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Introduction

Hypertensive disorders during pregnancy occur in women with pre-existing primary or secondary chronic hypertension, and in women who develop new-onset hypertension in the second half of pregnancy.

Hypertensive disorders during pregnancy carry risks for the woman and the baby. Although the rate of eclampsia in the United Kingdom (UK) appears to have fallen, hypertension in pregnancy remains one of the leading causes of maternal death in the UK. Maternal morbidity may also be substantial. A UK study reported that one-third of severe maternal morbidity was a consequence of hypertensive conditions. A study from one region of the UK reported that 1 in 50 women with severe pre-eclampsia were admitted to intensive care. More recently, the long-term consequences for women with a diagnosis of hypertension during pregnancy have become clear, in particular chronic hypertension and an increase in lifetime cardiovascular risk.

Hypertensive disorders also carry a risk for the baby. In the most recent UK perinatal mortality report, 1 in 20 (4.5%) stillbirths in infants without congenital abnormality occurred in women with pre-eclampsia. The contribution of pre-eclampsia to the overall preterm birth rate is substantial; 1 in 250 women in their first pregnancy will give birth before 34 weeks as a consequence of pre-eclampsia and 8–10% of all preterm births result from hypertensive disorders. Half of women with severe pre-eclampsia give birth preterm.

Small-for-gestational age babies (mainly arising as a consequence of fetal growth restriction arising from placental disease) are common, with 20–25% of preterm births and 14–19% of term births in women with pre-eclampsia being less than the tenth centile of birth weight for gestation.

There is national guidance on the care of women with severe pre-eclampsia or eclampsia and on screening for hypertensive disorders during pregnancy. However, there has been no guidance on the assessment and care of women and their babies after a diagnosis of hypertension (including the use of...
antihypertensive treatment) or on maternity care for women with chronic hypertension.

This clinical guideline contains recommendations for the diagnosis and management of hypertensive disorders during pregnancy in the antenatal, peripartum and postnatal periods. It includes recommendations for women with chronic hypertension who wish to conceive and recommendations for advice to women after a pregnancy complicated by hypertension.

This guideline assumes that prescribers will use a drug’s summary of product characteristics to inform decisions made with individual patients.

This guideline recommends some drugs for indications for which they do not have a UK marketing authorisation at the date of publication, if there is good evidence to support that use. Unlicensed drugs are marked with an asterisk.
**Woman-centred care**

This guideline offers best practice advice on the care of women with hypertensive disorders in pregnancy.

Treatment and care should take into account women’s needs and preferences. Women with hypertensive disorders in pregnancy should have the opportunity to make informed decisions about their care and treatment, in partnership with their healthcare professionals. If women do not have the capacity to make decisions, healthcare professionals should follow the Department of Health guidelines – ‘Reference guide to consent for examination or treatment’ (2001) (available from www.dh.gov.uk). Healthcare professionals should also follow the code of practice that accompanies the Mental Capacity Act (summary available from www.publicguardian.gov.uk).

Good communication between healthcare professionals and women is essential. It should be supported by evidence-based written information tailored to women’s needs. Treatment and care, and the information women are given about it, should be culturally appropriate. It should also be accessible to people with additional needs such as physical, sensory or learning disabilities, and to people who do not speak or read English.
Key priorities for implementation

Reducing the risk of hypertensive disorders in pregnancy
Advise women at high risk of pre-eclampsia to take 75 mg of aspirin* daily from 12 weeks until the birth of the baby. Women at high risk are those with any of the following:

- hypertensive disease during a previous pregnancy
- chronic renal disease
- autoimmune disease such as systemic lupus erythematosus or antiphospholipid syndrome
- type 1 or type 2 diabetes
- chronic hypertension. [1.1.1.1]

Management of pregnancy with chronic hypertension
Advise women of childbearing age who take angiotensin-converting enzyme (ACE) inhibitors and angiotensin II receptor blockers (ARBs):

- that there is an increased risk of congenital abnormalities if these drugs are taken during pregnancy
- to discuss alternative antihypertensive treatment with their healthcare professional if they are planning pregnancy. [1.2.1.1]

In pregnant women with chronic hypertension aim to keep blood pressure lower than 150/100 mmHg. [1.2.4.1]

