Hypertensive Disorders *in* Pregnancy

EXECUTIVE SUMMARY

New York State Department of Health

May 2013

Hypertensive Disorders in Pregnancy (HDP)

Guideline Summary – Executive Summary

Background

Prompt identification and appropriate management of Hypertensive Disorders in Pregnancy (HDP) are essential for optimal outcomes because HDP:

- Are associated with severe maternal obstetric complications and increased maternal mortality risk.[1]
- Lead to preterm delivery, fetal intrauterine growth restriction, low birthweight and perinatal death.[2]

In 2010, the New York State Department of Health implemented a new Maternal Mortality Review Initiative. The new process is completed in conjunction with Island Peer Review Organization (IPRO) and an expert committee that includes representation from ACOG and many other professional organizations and experts. The updated initiative is intended to ensure a comprehensive review of factors leading to maternal deaths in New York State, based on sufficient information to develop strategies and measures to decrease the risk of these deaths. The first meeting of the expert committee included a review of preliminary 2006-2008 data on 70 maternal deaths, showing leading causes of death to be: hypertension (20%), hemorrhage (19%) and embolism (17%). Chronic illness, obesity and prenatal risk factors were identified as important circumstances in the cases reviewed. This resulted in identification of several priorities including management of hypertension, obesity and embolism/Deep Vein Thrombosis (DVT) for development of clinical guidelines. Management of hypertension during pregnancy was selected as the first topic for development. A multidisciplinary subcommittee of the Expert Review Committee and the Department worked with IPRO and the subcommittee to develop guidelines on the diagnosis, evaluation, and management of Hypertensive Disorders in Pregnancy.

The updated maternal mortality review initiative is consistent with the department's priorities of improving birth outcomes and decreasing maternal mortality in accordance with Title V Maternal and Child Health Services Block Grant and the department's prevention agenda. Maternal and infant mortality and morbidity are key indicators of the health of a society. These measures are a reflection of the current health status of a large segment of the population and a predictor of the health of the next generation.

Effective and error-free health care delivery for complex conditions such as HDP depends on a well-functioning, coordinated care team that fosters collaboration and communication among care team members.[3]

This guidance document is intended for health care providers who care for pregnant women in a variety of clinical settings. This guidance document aims to promote quality services and enhance communication among the myriad of providers who provide health care to pregnant women, including obstetricians, family practice physicians, emergency department physicians, midwives, anesthesiologists, nurses and others.

[1] Berg CJ, Callaghan WM, Syverson C, Henderson Z. Pregnancy-related mortality in the United States 1998-2005. Obstetrics and Gynecology 2010; 116(6): 1302-1309.

[2] Roberts JM, Pearson G, Cutler J, Lindheimer M. Summary of the NHLBI Working Group on Research on Hypertension in Pregnancy. Hypertension 2003; 41:437-445.

[3] Institute of Medicine. Committee on Quality of Health Care in America. Crossing the quality chasm: a new health system for the 21st century. Washington DC: the National Academies Press, 2001.

Definition and classification of Hypertensive Disorders in Pregnancy (HDP)

Hypertensive Disorders in Pregnancy are comprised of a spectrum of disorders typically classified into categories and stratified according to severity: chronic (preexisting) hypertension, gestational hypertension, preeclampsia (including chronic (preexisting) hypertension with superimposed preeclampsia) and eclampsia. These classifications promote accurate, effective communication among health care providers and form the basis of management recommendations.

The spectrum of hypertension and preeclampsia

Hypertension in pregnancy

Hypertension in pregnancy is defined as a systolic blood pressure ≥140 mm Hg OR diastolic blood pressure ≥90 mm Hg or both. Both systolic and diastolic blood pressure elevations are important in the identification of HDP. Hypertensive blood pressure readings should be confirmed using the appropriate measurement technique (as described below) with remeasurement after 10-15 minutes of rest.

