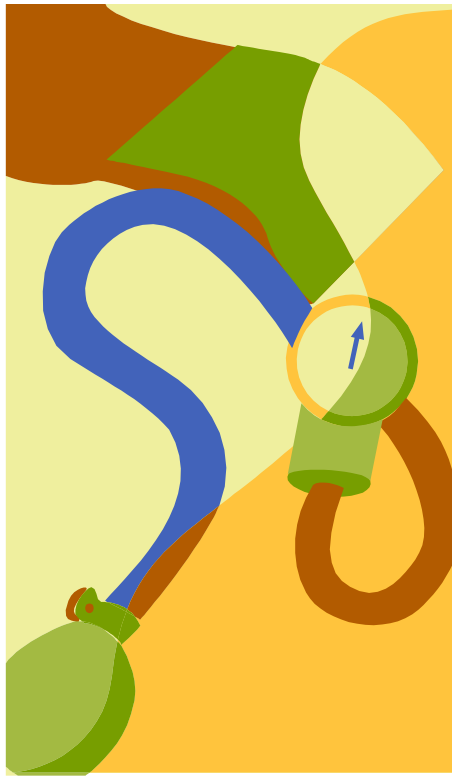
Hypertension in Pregnancy



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Objectives

Review and Highlight Aspects of:

May 2014 SOGC Guideline (replaces March 2008 Guideline)

Diagnosis, Evaluation and Management of the Hypertensive Disorders of Pregnancy

About the Guideline

Full Guideline: 84 pages (*Pregnancy Hypertension*)

Executive Summary: 23 pages (*JOGC*)

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Outline

Chapter 1: Diagnosis and Classification of the Measurement of BP for Hypertensive Disorders of Pregnancy (HDP)

Chapter 2: Prediction and Prevention

Chapter 3: Treatment of the Hypertensive Disorders of Pregnancy

Chapter 4: Patient Perspective

Chapter 5: Knowledge Translation Tools And Implementation Of The Guideline

EXECUTIVE SUMMARY

CLINICAL PRACTICE GUIDELINE

Our Patient

Ms. HBP, 38 year old with a 5 year history of IDDM and primary hypertension for 2 years, on labetalol G3P2, 2 previous C-sections.

Pregnant

Table 1. Key to evidence statements and grading of recommendations, using the ranking of the Canadian Task Force on Preventive Health Care

Quality of evidence assessment †	Classification of recommendations
I: Evidence obtained from at least one properly randomized controlled trial	A. There is good evidence to recommend the clinical preventive action
II-1: Evidence from well-designed controlled trials without randomization	B. There is fair evidence to recommend the clinical preventive action
II-2: Evidence from well-designed cohort (prospective or retrospective) or case–control studies, preferably from more than one centre or research group	C. The existing evidence is conflicting and does not allow to make a recommendation for or against use of the clinical preventive action; however, other factors may influence decision-making
II-3: Evidence obtained from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of treatment with penicillin in the 1940s) could also be included in this category	D. There is fair evidence to recommend against the clinical preventive action
III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees	E. There is good evidence to recommend against the clinical preventive action
	L. There is insufficient evidence (in quantity or quality) to make a recommendation; however, other factors may influence decision-making

Chapter 1 – Diagnosis and Classification

BP Measurement

HOW TO TAKE A BLOOD PRESSURE CONSISTENTLY

Diagnosis of Hypertension

HOW TO MAKE A DIAGNOSIS OF HYPERTENSION

Classification of HDPs

HOW TO DEFINE HYPERTENSION IN PREGNANCY

Table 2. Classification of the hypertensive disorders of pregnancy

Pre-existing (chronic) hypertension This is defined as hypertension that develops either pre-pregnancy or at < 20+0 weeks' gestation

With comorbid condition(s) Comorbid conditions (e.g., pre-gestational type I or II diabetes mellitus or kidney disease)

With evidence of preeclampsia - also known as superimposed preeclampsia,.*

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Gestational hypertension This is defined as hypertension that develops for the first time at ≥20+0 weeks' gestation.

With comorbid condition(s) Comorbid conditions (e.g., pre-gestational type I or II diabetes mellitus or kidney disease)

With evidence of preeclampsia - evidence of preeclampsia may appear only many weeks after the onset of gestational hypertension.