Assessment of proteinuria in hypertensive disorders of pregnancy
Use an automated reading device for measuring urinary protein levels by the dipstick test to diagnose pre-eclampsia in a secondary care setting. [1.3.1.1]
Management of pregnancy with gestational hypertension
Manage gestational hypertension as described in Table 1: [1.4.1.3]
Table 1. Management of women with gestational hypertension

<table>
<thead>
<tr>
<th>Degree of hypertension</th>
<th>Mild hypertension (&lt;149/99 mmHg)</th>
<th>Moderate hypertension (150/100 to 159/109 mmHg)</th>
<th>Severe hypertension (160/110 mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admit to hospital</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Treat</td>
<td>No</td>
<td>Yes - with oral labetalol(^1) to keep:</td>
<td>Yes - with oral labetalol(^1) to keep:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• diastolic blood pressure less than 100 mmHg but</td>
<td>• diastolic blood pressure less than</td>
</tr>
<tr>
<td></td>
<td></td>
<td>more than 80 mmHg</td>
<td>100 mmHg but more than 80 mmHg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• systolic blood pressure less than 150 mmHg</td>
<td>• systolic blood pressure less than</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>150 mmHg</td>
</tr>
<tr>
<td>Measure blood pressure</td>
<td>Yes - routinely not more than once</td>
<td>Yes - at least twice a week</td>
<td>Yes - at least four times a day</td>
</tr>
<tr>
<td></td>
<td>a week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for proteinuria</td>
<td>Yes at each visit using automated</td>
<td>Yes at each visit using automated dipsticks</td>
<td>Yes daily using automated dipsticks</td>
</tr>
<tr>
<td></td>
<td>dipsticks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood tests</td>
<td>No (none in addition to those for</td>
<td>Yes - test urea electrolytes and request a full</td>
<td>Yes - test at presentation: full</td>
</tr>
<tr>
<td></td>
<td>routine antenatal care)</td>
<td>blood count, platelets, serum creatinine,</td>
<td>blood count, platelets, serum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>transaminases, bilirubin</td>
<td>creatinine, transaminases,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• do not carry out further blood tests if no</td>
<td>bilirubin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>proteinuria at subsequent visits.</td>
<td>• monitor weekly: full</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>blood count, platelets, serum</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>creatinine, transaminases,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>bilirubin</td>
</tr>
</tbody>
</table>

\(^1\) Labetalol is licensed for the treatment of hypertension, including during pregnancy and is already used widely in UK obstetric practice, but the SPCs (August 2009) advise that it should only be used during the first trimester of pregnancy if the potential benefit outweighs the potential risk, and that breastfeeding is not recommended. Informed consent on the use of labetalol in these situations should be obtained and documented.
Offer birth to women with gestational hypertension whose diastolic blood pressure is greater than 95 mmHg with or without antihypertensive treatment after 37 + 0 weeks. [1.4.2.3]
Management of pregnancy with pre-eclampsia

Manage pre-eclampsia as described in Table 2: [1.5.1.2]

Table 2. Management of women with pre-eclampsia

<table>
<thead>
<tr>
<th>Degree of hypertension</th>
<th>Mild hypertension (&lt;149/99 mmHg)</th>
<th>Moderate hypertension (150/100 to 159/109 mmHg)</th>
<th>Severe hypertension (160/110 mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admit to hospital</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Treat</td>
<td>No</td>
<td>Yes with oral labetalol(^2) to keep</td>
<td>Yes with oral labetalol(^2) to keep</td>
</tr>
<tr>
<td></td>
<td>(none in addition to routine antenatal care)</td>
<td>• diastolic blood pressure less than 100 mmHg but more than 80 mmHg</td>
<td>• diastolic blood pressure less than 100 mmHg but more than 80 mmHg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• systolic blood pressure less than 150 mmHg</td>
<td>• systolic blood pressure less than 150 mmHg</td>
</tr>
<tr>
<td>Measure blood pressure</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>At least four times a day.</td>
<td>At least four times a day.</td>
<td>More frequently than six hourly, depending on clinical circumstances.</td>
</tr>
<tr>
<td>Test for proteinuria</td>
<td>Do not repeat quantification of proteinuria</td>
<td>Do not repeat quantification of proteinuria</td>
<td>Do not repeat quantification of proteinuria</td>
</tr>
<tr>
<td>Blood tests</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Monitor using the following tests twice a week: full blood count, platelets, serum creatinine, transaminases, bilirubin.</td>
<td>Monitor using the following tests three times a week: full blood count, platelets, serum creatinine, transaminases, bilirubin.</td>
<td>Monitor using the following tests every other day: full blood count, platelets, serum creatinine, transaminases, bilirubin.</td>
</tr>
</tbody>
</table>