- **Chronic (preexisting) hypertension** is defined as systolic blood pressure ≥140 mm Hg OR diastolic blood pressure ≥90 mm Hg, or both, before 20 weeks of gestation, or prior to pregnancy. Elevated readings should be documented on more than one occasion.
- **Gestational hypertension** is defined as new hypertension (systolic blood pressure ≥140 mm Hg OR diastolic blood pressure ≥90 mm Hg, or both) presenting at or after 20 weeks gestation without proteinuria or other features of preeclampsia; this terminology replaces the term "Pregnancy-Induced Hypertension".
- **Severe hypertension in pregnancy** is defined as systolic blood pressure ≥160 mm Hg or diastolic blood pressure ≥110 mm Hg, or both. The Society of Obstetricians and Gynaecologists of Canada (SOGC) expert consensus suggests that a single reading at this level be confirmed within 15 minutes. Severe hypertension in pregnancy is considered to be a hypertensive emergency that requires urgent intervention. The American Congress of Obstetricians and Gynecologists (ACOG) Committee Opinion "Emergent Therapy for Acute Onset, Severe Hypertension with Preeclampsia or Eclampsia" recommends that severe hypertension that persists for 15 minutes or more in the setting of preeclampsia or eclampsia is a hypertensive emergency that requires immediate intervention.[4]

[4] Committee on Obstetric Practice. Emergent Therapy for Acute Onset, Severe Hypertension with Preeclampsia or Eclampsia. Committee Opinion No. 514. American College of Obstetricians and Gynecologists (ACOG). December 2011.

Proteinuria in pregnancy

- In the context of identification of preeclampsia, significant proteinuria is present when 24-hour protein excretion equals or exceeds 300 mg/day. The spot urine protein: creatinine ratio has also been used to define significant proteinuria in the identification of preeclampsia. The ACOG practice bulletin "Chronic Hypertension in Pregnancy" notes that a protein : creatinine ratio in the range of 0.15 to 0.3 g protein/g creatinine has been used to identify women who should be further evaluated.[5] The SOGC and the National Collaborating Centre for Women's and Children's Health, National Institute for Health and Clinical Excellence (NICE) identify significant proteinuria as a protein : creatinine ratio of ≥30 mg protein/mmol creatinine.[6]

[5] Chronic hypertension in pregnancy. Practice Bulletin No.125. American College of Obstetricians and Gynecologists (ACOG). Obstetrics and Gynecology 2012; 119: 396-407.

[6] Rowe T, Senikas V, Pothier M, Fairbanks J, editors. Diagnosis, Evaluation and Management of the Hypertensive Disorders of Pregnancy. Society of Obstetricians and Gynaecologists of Canada (SOGC). Journal of Obstetrics and Gynaecology Canada 2008; 30(3): S1-S48.

Preeclampsia and eclampsia

- **Preeclampsia** is defined as hypertension plus significant proteinuria, specifically gestational hypertension plus new onset proteinuria or chronic (preexisting) hypertension with new or worsening proteinuria.

- Preeclampsia can also occur without proteinuria, with hepatic, hematopoetic, or other manifestations. Edema is no longer considered a specific diagnostic criterion for preeclampsia. Pregnant women with hypertension plus other adverse conditions but no proteinuria should have further evaluation for preeclampsia. If preeclampsia develops in women with chronic (preexisting) hypertension, the classification of disease is chronic (preexisting) hypertension with superimposed preeclampsia.

- **Severe preeclampsia:** ACOG criteria for severe preeclampsia include the presence of any ONE of the following:

  - Severe hypertension, (systolic blood pressure ≥160 mm Hg or diastolic blood pressure ≥110 mm Hg, or both).
  - Cerebral or visual disturbance,
  - Epigastric or right upper quadrant pain,
  - Oliguria,
  - Pulmonary edema,
  - Cyanosis,
  - Impaired liver function,
  - Thrombocytopenia,
  - Intrauterine growth restriction (IUGR).

- **Eclampsia** is defined as new onset, grand mal seizures in pregnant women with preeclampsia. Some women presenting with eclampsia do not have pre-diagnosed preeclampsia, and some women may present with eclampsia in the postpartum period.

HELLP syndrome

- HELLP syndrome is a serious systemic disorder associated with preeclampsia and manifested by hemolysis, elevated liver enzymes (transaminases), and low platelet count.

Assessment of HDP

Assessment of HDP includes assessment of the risk for preeclampsia, the severity of preeclampsia, and the presence of additional relevant findings, including identifiable causes of hypertension or kidney disease.