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Preeclampsia may arise de novo. It is defined as gestational hypertension with one or more of the following:

- new proteinuria, or
- one or more adverse conditions,* or
- one or more severe complications.*

Severe preeclampsia is defined as preeclampsia with one or more severe complications.

Other hypertensive effects†

Transient hypertensive effect: Elevated BP may be due to environmental stimuli, e.g., the pain of labour.

White-coat hypertensive effect: This is defined as BP that is elevated in the office (sBP ≥140 mmHg or dBP ≥90 mmHg), but consistently normal outside of the office (< 135/85 mmHg) by ABPM or HBPM

Masked hypertensive effect: This is defined as BP that is consistently normal in the office (sBP < 140 mmHg or dBP < 90 mmHg), but elevated outside of the office (≥135/85 mmHg) by ABPM or repeated HBPM.

†These may occur in women whose BP is elevated at < 20+0 or ≥20+0 weeks who are suspected of having pre-existing or gestational hypertension / preeclampsia, respectively.

30. Severe preeclampsia, as defined in this guideline, warrants delivery. (II-2B)

31. **The term PIH (pregnancy-induced hypertension**) should be abandoned, as its meaning in clinical practice is unclear. (III-D)

Table 3. **Adverse conditions and severe complications of preeclampsia**

Organ system affected	Adverse conditions (Increase risk for Severe Complications)	Severe complications (Warrant Delivery)
CNS	Headache/visual symptoms	Eclampsia PRES Cortical blindness or retinal detachment Glasgow coma scale < 13 Stroke, TIA, or RINDFeto-placental
FETAL-Placental	Abnormal FHR IUGR Oligohydramnios A/R EDF flow by Doppler	Abruption with evidence of maternal or fetal compromise Reverse ductus venosus A wave Stillbirth

PRES: posterior reversible leukoencephalopathy syndrome; TIA: transient ischemic attack; RIND: reversible ischemic neurological deficit (< 48 hr); WBC: white blood cell; INR: international normalized ratio; aPTT: activated partial thromboplastin time; RUQ: right upper quadrant; AST: aspartate aminotransferase; ALT: alanine aminotransferase; LDH: lactate dehydrogenase; DIC: disseminated intravascular coagulation; FHR: fetal heart rate.

Other Severe Conditions Which Warrant Delivery

Uncontrolled hypertension > 12 hours with 3 antihypertensive agents

Pulmonary Edema

MI

Platelet Count < 50 X 10(9)/L

Transfusion of any blood product

Acute Kidney Injury (Cr > 150 with no history of renal disease) or new dialysis

Hepatic Hematoma or Rupture

Investigations to Classify HDPs

Recommendations

32. For women with pre-existing hypertension, the following should be performed in early pregnancy (if not previously documented): serum creatinine, fasting blood glucose, serum potassium, and urinalysis (III-D), and EKG. (II-2C)

34. Women with suspected preeclampsia should undergo the maternal laboratory (II-2B) and pertinent fetal (II-1B) testing.

FETAL TESTING **Abnormalities are not specific to the cause of poor placentation and/or placental dysfunction**

Uterine artery Doppler velocimetry Unilateral/bilateral notching, or elevated pulsatility index or resistance index may support a diagnosis of placental insufficiency including preeclampsia

Fetal monitoring Abnormal or atypical FHR tracing (e.g., decreased variability)

Deepest amniotic fluid pocket: Oligohydramnios associated with adverse perinatal outcomes

Ultrasonographic assessment of fetal growth
Usually intrauterine fetal growth restriction (typically asymmetrical but can be symmetrical if early and/or severe)

Umbilical artery Doppler Increased resistance, absent or reversed end-diastolic flow

Ductus venosus Doppler Increased resistance, especially absent or reverse A wave

Middle cerebral artery Doppler Cerebral redistribution (decreased resistance or “brain-sparing effect”). May be lost in extreme cases prior to fetal death

Our Patient

Ms. HBP, 38 year old with a 5 year history of IDDM and primary hypertension for 2 years on labetalol at 30 weeks develops an increase in blood pressure of 145/95mmHg, and new onset proteinuria

What is her classification?

Pre-existing hypertension with co-morbid conditions with evidence of preeclampsia.