\(^2\) Labetalol is licensed for the treatment of hypertension, including during pregnancy and is already used widely in UK obstetric practice, but the SPCs (August 2009) advise that it should only be used during the first trimester of pregnancy if the potential benefit outweighs the potential risk, and that breastfeeding is not recommended. Informed consent on the use of labetalol in these situations should be obtained and documented.
Consultant obstetric staff should advise and document the biochemical, haematological and clinical thresholds (maternal and fetal) for birth in women with pre-eclampsia before 34 weeks. [1.5.2.2]

In women who have had pre-eclampsia perform medical review at the postnatal visit (6–8 weeks after the birth). [1.5.3.12]

**Advice at discharge from maternity care**

Inform women that if they had pre-eclampsia in their first pregnancy, their risk of developing:

- gestational hypertension in their next pregnancy is 1 in 4 (26%)
- pre-eclampsia in their next pregnancy is around 1 in 7 (14.5%)
- pre-eclampsia in their next pregnancy is 1 in 4 (25%) if their pre-eclampsia was complicated by severe pre-eclampsia, HELLP syndrome or eclampsia and led to birth before 34 weeks, and 1 in 2 (55%) if it led to birth before 28–30 weeks. [1.9.4.2]

1 Guidance

The following guidance is based on the best available evidence. The full guideline (Hypertension in pregnancy) gives details of the methods and the evidence used to develop the guidance.

**Definitions**

For the purposes of this guideline, the following definitions apply:

**Chronic hypertension** is hypertension that is present at the booking visit or before 20 weeks or if the woman is already taking antihypertensive medication when referred to maternity services. It can be primary or secondary in aetiology.

**Eclampsia** is a convulsive condition that arises from pre-eclampsia.

**HELLP syndrome** is haemolysis, elevated liver enzymes and low platelet count.
Gestational hypertension is new hypertension presenting after 20 weeks without significant proteinuria.

Pre-eclampsia is new hypertension presenting after 20 weeks with significant proteinuria.

Significant proteinuria is if there is more than 300 mg protein in a 24-hour urine collection.

In addition, the Guideline Development Group (GDG) has defined mild, moderate and severe hypertension to assist the development of guidance as follows:

Mild hypertension diastolic blood pressure 90–99 mmHg, systolic blood pressure 140–149 mmHg.

Moderate hypertension diastolic blood pressure 100–109 mmHg, systolic blood pressure 150–159 mmHg.

Severe hypertension diastolic blood pressure 110 mmHg or greater, systolic blood pressure 160 mmHg or greater.

1.1 Reducing the risk of hypertensive disorders in pregnancy

1.1.1 Antiplatelet agents

1.1.1.1 Advise women at high risk of pre-eclampsia to take 75 mg of aspirin* daily from 12 weeks until the birth of the baby. Women at high risk are those with any of the following:

- hypertensive disease during a previous pregnancy
- chronic renal disease
- autoimmune disease such as systemic lupus erythematosis or antiphospholipid syndrome

*In this guideline, drug names are marked with an asterisk if they do not have UK marketing authorisation for the indication in question at the time of publication ([date]). Informed consent should be obtained and documented.
• type 1 or type 2 diabetes
• chronic hypertension.

1.1.1.2 Offer women with more than one moderate risk factor for pre-eclampsia 75 mg of aspirin* daily from 12 weeks until the birth of the baby. Factors indicating moderate risk are:

• first pregnancy
• age more than 40 years
• body mass index (BMI) more than 35 at first visit
• family history of pre-eclampsia
• multiple pregnancy.

1.1.2 Other pharmaceutical agents

1.1.2.1 Do not use the following for the prevention of hypertensive disorders during pregnancy:

• nitric oxide donors
• progesterone
• diuretics
• low molecular weight heparin.