Blood pressure measurement

Appropriate blood pressure measurement technique is essential for identifying and monitoring HDP. Blood pressure is highly variable within subjects; appropriate care must be taken to standardize practice in order to minimize various factors that affect clinic blood pressure measurement, especially choice of cuff size, degree of stimulation, posture, and talking. Office BP remains the gold standard for detection of HDP despite the increasing use of non-office BP values (self-determined home blood pressure and 24-hour ambulatory) in non-pregnant individuals with hypertension. Observational studies have shown that self-determined home blood pressure and 24-hour ambulatory blood pressure monitoring may be useful in the identification and surveillance of HDP.

Measurement devices and techniques

- Diastolic readings should reflect Korotkoff phase V readings (disappearance of tones), if blood pressure is measured with a manual device.
- Semi-automated oscillometric devices should be checked periodically for accuracy.
- The blood pressure cuff should be large enough that the inflatable bladder covers 75%-100% of the circumference of the upper arm.
- Blood pressure should be measured in both arms at the initial visit ideally, with the higher value taken as the blood pressure of record, and that arm noted in the record as the basis for all subsequent determinations.

Measurement conditions

- Caffeine and tobacco should be avoided for at least 30 minutes prior to blood pressure measurement.
- Patient should be undisturbed and at rest for at least 5 minutes, in a quiet room if possible. Neither the patient nor the trained observer should talk during the measurement itself.
- Blood pressure should be measured with the patient **sitting in a chair** with feet flat on the floor, not with back unsupported and legs dangling from an exam table.

- If it is not possible to measure blood pressure with patient in an upright, sitting position, blood pressure should be measured in the left lateral recumbent position, even though BP will be lower by a few mm Hg if taken in the free arm.

Assessment of proteinuria

- All pregnant women should have standard dipstick screening for proteinuria at each visit. Women diagnosed with hypertension in pregnancy, and other women at risk for preeclampsia, should have more definitive baseline evaluation of proteinuria, with either 24-hour urine collection for protein or spot urinary protein: creatinine ratio to quantify the amount of proteinuria.

Assessment of risk for preeclampsia

- Risk factors: Various conditions predispose to preeclampsia, including chronic (preexisting) hypertension, previous preeclampsia, autoimmune diseases, presence of antiphospholipid antibodies, chronic kidney disease, and diabetes mellitus. Women with these conditions are considered to be at high risk for HDP. Other factors that increase the risk for HDP include: multifetal pregnancy, obesity, maternal age ≥ 40, nulliparity, vascular disease, family history of preeclampsia, thrombophilia and an inter-pregnancy interval ≥10 years. Black race has also been associated with increased risk for preeclampsia.

- Consideration should be given to risk factors for preeclampsia when developing surveillance and monitoring strategies, including visit frequency.

- Baseline renal function assessment, including serum creatinine, blood urea nitrogen and 24-hour urinary protein or spot urine for protein-creatinine ratio, is recommended for all pregnant women with chronic (preexisting) hypertension. Most guidelines recommend additional laboratory testing for women at risk for preeclampsia, including complete blood count, platelet count, aspartate aminotransferase (AST), alanine aminotransferase (ALT), lactate dehydrogenase (LDH), bilirubin and serum uric acid. Doppler velocimetry is not recommended for women at low risk for preeclampsia.

Assessment of preeclampsia

- All women diagnosed with hypertension in pregnancy should be assessed for the presence or absence of preeclampsia. Women with high risk for preeclampsia should have more definitive evaluation of proteinuria than women at low risk, and high-risk women should be evaluated for preeclampsia through other clinical and laboratory evaluations.

Risk reduction for HDP, preeclampsia and other complications of HDP

Anticipatory guidance

- Pregnant women at risk for preeclampsia should be provided with anticipatory guidance regarding symptoms of preeclampsia to be reported to the physician, midwife, nurse practitioner, or physician assistant.

Diet/lifestyle

- A healthy lifestyle is generally recommended for pregnant women, including moderate exercise. Appropriate weight gain based on pre-pregnancy body mass index (BMI), as per Institute of Medicine (IOM) guidelines is recommended.
- Dietary calcium and other supplements: Adequate calcium intake (1300 mg/day for women ages 14-18 and 1000 mg/day for women over age 18) is necessary for maternal health, and women with low dietary intake of calcium should receive calcium supplementation. There is no clear evidence for the benefit of calcium for the reduction of the risk of preeclampsia in the general US population. There is no evidence to support recommending other dietary supplements for the prevention of preeclampsia.