Chapter 2: Prediction and Prevention

Predicting Preeclampsia

RISK MARKERS FOR PREECLAMPSIA

Demographics and family history

Maternal age ≥40 years‡

Family history of preeclampsia

(mother or sister)

Family history of early-onset cardiovascular

disease

RISK MARKERS FOR PREECLAMPSIA

Past medical or obstetric history

Previous preeclampsia

Anti-phospholipid antibody syndrome

Pre-existing medical condition(s)

- Pre-existing hypertension or diastolic BP ≥90 mmHg
- Pre-existing renal disease or proteinuria
- Pre-existing diabetes mellitus

Lower maternal birthweight and/or preterm delivery

Heritable thrombophilias§

Increased pre-pregnancy triglycerides

Non-smoking

Cocaine and metamphetamine use

Previous miscarriage at ≤10 weeks with same partner

RISK FACTORS CURRENT PREGNANCY

First trimester

Multiple pregnancy

Overweight/obesity

First ongoing pregnancy

New partner

Short duration of sexual relationship with current partner

Reproductive technologies

Inter-pregnancy interval ≥10 years

BP ≥130 mmHg, or dBP ≥80 mmHg

Vaginal bleeding in early pregnancy

Gestational trophoblastic disease

Abnormal PAPP-A or free βhCG

Second or third trimester

Elevated BP (gestational hypertension)

Abnormal AFP, hCG, inhA, or E 3

Excessive weight gain in pregnancy

Infection during pregnancy

(e.g., UTI, periodontal disease)

Abnormal uterine artery Doppler

IUGR

Investigational laboratory markers

Preventing Preeclampsia and Its Complications in Women at Low Risk

41. Calcium supplementation of at least 1 g/d, orally, is recommended for women with low dietary intake of calcium (< 600 mg/d). (I-A)

42. The following are recommended for other established beneficial effects in pregnancy:

-abstention from alcohol for prevention of fetal alcohol effects (II-2E)

-exercise for maintenance of fitness (I-A)

-periconceptual use of a folate-containing multivitamin for prevention of neural tube defects (I-A)

-smoking cessation for prevention of low birthweight and preterm birth. (I-E)

Preventing Preeclampsia and Its complications in Women at Increased Risk

Recommendations

47. Low-dose acetylsalicylic acid and calcium supplementation (of at least 1 g/d) for women with low calcium intake are recommended for preventions of preeclampsia in women at high risk. (I-A)

48. Acetylsalicylic acid should be: taken in a low dose (75–162 mg/d), (III-B) administered at bedtime, (I-B) initiated after diagnosis of pregnancy but before 16 weeks' gestation, (I-B) and considered for continuation until delivery. (I-C)

49. Prophylactic doses of low-molecular-weight heparin may be discussed in women with previous placental complications (including preeclampsia) to prevent the recurrence of severe or early-onset preeclampsia, preterm delivery, and/or infants thatare small for gestational age. (I-B)

CHAPTER 3

TREATMENT OF ANTIHYPERTENSIVE DISORDERS

Antihypertensive Therapy for Severe Hypertension

Recommendations

62. Blood pressure should be lowered to < 160 mmHg systolic and < 110 mmHg diastolic. (I-A)

63. Initial antihypertensive therapy in the hospital setting should be with nifedipine short-acting capsules, parenteral hydralazine, or parenteral labetalol. (I-A)

66. Nifedipine and magnesium sulphate can be used contemporaneously. (II-2B)

67. Magnesium sulphate is not recommended solely as an antihypertensive agent. (I-E)

68. Continuous fetal heart rate monitoring is advised until blood pressure is stable. (III-L

Antihypertensive Therapy for Non-Severe Hypertension Without Comorbid Conditions

Recommendations

69. Antihypertensive drug therapy may be used to keep systolic blood pressure at 130 to 155 mmHg and diastolic blood pressure at 80–105 mmHg. (I-B)

71. Initial therapy in pregnancy can be with one of a variety of antihypertensive agents available in Canada: methyldopa (I-A), labetalol (I-A), other beta-blockers (acebutolol, metoprolol, pindolol, and propranolol), (I-B) and calcium channel blockers (nifedipine). (I-A)

72. Angiotensin-converting enzyme inhibitors and angiotensin receptor blockers should not be used during pregnancy. (II-2E)

For Non-Severe Hypertension (BP of 140–159/ 90–109 mmHg) With Comorbid Conditions

Recommendations

74. For women with comorbid conditions, antihypertensive drug therapy should be used to keep systolic blood pressure at < 140 mmHg and diastolic blood pressure at < 90 mmHg. (III-C)

75. Initial therapy in pregnancy can be with one of a variety of antihypertensive agents as listed for women without co-morbidities. (III-C)

76. Captopril, enalapril, or quinapril may be used postpartum, even during breastfeeding. (III-B)

Our Patient

Ms. HBP, 38 year old with a 5 year history of IDDM and primary hypertension for 2 years on labetalol.