1.1.3 Nutritional supplements

1.1.3.1 Do not use the following supplementation to prevent hypertensive disorders during pregnancy:

• magnesium
• folic acid
• antioxidants (vitamins C and E)
• fish oils or algal oils
• garlic.

1.1.4 Diet

1.1.4.1 Do not advise salt restriction during pregnancy to prevent gestational hypertension or pre-eclampsia.
1.1.5 Lifestyle

1.1.5.1 Advice on rest, exercise and work for women at risk of hypertensive disorders during pregnancy should be the same as for healthy pregnant women.

1.2 Management of pregnancy with chronic hypertension

Women with chronic hypertension should be given advice and treatment in line with ‘Hypertension: the management of hypertension in adults in primary care’ (NICE clinical guideline 34), unless it specifically differs from recommendations in this guideline.

1.2.1 Pre-pregnancy advice

1.2.1.1 Advise women of childbearing age who take angiotensin-converting enzyme (ACE) inhibitors and angiotensin II receptor blockers (ARBs):

- that there is an increased risk of congenital abnormalities if these drugs are taken during pregnancy
- to discuss alternative antihypertensive treatment with their healthcare professional if they are planning pregnancy.

1.2.1.2 Review antihypertensive treatments for women taking ACE inhibitors or ARBs when they become pregnant (preferably within 2 working days of notification of pregnancy) and discuss alternatives.

1.2.1.3 Advise women of childbearing age who take chlorothiazide diuretics:

- that there may be an increased risk of congenital abnormality and neonatal complications if these drugs are taken during pregnancy
- to discuss alternative antihypertensive treatment with their healthcare professional if they are planning pregnancy.
1.2.1.4 Advise women of childbearing age who take other antihypertensive treatments that there is no evidence that such treatments carry a risk of congenital malformation.

1.2.2 Diet

1.2.2.1 Encourage women with chronic hypertension to keep their dietary sodium intake low, either by reducing or substituting sodium salt, as this can reduce blood pressure. [This recommendation is adapted from ‘Hypertension: management of hypertension in adults in primary care’ (NICE clinical guideline 34).]

1.2.3 Prevention of pre-eclampsia

1.2.3.1 In women with chronic hypertension, offer treatment with aspirin* (75 mg/day) from 12 weeks until the birth of the baby.

1.2.4 Treatment of hypertension

1.2.4.1 In pregnant women with chronic hypertension aim to keep blood pressure lower than 150/100 mmHg.

1.2.4.2 In pregnant women with chronic hypertension do not use treatment to lower diastolic blood pressure to less than 80 mmHg.

1.2.4.3 In pregnant women with end-organ damage secondary to chronic hypertension offer treatment to keep blood pressure lower than 140/90 mmHg.

1.2.4.4 Refer pregnant women with secondary chronic hypertension for specialist treatment.

1.2.4.5 In women with chronic hypertension, advise antihypertensive treatment dependent on pre-existing treatment, side-effect profiles and teratogenicity.
1.2.5 **Antenatal visits**

1.2.5.1 In women with chronic hypertension, schedule additional antenatal visits on the basis of the individual needs of the woman and her baby.

1.2.6 **Timing of birth**

1.2.6.1 For women with chronic hypertension whose blood pressure is lower than 159/109 mmHg with or without antihypertensive treatment, do not offer birth before 37 weeks.

1.2.6.2 For women with refractory severe chronic hypertension, offer birth before 37 weeks after a course of antenatal steroids has been completed.

1.2.6.3 Offer birth to women with chronic hypertension whose diastolic blood pressure is greater than 95 mmHg with or without antihypertensive treatment after 37 + 0 weeks.

1.2.6.4 Offer birth to women with chronic hypertension after 39 + 0 weeks.

1.2.6.5 Consider birth at any gestation when there is evidence of impending fetal death.

1.2.7 **Postnatal investigation, monitoring and treatment**

1.2.7.1 In women with chronic hypertension who have just given birth, measure blood pressure:

- daily while the woman is an inpatient
- between day 3 and day 5 after birth
- as clinically indicated if antihypertensive treatment is changed after birth.