Drugs

Aspirin

- There is strong evidence that low-dose aspirin reduces the risk of preeclampsia and its complications in women who are at high risk for preeclampsia, including women with preeclampsia during a prior pregnancy, chronic kidney disease, autoimmune disorder/antiphospholipid antibodies, preexisting type 1 or type 2 diabetes or chronic (preexisting) hypertension.
- Women at high risk for preeclampsia should receive low-dose aspirin at 81 mg/day. There is expert consensus that aspirin therapy should begin as early as possible for maximal benefit and should continue to delivery, supported by evidence that has shown that the most benefit in risk reduction may be achieved if aspirin therapy is begun before 16 weeks gestation.
- More evidence is needed to ascertain the benefit of low-dose aspirin therapy for women with other risk factors for preeclampsia, although risk is increased if more than one risk factor is present.
- There is no evidence for the benefit of aspirin in reducing preeclampsia risk in low risk women, including low risk nulliparous women.

Other pharmaceuticals

- There is no evidence to recommend pharmaceuticals other than low-dose aspirin in the prevention of preeclampsia or its complications.

Ambulatory care of HDP

Preconception/initial visit counseling and evaluation

- Women with chronic (preexisting) hypertension should be provided with preconception counseling, including counseling regarding treatment strategies, medication risks and alternatives for those planning pregnancy. Renin-angiotensin-aldosterone system (RAAS) inhibitor drugs, including angiotensin converting enzyme inhibitors and angiotensin receptor blockers, are contraindicated in all trimesters of pregnancy. Women should be changed from RAAS inhibitor drugs to alternative therapy upon discovery of intrauterine pregnancy. For women planning pregnancy, RAAS drugs should be discontinued if an effective alternative exists.
- Women with HDP should be provided with education regarding their condition and self-management.

Diet

- Appropriate weight gain according to IOM guidelines is recommended. There is insufficient evidence regarding salt restriction in women with chronic (preexisting) hypertension.

Lifestyle

- A healthy lifestyle is recommended for women with HDP. Moderate exercise is often part of the care plan for women with well-controlled chronic (preexisting) hypertension. There is insufficient evidence for a recommendation regarding optimal activity levels for women newly diagnosed with gestational hypertension. Aerobic exercise is not recommended for women with preeclampsia.

Blood pressure threshold and targets for treatment

- The goal of blood pressure management in hypertensive disorders in pregnancy is to optimize pregnancy outcome, which requires consideration of minimizing maternal risk while maintaining placental/fetal perfusion.
- Non-severe hypertension: There is no definitive evidence for optimal blood pressure targets in hypertensive disorders in pregnancy; there is a particular lack of clear evidence regarding the optimal management of women with non-severe hypertension. Some experts in the U.S., including the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure in their Seventh Report, have recommended treating women with chronic (preexisting) hypertension and no evidence of end-organ damage whose blood pressure is 150-160 mm Hg systolic or 100-110 mm Hg diastolic.[7,8]
- Severe hypertension: Acute management should be initiated for severe hypertension, defined as systolic blood pressure ≥160 mm Hg or diastolic blood pressure ≥110 mm Hg or both.

7 Chronic hypertension in pregnancy. Practice Bulletin No.125. American College of Obstetricians and Gynecologists (ACOG). Obstetrics and Gynecology 2012; 119: 396-407.

8 National High Blood Pressure Education Program. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC7). Bethesda (MD): National Heart, Lung and Blood Institute (US); 2004 Aug. 86p. (NIH publication no. 04-5230).