Why should patients with comorbid conditions have tighter control?

Potential increased risk for end-organ damage and increased cardiovascular risk

Corticosteroids for Acceleration of Fetal Pulmonary Maturity

Recommendations

77. Antenatal corticosteroid therapy should be considered for all women who present with preeclampsia at ≤34+6 weeks' gestation. (I-A)

78. Antenatal corticosteroid therapy should be considered for women who present at ≤34+6 weeks' gestation with gestational hypertension (despite the absence of proteinuria or adverse conditions) only if delivery is contemplated within the next 7 days. (III-L)

79. A rescue dose of corticosteroids may be considered for women at ≤34+6 weeks' gestation who remain at high risk of preterm delivery 7 days or more after an initial course of antenatal corticosteroids. (I-C)

80. Antenatal corticosteroids may be considered for women delivered by elective Caesarean delivery at ≤38+6 weeks' gestation to reduce respiratory morbidity. (I-B)

Prior to elective Caesarean section at ≤38+6 weeks' gestation, antenatal corticosteroids decrease the excess neonatal respiratory morbidity and NICU admissions.36,37

All subgroup analyses have not necessarily revealed such benefits following Caesarean or vaginal delivery.35

35. Roberts D, Dalziel SR. Antenatal corticosteroids for accelerating fetal lung maturation for women at risk of preterm birth. Cochrane Database of Systematic Reviews 2006;(3)CD004454.

36. Stutchfield P, Whitaker R, Russell I; Antenatal Steroids for Term Elective Caesarean Section (ASTECS) Research Team. Antenatal betamethasone and incidence of neonatal respiratory distress after elective caesarean section: pragmatic randomised trial. BMJ 2005;331:662.

37. Roberts D; Royal College of Obstetricians and Gynaecologists. Antenatal corticosteroids to reduce neonatal morbidity and mortality. Green-top Guideline No. 7. London: Royal College of Obstetricians and Gynaecologists; 2010. Available at: http://www.rcog.org.uk/files/ rcog-corp/GTG%207.pdf. Accessed on February 28, 2014.

Timing of Delivery for Women With Preeclampsia

Delivery is the only intervention that initiates resolution of preeclampsia, and women with gestational hypertension or pre-existing hypertension with preeclampsia.

Recommendations

81. Consultation with an obstetrician (by telephone if necessary) is mandatory in women with severe preeclampsia. (III-B)

82. All women with severe preeclampsia should be delivered immediately (either vaginally or by Caesarean), regardless of gestational age. (III-C)

83. For women with non-severe preeclampsia at < 24+0 weeks' gestation, counselling should include, as an option, information about delivery within days. (II-2B)

84. For women with non-severe preeclampsia at 24+0 to 33+6 weeks' gestation, expectant management should be considered, but only in perinatal centres capable of caring for very preterm infants. (I-B)

85. For women with non-severe preeclampsia at 34+0 to 36+6 weeks' gestation, there is insufficient evidence to make a recommendation about the benefits or risks of expectant management. (III-L)

Severe Preeclampsia

Definitions of severe preeclampsia vary, but most include multi-organ involvement

We modified our definition of severe preeclampsia to preeclampsia associated with one or more severe complications. Severe preeclampsia now warrants delivery regardless of gestational age.

Our definition excludes heavy proteinuria and HELLP syndrome, which are not absolute indications for delivery, and includes stroke and pulmonary edema, which are leading causes of maternal death in preeclampsia.

There is no international consensus on what defines severe preeclampsia. This document defines it as preeclampsia requiring delivery due to serious maternal end-organ involvement and/or fetal compromise.