1.2.7.2 In women with chronic hypertension who have recently given birth, aim to keep blood pressure below 140/90 mmHg.
1.2.7.3 In women with chronic hypertension who have just given birth, continue use of antenatal antihypertensive treatment.

1.2.7.4 In women with chronic hypertension who have recently given birth, review long-term antihypertensive treatment 2 weeks after the birth.

1.2.7.5 If a woman has received methyldopa\(^3\) to treat chronic hypertension during pregnancy, stop within 2 days of birth and restart the antihypertensive treatment the woman was receiving before planning pregnancy.

1.2.7.6 In women with chronic hypertension, avoid diuretic treatment for hypertension if the woman is breastfeeding or expressing milk.

1.2.7.7 Advise women with chronic hypertension that the following commonly used drugs have no known adverse effects on babies receiving breast milk:

- labetalol\(^4\)
- nifedipine\(^5\)
- enalapril\(^6\)

\(^3\)Methyldopa is licensed for the treatment of hypertension and is already used widely in UK obstetric practice, but the SPC (August 2009) advises that its use in women who are, or may become, pregnant or who are breastfeeding their newborn infant requires that anticipated benefits be weighed against possible risks. Informed consent on the use of methyldopa in these situations should be obtained and documented.

\(^4\)Labetalol is licensed for the treatment of hypertension, including during pregnancy and is already used widely in UK obstetric practice, but the SPCs (August 2009) advise that it should only be used during the first trimester of pregnancy if the potential benefit outweighs the potential risk, and that breastfeeding is not recommended. Informed consent on the use of labetalol in these situations should be obtained and documented.

\(^5\)Nifedipine is licensed for the treatment of hypertension and is already used widely in UK obstetric practice, but the SPCs (August 2009) advise that it is contraindicated in pregnancy before week 20 and during breastfeeding, or that it must not be administered during the entire pregnancy and that the child should be weaned if treatment should be necessary during the lactation period, or that it should not be used in women who are or who may become pregnant and that it is not recommended during lactation, or that it should not be used in nursing mothers and women who are or who may become pregnant. Informed consent on the use of nifedipine in these situations should be obtained and documented.

\(^6\)Enalapril is licensed for the treatment of hypertension and is already used widely in UK obstetric practice, but the SPC (August 2009) advises that it is contraindicated in the second and third trimesters of pregnancy and that it is not recommended during the first trimester of pregnancy or in breastfeeding for preterm infants and for the first few weeks after delivery. Informed consent on the use of enalapril in these situations should be obtained and documented.
• captopril\textsuperscript{7}
• atenolol\textsuperscript{8}
• metoprolol\textsuperscript{9}
• chlorothiazide/hydrochlorothiazide.\textsuperscript{10}

1.2.7.8 Advise women with chronic hypertension that there is insufficient evidence on the safety in babies receiving breast milk of the following drugs that are commonly used to treat hypertension:

• ARBs
• amlodipine
• ACE inhibitors other than enalapril\textsuperscript{11} and captopril\textsuperscript{12}.

\textsuperscript{7}Captopril is licensed for the treatment of hypertension and is already used widely in UK obstetric practice, but the SPC (August 2009) advises that it is contraindicated in the second and third trimesters of pregnancy and in lactation, and that is not recommended during the first trimester of pregnancy. Informed consent on the use of captopril in these situations should be obtained and documented.

\textsuperscript{8}Atenolol is licensed for the treatment of hypertension and is already used widely in UK obstetric practice, but the SPCs (August 2009) advise that its use in early pregnancy should be avoided, or that its use in women who are, or may become, pregnant requires that the anticipated benefit be weighed against the possible risks, particularly in the first and second trimesters and caution should be exercised when it is administered during pregnancy or to a woman who is breastfeeding. Informed consent on the use of atenolol in these situations should be obtained and documented.

\textsuperscript{9}Metoprolol is licensed for the treatment of hypertension and is already used widely in UK obstetric practice, but the SPCs (August 2009) advise that it should not be used in pregnancy or nursing mothers unless the physician considers that the benefit outweighs the possible hazard to the fetus/infant and breastfeeding is not recommended, or that it should not be used in pregnancy or lactation unless it is considered that the benefit outweighs the possible risk to the fetus/infant. Informed consent on the use of metoprolol in these situations should be obtained and documented.