Antihypertensive agents for non-acute blood pressure management in women with chronic (preexisting) hypertension

- In the absence of contraindications, labetalol is preferred for management of hypertension in pregnancy. If labetalol is contraindicated, extended-release nifedipine is commonly used in pregnant women with chronic (preexisting) hypertension. Methyldopa has also been used in HDP. Women with chronic (preexisting) hypertension who are well controlled on diuretics prior to pregnancy do not need to have the diuretic discontinued during pregnancy. Atenolol is not recommended for use during pregnancy due to association with IUGR. Discussion with Maternal Fetal Medicine regarding optimal blood pressure management for women with chronic (preexisting) hypertension may be helpful. Standard and maximum oral dose ranges for common antihypertensives include the following:
    - Labetalol: standard oral dose range 200 – 800 mg/day in 2-3 divided doses; maximum dose 2,400 mg/day
    - Nifedipine (extended-release): standard oral dose range 30 – 60 mg/day; maximum 120 mg/day
    - Methyldopa: standard oral dose range 250 – 1,000 mg/day in 2-3 divided doses; maximum dose 3,000 mg/day

Maternal surveillance: proteinuria testing and blood pressure monitoring

- Women with HDP should have periodic, definitive proteinuria testing (24-hour urine collection or spot urinary protein: creatinine ratio to quantify the amount of proteinuria) as indicated.

- Although there is no definitive evidence, the use of daily home monitoring should be individualized and is encouraged, and the use of home monitoring can lead to improved self-management for women with HDP.

Fetal surveillance – tests of fetal well being

There is no definitive evidence regarding the most appropriate way to conduct fetal surveillance testing for women with HDP. Fetal growth should be assessed with ultrasonography in all women with HDP. Non-stress test, biophysical profile, deepest amniotic fluid pocket assessment and umbilical artery Doppler velocimetry are commonly used tests, but there is no evidence to determine which test or group of tests is most appropriate for fetal surveillance. Fetal testing should be conducted in the context of a coordinated system, with involvement of obstetricians and maternal-fetal medicine subspecialists based on the patient's degree of control and risk.

Frequency of fetal testing and monitoring

- There is no definitive evidence regarding the most appropriate timing of initiation or interval of testing in women with HDP. It is reasonable to initiate fetal testing beginning

no later than 32 weeks and to conduct fetal tests of well-being once to twice weekly in women with HDP. Surveillance for fetal growth should be conducted with ultrasonography at least monthly for women with HDP, and ultrasound should be initiated earlier than 32 weeks for fetal indications such as evidence of IUGR or maternal indications such as comorbid conditions, for example, diabetes.

Referrals/consultations

- Consultation/referral to an obstetrician/gynecologist is recommended for women with HDP. Maternal-fetal medicine telephone consultation is always available with the regional perinatal center. Consider maternal/neonatal needs and availability of ICU when considering transfer to a regional perinatal center. Control of severe hypertension and seizure prophylaxis must be initiated at the referring hospital prior to maternal transport.

Inpatient prenatal care of HDP – severe hypertension and preeclampsia

Indications for inpatient care

- Inpatient care is generally recommended for all women with severe hypertension or preeclampsia.
- Hospitals should have written protocols to identify indications for outpatient care and to outline how home monitoring will be conducted. Patients with HDP being discharged to home should have formal written instructions for how their outpatient monitoring and management will be conducted.

Communications

- Hospitals should have written protocols for management of HDP that are available to all care team members.

Acute management of severe hypertension

- Severe hypertension, systolic blood pressure ≥160 mm Hg *or* diastolic ≥110 mm Hg or both, requires urgent management.
- Intravenous labetalol is recommended for initial therapy for severe hypertension. Hydralazine is also acceptable for initial therapy for severe hypertension.
- ACOG sample order sets provided in the ACOG Committee Opinion 514, "Emergent Therapy for Acute Onset, Severe Hypertension with Preeclampsia or Eclampsia" (December 2011) include the following medication dosage protocols for acute, severe hypertension:

Set 1: Labetalol first protocol

- Notify OB provider when patient presents with severe HTN (systolic ≥160 mm Hg or diastolic ≥110 mm Hg)
- Initiate appropriate fetal surveillance
- Labetalol 20 mg IV over 2 min; recheck BP in 10 min; if still above either threshold then:
- Labetalol 40 mg IV over 2 min; recheck BP in 10 min; if still above either threshold then:
- Labetalol 80 mg IV over 2 min; recheck BP in 10 min; if still above either threshold then:
- Hydralazine 10 mg IV over 2 min; recheck BP in 20 min; if still above either threshold then:
- Emergency consultation with maternal fetal medicine (MFM), anesthesia, internal medicine, or critical care specialist.