86. For women with preeclampsia at ≥37+0 weeks' gestation, immediate delivery is recommended. (I-A)

87. For women with non-severe preeclampsia complicated by hemolysis, elevated liver enzymes, low platelets syndrome at 24+0 to 34+6 weeks' gestation, consider delaying delivery long enough to administer antenatal corticosteroids for acceleration of fetal pulmonary maturity if there is temporary improvement in maternal laboratory testing. (II-2B)

88. All women with hemolysis, elevated liver enzymes, low platelets syndrome at ≥35+0 weeks' gestation should be considered for immediate delivery. (II-2B)

Timing of Delivery for Women With Gestational Hypertension

Recommendations

89. For women with gestational hypertension (without preeclampsia) at ≥37+0 weeks' gestation, delivery within days should be discussed. (I-B)

90. For women with gestational hypertension (without preeclampsia) at < 37+0 weeks' gestation, there is insufficient evidence to make a recommendation about the benefits or risks of expectant management. (III-L)

Timing of Delivery for Women With Pre-Existing Hypertension

Recommendation

91. For women with uncomplicated pre-existing hypertension who are otherwise well at ≥37+0 weeks' gestation, delivery should be considered at 38+0 to 39+6 weeks' gestation. (II-1B)

Our Patient

Ms. HBP, 38 year old with a 5 year history of IDDM well controlled and preexisting hypertension on labetalol BP 135/75mmHg (and did not develop preeclampsia) is now 37 weeks gestation, 2 previous C-sections and has a breech presentation?

PLAN for mode of delivery?

C-section

When?

39 weeks

Would you give her steroids if planning elective C-section < 39 weeks gestation?

What if she had preeclampsia at 37 weeks and 4 days?

Mode of Delivery

Recommendations

92. For women with any hypertensive disorder of pregnancy, vaginal delivery should be considered unless a Caesarean delivery is required for the usual obstetric indications. (II-2B)

93. If vaginal delivery is planned and the cervix is unfavourable, then cervical ripening should be used to increase the chance of a successful vaginal delivery. (1-A)

94. At a gestational age remote from term, women with a hypertensive disorder of pregnancy with evidence of fetal compromise may benefit from delivery be emergency Caesarean section. (II-2B)

95. Antihypertensive treatment should be continued throughout labour and delivery to maintain systolic blood pressure at < 160 mmHg and diastolic blood pressure at < 110 mmHg. (II-2B)

Monitoring

Recommendations

106. Arterial line insertion may be used for continuous arterial blood pressure monitoring when blood pressure control is difficult or there is severe bleeding. (II-3B)

107. Central venous pressure monitoring is not routinely recommended, and if a central venous catheter is inserted, it should be used to monitor trends and not absolute values. (II-2D)

108. Pulmonary artery catheterization is not recommended unless there is a specific associated indication (III-D), and then only in an intensive care unit setting. (III-B)

Neuraxial analgesia and/or anaesthesia are appropriate in women:

a. with preeclampsia, provided there are no associated coagulation concerns (II-2E)

b. with a platelet count ≥75 × 10 9/L, (II-2B);

c. taking low-dose acetylsaliclylic acid in the presence of an adequate platelet count (I-A);

d. receiving unfractionated heparin in a dose of ≤10 000 IU/d subcutaneously, 4 hours after the last dose and possibly immediately after the last dose without any delay (III-B)

e. receiving unfractionated heparin in a dose> 10 000 IU/d subcutaneously if they have a normal activated partial thromboplastin time 4hours after the last dose (III-B);

f. receiving intravenous heparin in a therapeutic dose if they have a normal activated partial thromboplastin time 4 hours after the last dose (III-B); or

g. receiving low-molecular-weight heparin 10 to 12 hours after a prophylactic dose, or 24 hours after a therapeutic dose. (III-B)

Give Platelets for any mode of delivery if platelets < 20 and for C-section if Platelets < 50.

We do not recommend corticosteroids for treatment of hemolysis, elevated liver enzymes, low platelets syndrome until they have been proven to decrease maternal morbidity. (II-3L)

We recommend against plasma exchange or plasmapheresis for hemolysis, elevated liver enzymes, low platelets syndrome, particularly within the first 4 days postpartum. (II-3E)

Dexamethasone in the post-partum treatment of HELLP syndrome. - Vigil-De Gracia P1, García-Cáceres E.

OBJECTIVE:

To determine if the routine initiation of dexamethasone in patients with post-partum HELLP syndrome produces therapeutic benefits.

METHOD:

The puerperal courses of 17 mothers who initially received dexamethasone after delivery were compared to 17 other mothers with HELLP syndrome who received no corticosteroids during the puerperium course. Treated patients immediately received 10 mg of dexamethasone post-partum (intravenously) followed 12 h later by 10 mg and 10 mg at 24 h post-partum, to a total of 30 mg.