\textsuperscript{10}Chlorothiazide/hydrochlorothiazide, which are already used widely in UK obstetric practice, are available only in combination products (e.g. combinations with captopril or enalapril, and the SPCs (August 2009) for the combination products advise the same contraindications and warnings in relation to pregnancy and lactation as for captopril or enalapril alone). Informed consent on the use of chlorothiazide/hydrochlorothiazide combination products in these situations should be obtained and documented.

\textsuperscript{11}Enalapril is licensed for the treatment of hypertension and is already used widely in UK obstetric practice, but the SPC (August 2009) advises that it is contraindicated in the second and third trimesters of pregnancy and that it is not recommended during the first trimester of pregnancy or in breastfeeding for preterm infants and for the first few weeks after delivery. Informed consent on the use of enalapril in these situations should be obtained and documented.

\textsuperscript{12}Captopril is licensed for the treatment of hypertension and is already used widely in UK obstetric practice, but the SPC (August 2009) advises that it is contraindicated in the second and third trimesters of pregnancy and in lactation, and that is not recommended during the first trimester of pregnancy. Informed consent on the use of captopril in these situations should be obtained and documented.
1.2.7.9 In women with chronic hypertension perform medical review at the postnatal visit (6–8 weeks after the birth).

1.3 **Assessment of proteinuria in hypertensive disorders of pregnancy**

1.3.1.1 Use an automated reading device for measuring urinary protein levels by the dipstick test to diagnose pre-eclampsia in a secondary care setting.

1.3.1.2 Quantify proteinuria when there is 1+ or more on automated urinary dipstick.

1.3.1.3 Use 24-hour urine collection to quantify proteinuria.

1.4 **Management of pregnancy with gestational hypertension**

1.4.1 **Treatment of hypertension**

1.4.1.1 In women with gestational hypertension full assessment should be carried out by a healthcare professional in a secondary care setting trained in the management of hypertensive disorders.

1.4.1.2 In women with gestational hypertension, take account of the following risk factors when planning assessment and follow-up:

- age more than 40 years
- nulliparity
- pregnancy interval of more than 10 years
- family history of pre-eclampsia
- multiple pregnancy
- BMI more than 35
- gestational age at presentation
- previous history of pre-eclampsia or gestational hypertension
- pre-existing vascular disease
- pre-existing renal disease.
1.4.1.3 Manage gestational hypertension as described in Table 1:

Table 1. Management of women with gestational hypertension

<table>
<thead>
<tr>
<th>Degree of hypertension</th>
<th>Mild hypertension (&lt;149/99 mmHg)</th>
<th>Moderate hypertension (150/100 to 159/109 mmHg)</th>
<th>Severe hypertension (160/110 mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admit to hospital</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Treat</td>
<td>No</td>
<td>Yes - with oral labetalol(^\text{13}) to keep:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• diastolic blood pressure less than 100 mmHg but</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• more than 80 mmHg</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• systolic blood pressure less than 150 mmHg</td>
<td></td>
</tr>
<tr>
<td>Measure blood pressure</td>
<td>Yes routinely not more than once a week</td>
<td>Yes at least twice a week</td>
<td>Yes at least four times a day</td>
</tr>
<tr>
<td>Test for proteinuria</td>
<td>Yes at each visit using automated dipsticks</td>
<td>Yes at each visit using automated dipsticks</td>
<td>Yes daily using automated dipsticks</td>
</tr>
<tr>
<td>Blood tests</td>
<td>No (none in addition to those for routine antenatal care)</td>
<td>Yes • test urea electrolytes and request a full blood count, platelets, serum creatinine, transaminases, bilirubin • do not carry out further blood tests if no proteinuria at subsequent visits.</td>
<td>Yes • test at presentation: full blood count, platelets, serum creatinine, transaminases, bilirubin • monitor weekly: full blood count, platelets, serum creatinine, transaminases, bilirubin</td>
</tr>
</tbody>
</table>

\(^\text{13}\)Labetalol is licensed for the treatment of hypertension, including during pregnancy and is already used widely in UK obstetric practice, but the SPCs (August 2009) advise that it should only be used during the first trimester of pregnancy if the potential benefit outweighs the potential risk, and that breastfeeding is not recommended. Informed consent on the use of labetalol in these situations should be obtained and documented.