Set 2: Hydralazine first protocol

- Notify OB provider when patient presents with severe HTN (systolic ≥160 mm Hg or diastolic ≥110 mm Hg)
- Initiate appropriate fetal surveillance
- Hydralazine 5 or 10 mg IV over 2 min; recheck BP in 20 min; if still above either threshold then:
- Hydralazine 10 mg IV over 2 min; recheck BP in 20 min; if still above either threshold then:
- Labetalol 20 mg IV over 2 min; recheck BP in 10 min; if still above either threshold then:
- Labetalol 40 mg IV over 2 min and;
- Obtain emergency consultation with MFM, anesthesia, internal medicine, or critical care specialist.

Seizure prophylaxis

- Seizure prophylaxis with magnesium sulfate is recommended for women with severe preeclampsia. Seizure prophylaxis may also be considered for women with preeclampsia that is not classified as severe.

Management of seizures in eclampsia

- Seizures in eclampsia should be treated with magnesium sulfate.

Therapy for HELLP syndrome

- Guidelines of the Society of Obstetricians and Gynaecologists of Canada (SOGC)[9] expert consensus state that platelet transfusion is indicated when platelet count is <50 x 109/L and falling, and/or there is coagulopathy. Some experts recommend platelet transfusion for platelet count <40 x 109 prior to intubation for Cesarean section. Platelet transfusion is recommended prior to delivery for any woman with HELLP syndrome and platelet count <20 x 109/L.

Antenatal steroids

- Antenatal steroids should be considered for women at risk for preterm delivery who present between 24 and 34 weeks gestation.

9 Rowe T, Senikas V, Pothier M, Fairbanks J, editors. Diagnosis, Evaluation and Management of the Hypertensive Disorders of Pregnancy. Society of Obstetricians and Gynaecologists of Canada (SOGC). Journal of Obstetrics and Gynaecology Canada 2008; 30(3): S1-S48.

Fluid balance

- Women with preeclampsia have reduced plasma volume and routine fluid restriction in all such women may not be appropriate. Optimizing fluid balance prior to delivery is essential, and fluid balance should be carefully monitored in women with HDP. Fluid management for these patients, including an intravenous (IV) fluid bolus prior to administration of regional anesthesia, should be directed by an anesthesiologist with expertise in this area.

Thromboprophylaxis

- Preeclampsia and associated risk factors, such as obesity and immobility, increase the risk for thromboembolic disease. These risks for thromboembolic disease should be considered when determining the need for prophylaxis.

Delivery/intrapartum care

Delivery timing

- Determination of delivery timing in women with HDP is a complex decision that requires consideration of gestational age, degree of hypertension control, and patterns of maternal and fetal adverse conditions.

- Preeclampsia is a maternal indication for delivery, and delivery should take place by 37 weeks. Delivery should not be deferred to 39 weeks for women with preeclampsia. Delivery at 37 weeks for mild preeclampsia is an indicated delivery and is not considered elective.

- Delivery should not be deferred to await antenatal steroid administration if delivery is warranted for severe maternal indications.

Mode of delivery

- Vaginal delivery is preferred unless there is another indication for Cesarean section.

Anesthesia

- Regional anesthesia is preferred in women with HDP unless it is contraindicated by coagulopathy or other condition.

Postpartum and follow-up

Postpartum care

- Close monitoring of women with HDP is essential in the postpartum period. Many women with preeclampsia can deteriorate postpartum. Preeclampsia and eclampsia can develop in the postpartum period, and blood pressure in women with chronic (preexisting) hypertension is often unstable for 1-2 weeks postpartum.
- Blood pressure should be monitored at least every 4 hours postpartum, and women should not be discharged until blood pressure has been well controlled for at least 24 hours.
- The follow-up plan for monitoring of women with HDP should be clear in discharge instructions.
- Peak postpartum blood pressure occurs between days 3-5 after birth. Blood pressure should be measured at least once in the 3-5 day postpartum period.

Risk communication/lifestyle counseling

- Women with HDP should be advised of the risk for recurrent HDP and of future cardiovascular risk. It is important to note that ACOG recommends that all health encounters during a woman's reproductive years, particularly those that are part of preconception care, should include counseling on appropriate health behaviors to optimize pregnancy outcomes and prevent maternal mortality.


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