an African American/Black female increases the risk of developing hypertensive disorders in pregnancy. Many of the risk factors tend to impact black

women at a greater incidence than any other race. In a large, nationwide, contemporary cohort study from 2014 with a diverse racial/ethnic obstetrical population, non-Hispanic black women were more likely to begin pregnancy with chronic hypertension and to develop mild, severe, or superimposed preeclampsia, while Hispanic women and Asians/Pacific Islanders were more likely to remain normotensive during pregnancy, compared with non-Hispanic white women. The racial/ethnic variation in patterns of severe preeclampsia and superimposed preeclampsia mirrored cardiovascular disease risks later in life, where studies have generally found higher odds of cardiovascular diseases in non-Hispanic black women and lower odds in Asian and Hispanic women (Ghosh, G., Grewal, J., Männistö, T., Mendola, P., Chen, Z., Xie, Y., & Laughon, S. K.,2014).

"Preeclampsia is estimated to complicate 3 percent to 6 percent of all pregnancies. The rate of Preeclampsia in the U.S. has increased 25 percent in the past two decades, according to the American College of Obstetricians and Gynecologists" (Norton Healthcare, 2018). According to the Preeclampsia Foundation (2020), 5-8% of pregnant women diagnosed with preeclampsia had no known risk factors. Although some women have no known risk factors, there are factors which increase the risk of developing preeclampsia:

- Previous diagnosis of preeclampsia,
- Being pregnant with multiples,
- History of chronic high blood pressure, diabetes, kidney disease or organ transplant,
- First pregnancy,
- Obesity, particularly with Body Mass Index (BMI) of 30 or greater,
- Over 35 or under 20 years of age,
- Family history of preeclampsia,
- Polycystic ovarian syndrome,
- Lupus or other autoimmune disorders, including rheumatoid arthritis, sarcoidosis, and multiple sclerosis,
- In-vitro fertilization, and
- Sickle cell disease (Preeclampsia Foundation, 2020).

Women with twin pregnancies have a three-to-fourfold chance of developing Preeclampsia during pregnancy compared to a singleton pregnancy (Laine, Murzakanova, Sole, Pay, Heradstveit, and Raisanen, 2019). Per the University of Rochester Medical Center (2020), African American/Black women are more likely to have twins than any other race.

Women who have Sickle Cell Disease are susceptible to developing hypertensive disorders, as previously identified in Postpartum Hemorrhage data. Sickle cell disease is more prevalent

among African American/Black women compared to white women. Pulmonary arterial hypertension (PAH) is one of the main complications of Sickle Cell Disease and increases significantly maternal risk during pregnancy (Karimi, 2020). Even though there is no new advanced therapy to minimize the risks, early diagnosis in pregnant patients with a diagnosis of sickle cell anemia is essential (Karimi, 2020).

Systemic lupus erythematosus (SLE) and polycystic ovarian syndrome (PCOS) are two common disorders that impact many women, especially African American/Black women. African American/Black females are three times more likely to develop lupus than white women, and one in 10 women of color are affected by PCOS (Basile, 2020) (Center for Disease Control and Prevention, 2018). Women who have rheumatoid arthritis, seizures, and high blood pressure are at greater risk of developing lupus due to the medication. Women with SLE or PCOS are at a greater risk of developing heart disease, type 2 diabetes, dyslipidemia, and hypertension (Pan, Chen, Tsao. and Chen, 2020).

Per the U.S. Department of Health and Human Services Office of Minority Health, 2020, "African American women have the highest rates of obesity or being overweight compared to other groups in the United States. About 4 out of 5 African American women are overweight or obese." Having an increased BMI can contribute to the development of preeclampsia during pregnancy. Many women tend to gain weight during pregnancy progression, which further impacts maternal and neonate health.

CDC announced Sept 5, 2019 that reducing disparities will require the participation of multiple systems to address the factors affecting these disparities. Hospitals and healthcare systems can implement standardized protocols in quality improvement initiatives, especially among facilities that serve disproportionately affected communities. CDC urges systems to identify and address implicit bias in healthcare that would likely improve patient-provider interactions, health communication, and health outcomes.[3]

Many continue to view overall maternal health as a contributing factor to maternal mortality and morbidity. Unfortunately, the numerous studies show the racial/ethnic disparities impacting the pregnancy-related mortality (Petersen et al., 2019). The public continues to cry out for change. Initiatives such as the HEAR HER campaign by the Center for Disease Control and Prevention (CDC) and Speak Up initiative by the Institute for Perinatal Quality Improvement are offering training to help combat this outrage. Even with the mentioned initiatives, change is slow to come

[3] https://www.cdc.gov/media/releases/2019/p0905-racial-ethnic-disparities-pregnancy-deaths.html

for our Black Mamas, but why? Many people struggle with their own implicit and explicit biases without even being aware. We can no longer turn our heads from the data, or the information presented to us. We must acknowledge the information presented to us and work to make changes for those depending on us for safe care.