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1.4.1.4 In women receiving outpatient treatment for severe gestational hypertension, measure blood pressure and test urine twice weekly and carry out weekly blood tests.

1.4.1.5 In women with mild hypertension presenting before 32 weeks or at high risk of pre-eclampsia (see 1.1.1.1), measure blood pressure and test urine twice weekly.

1.4.1.6 In women with gestational hypertension, offer alternative antihypertensive treatment after considering side-effect profiles for the woman, fetus and neonate.

1.4.1.7 Do not use bed rest as a treatment for gestational hypertension.

1.4.2 Timing of birth

1.4.2.1 For women with gestational hypertension whose blood pressure is lower than 159/109 mmHg with or without antihypertensive treatment, do not offer birth before 37 weeks.

1.4.2.2 For women with refractory severe gestational hypertension, offer birth before 37 weeks after a course of antenatal steroids has been completed.

1.4.2.3 Offer birth to women with gestational hypertension whose diastolic blood pressure is greater than 95 mmHg with or without antihypertensive treatment after 37 + 0 weeks.

1.4.2.4 Offer birth to women with gestational hypertension after 39 + 0 weeks.

1.4.3 Postnatal investigation, monitoring and treatment

1.4.3.1 In women with gestational hypertension who have just given birth, measure blood pressure:

- daily while the woman is an inpatient
- between day 3 and day 5 after birth
• as clinically indicated if antihypertensive treatment is changed after birth.

1.4.3.2 In women with gestational hypertension who have recently given birth, aim to keep blood pressure below 140/90 mmHg.

1.4.3.3 In women with gestational hypertension who have just given birth, continue use of antenatal antihypertensive treatment.

1.4.3.4 If a woman has received methyldopa\(^1\) to treat gestational hypertension, stop within 2 days of birth.

1.4.3.5 For women with gestational hypertension who have recently given birth:

- consider reducing antihypertensive treatment if their blood pressure falls below 140/90 mmHg
- reduce antihypertensive treatment if their blood pressure falls below 130/80 mmHg.

1.4.3.6 For women who did not receive antihypertensive treatment and have recently given birth, start antihypertensive treatment if their blood pressure exceeds 150/100 mmHg.

1.4.3.7 For women with gestational hypertension who have recently given birth and are being discharged from hospital, write a care plan that includes all of the following:

- frequency of blood pressure monitoring required
- thresholds for reducing or stopping treatment
- indications for early referral to primary care for blood pressure review.

\(^1\)Methyldopa is licensed for the treatment of hypertension and is already used widely in UK obstetric practice, but the SPC (August 2009) advises that its use in women who are, or may become, pregnant or who are breastfeeding their newborn infant requires that anticipated benefits be weighed against possible risks. Informed consent on the use of methyldopa in these situations should be obtained and documented.
1.4.3.8 In women who have had gestational hypertension perform medical review at the postnatal visit (6–8 weeks after the birth).

1.4.3.9 Refer women who have had gestational hypertension and who still require antihypertensive treatment at the postnatal visit (6–8 weeks after the birth) for specialist assessment.

1.5 Management of pregnancy with pre-eclampsia

1.5.1 Treatment of hypertension

1.5.1.1 Assess women with pre-eclampsia at each consultation; assessment should be performed by an appropriately trained healthcare professional.