RESULTS:

The steroid treated group had significant changes over time in platelet count. Relative to the control group the platelet count increased significantly by 30 h post-partum ($P < 0.01$). The blood pressure, urinary output, lactic dehydrogenase, AST and ALT values were not significantly different between the dexamethasone and control group at any time by 72 h post-partum.

CONCLUSION:

Parturients with HELLP syndrome who received a short course of post-partum dexamethasone therapy had an accelerated recovery from their platelet count, but not from their liver enzymes and blood pressure.

Care Beyond 6 Weeks Postpartum

Recommendations

143. Women with a history of severe preeclampsia (particularly those who presented or delivered before 34 weeks' gestation) should be screened for pre-existing hypertension and underlying renal disease. (II-2B)

144. Referral for internal medicine or nephrology consultation (by telephone if necessary) should be considered for women with:

(i) postpartum hypertension that is difficult to control, or

(ii) women who had preeclampsia and have at 3-6 months postpartum either ongoing proteinuria, decreased estimated glomerular filtration rate (eGFR) (< 60 mL/min), or another indication of renal disease, such as abnormal urinary sediment. (III-A)

45. Women who are overweight should be encouraged to attain a healthy body mass index to decrease risk in future pregnancy (II-2A) and for long-term health. (I-A)

146. Women with pre-existing hypertension or persistent postpartum hypertension should undergo the following investigations (if not done previously) at least six weeks postpartum: urinalysis; serum sodium, potassium and creatinine; fasting glucose; fasting lipid profile; and standard 12-lead electrocardio- graphy. (III-L)

147. Women who are normotensive but who have had a hypertensive disorder of pregnancy, may benefit from assessment of traditional cardiovascular risk markers. (II-2B)

148. All women who have had a hypertensive disorder of pregnancy should pursue a healthy diet and lifestyle. (I-B)

Cardiovascular Risk Factors
World Heart Federation

MODIFIABLE RISK FACTORS

- Hypertension (high blood pressure)
- Tobacco use
- Raised blood glucose (diabetes)
- Physical inactivity
- Unhealthy diet
- Cholesterol/lipids
- Overweight and obesity

NON-MODIFIABLE RISK FACTORS

- Age
- Gender
- Family History

Our Patient

Ms. HBP, 38 year old with a 5 year history of IDDM and primary hypertension for 2 years - on labetalol 6 week post-partum check-up. Doing well.

Next steps?

May benefit with cardiac risk assessment and on-going care by internist if not already organized.

CHAPTER 4
Patient Perspective

Recommendations

151. Health care providers should be alert to symptoms of posttraumatic stress following a hypertensive disorder of pregnancy and refer women for appropriate evaluation and treatment. (II-2B)

152. Health care providers should inform their patients, antepartum and postpartum, about preeclampsia, its signs and symptoms, and the importance of timely reporting of symptoms to health care providers. (II-2B)

153. Information should be re-emphasized at subsequent visits. (III-C)

CHAPTER 5: KNOWLEDGE TRANSLATION TOOLS AND IMPLEMENTATION OF THE GUIDELINE

Some updates to the 2008 SOGC guidelines on the HDP may require additional effort to implement.

Recommendation 9 states that all measurement devices used in hospitals or offices should be checked regularly against a calibrated device may not be possible for all Canadian hospitals and offices to do on a regular basis.

Physicians should consider the category “other HDP” (white-coat and masked hypertension) as part of the classification of hypertensive women and consider using some form of out-of-office BP measurement to evaluate women with non-severe pre-existing or gestational hypertension.

Health care providers should inform pregnant women about the symptoms and signs of the HDPs and refer them to appropriate knowledge translation tools.

We recommend the use of corticosteroids for women ≤34+6 weeks’ gestation who are at high risk of delivery within the next seven days. This gestational age cut-off represents a fundamental change in practice that will require discussion.

Physicians should be familiar with the blood bank policies of their own hospital.

Physicians should be aware of postpartum signs of maternal posttraumatic stress disorder and the maternal and perinatal long-term effects of HDPs, especially at this vulnerable time in maternal care when the maternity care provider is often handing back care to the primary care physician.

The reader is reminded to refer to the full open-access guideline published in *Pregnancy Hypertension*, which contains not only the recommendations and tables presented, but also all explanatory text and additional references.

Thank you!