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Toolkit Framework

The Indiana Hypertension Toolkit provides information on hypertension in four domains following the AIM Patient Safety Bundle on Hypertension: READINESS, RECOGNITION AND PREVENTION, RESPONSE, REPORTING/SYSTEMS LEARNING. While standardized protocols have been included in this toolkit, protocols may be individualized for each delivering facility based on available resources. The AIM framework is included at the end of this section.

READINESS

https://in.gov/laboroflove/files/Readiness%20Bundle.pdf

The Readiness section provides strategies to improve readiness to treat severe hypertension in pregnancy or postpartum to prevent delays in identifying and treating severe hypertension in every unit. The goal is to implement critical clinical pathways on every unit, and have early warning signs, diagnostic criteria, monitoring and rapid access to treatment of severe preeclampsia and eclampsia.

Key elements in readiness include the identification of early warning signs, diagnostic criteria, monitoring, and treatment including order sets and algorithms.

Early warning signs establish when a patient will be evaluated by a provider at the bedside. We will provide a standard for Early Warning, diagnostic criteria for severe hypertension, and preeclampsia, and algorithms for monitoring and treatment. Second is team training, drills and debriefs. Thirdly, a process for timely triage and evaluation of pregnant and postpartum women in the ED or urgent care center. Fourth, establish rapid access to medication used for severe hypertension, preeclampsia, and eclampsia. And finally, all units should have a system plan for escalation, obtaining consultation, and maternal transport when needed.

- Ambulatory Readiness Assessment
- Emergency Department Readiness Assessment
- Inpatient Readiness Assessment

- Manual Blood Pressure Competency Checklist

RECOGNITION AND PREVENTION

https://in.gov/laboroflove/files/recognition-and-prevention-bundle.pdf

The Recognition and Prevention section includes documents that address a standard protocol for the measurement and assessment of BP and urine protein for all pregnancy and postpartum women. It establishes a standard response to maternal early warning signs, including listening to, and investigating patient symptoms and labs. This section provides facility wide standards for educating prenatal and postpartum women on signs and symptoms of hypertension.

- Inpatient
    - Differential Diagnosis
- Emergency
    - HELLP Syndrome Chart
    - Management of Pregnant/Postpartum Patients in the ED
- Ambulatory
    - Ambulatory Preeclampsia Checklist
    - Preeclampsia Patient Education Checklist

RESPONSE

https://in.gov/laboroflove/files/response-bundle.pdf

The Response section documents include facility wide standard protocols with checklists and escalation policies for management and treatment of severe hypertension, eclampsia, postpartum severe hypertension, and timeliness of follow up after discharge from the postpartum unit.

Risk Appropriate Care Considerations for Intrapartum Inpatient Settings

- Risk Appropriate Care Considerations for Post-Discharge and Outpatient Settings
- Nursing Acuity Assessment
- Management of Pregnant/Postpartum Patients in the ED
- Postpartum Preeclampsia Checklist
- CMQCC Eclampsia Algorithm
- Hypertension Pre-Transport Checklist
- Maternal-Fetal GO-No-Go Transport Algorithm
- Sample Medication Toolbox (CMQCC)

- Badge Buddy Labor and Delivery
- Badge Buddy Postpartum

REPORTING AND SYSTEMS LEARNING

https://in.gov/laboroflove/files/reporting-and-systems-learning-bundle.pdf

The Reporting and Systems Learning documents establish a culture of huddles for high-risk patients and post-event debriefs to identify successes and opportunities. If patients are admitted to ICU there should be a multidisciplinary review. Outcomes and process metrics to be monitored, such as time to treatment of severe BP < 60 minutes, and adherence to protocols for acute management.

- Charge Nurse Communication Unit Huddle Sheet
- Nurse to Nurse
- Severe Maternal Hypertension Debriefing
- Hot Debriefing Form
- Root Cause Analysis in Response to Patient Event
- Simulation Scenario Files
- Postpartum Procardia Simulation
- ICD 10 Codes for Hypertension