1.5.1.2 Manage pre-eclampsia as described in Table 2 below:
Table 2. Management of women with pre-eclampsia

<table>
<thead>
<tr>
<th>Degree of hypertension</th>
<th>Mild hypertension (&lt;149/99 mmHg)</th>
<th>Moderate hypertension (150/100 to 159/109 mmHg)</th>
<th>Severe hypertension (160/110 mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Admit to hospital</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Treat</strong></td>
<td>No</td>
<td>Yes with oral labetalol(^{15}) to keep</td>
<td>Yes with oral labetalol(^{15}) to keep</td>
</tr>
<tr>
<td></td>
<td>(none in addition to routine antenatal care)</td>
<td>• diastolic blood pressure less than 100 mmHg but more than 80 mmHg</td>
<td>• diastolic blood pressure less than 100 mmHg but more than 80 mmHg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• systolic blood pressure less than 150 mmHg</td>
<td>• systolic blood pressure less than 150 mmHg</td>
</tr>
<tr>
<td><strong>Measure blood pressure</strong></td>
<td>Yes At least four times a day.</td>
<td>Yes At least four times a day.</td>
<td>Yes More frequently than six hourly, depending on clinical circumstances.</td>
</tr>
<tr>
<td><strong>Test for proteinuria</strong></td>
<td>Do not repeat quantification of proteinuria</td>
<td>Do not repeat quantification of proteinuria</td>
<td>Do not repeat quantification of proteinuria</td>
</tr>
<tr>
<td><strong>Blood tests</strong></td>
<td>Yes Monitor using the following tests twice a week: full blood count, platelets, serum creatinine, transaminases, bilirubin.</td>
<td>Yes Monitor using the following tests three times a week: full blood count, platelets, serum creatinine, transaminases, bilirubin.</td>
<td>Yes Monitor using the following tests every other day: full blood count, platelets, serum creatinine, transaminases, bilirubin.</td>
</tr>
</tbody>
</table>

1.5.2 Timing of birth

1.5.2.1 Manage pregnancy in women with pre-eclampsia conservatively until 34 weeks.

\(^{15}\)Labetalol is licensed for the treatment of hypertension, including during pregnancy and is already used widely in UK obstetric practice, but the SPCs (August 2009) advise that it should only be used during the first trimester of pregnancy if the potential benefit outweighs the potential risk, and that breastfeeding is not recommended. Informed consent on the use of labetalol in these situations should be obtained and documented.
1.5.2.2 Consultant obstetric staff should advise and document the biochemical, haematological and clinical thresholds (maternal and fetal) for birth in women with pre-eclampsia before 34 weeks.

1.5.2.3 Consultant obstetric staff should write a plan for fetal monitoring.

1.5.2.4 Offer birth to women with pre-eclampsia before 34 weeks after discussion with neonatal and anaesthetic teams and a course of antenatal steroids has been given if:

- severe hypertension develops refractory to treatment
- maternal haematological, biochemical or clinical indications develop as specified in the consultant plan (see 1.5.2.2)
- fetal indications develop as specified in the consultant plan (see 1.5.2.3).

1.5.2.5 Advise birth for women with severe pre-eclampsia after 34 weeks once their blood pressure is controlled and, if appropriate, a course of antenatal steroids has been completed.

1.5.2.6 Offer birth to women with mild or moderate pre-eclampsia at 34 + 0 to 36 + 6 weeks depending on maternal and fetal condition, risk factors and availability of neonatal intensive care.

1.5.2.7 Advise birth within 24–48 hours for women with mild or moderate pre-eclampsia after 37 + 0 weeks.

1.5.3 Postnatal investigation, monitoring and treatment (including after discharge from critical care)

Blood pressure
1.5.3.1 In women with pre-eclampsia who did not receive antihypertensive treatment and have just given birth, measure blood pressure:

- at least four times a day while the woman is an inpatient
- between day 3 and day 5 after birth
• on alternate days until normal if blood pressure was abnormal on days 3–5.

1.5.3.2 In women with pre-eclampsia who have recently given birth, aim to keep blood pressure below 140/90 mmHg.

1.5.3.3 In women with pre-eclampsia who did not receive antihypertensive treatment and have recently given birth, start antihypertensive treatment for the first time if blood pressure is higher than 150/100 mmHg.

1.5.3.4 Ask women with pre-eclampsia who did not receive antihypertensive treatment and have recently given birth about severe headache and epigastric pain each time blood pressure is measured.

1.5.3.5 In women with pre-eclampsia who received antihypertensive treatment and have just given birth, measure blood pressure:

• at least four times a day while the woman is an inpatient
• every 1–2 days for up to 2 weeks after discharge from hospital until the woman is off treatment and has no hypertension.

1.5.3.6 In women with pre-eclampsia who have received antihypertensive treatment and have recently given birth, consider reducing antihypertensive treatment when their blood pressure falls below 140/90 mmHg.

1.5.3.7 In women with pre-eclampsia who have received antihypertensive treatment and have recently given birth, reduce antihypertensive treatment when blood pressure falls below 130/80 mmHg.

1.5.3.8 In women with pre-eclampsia who have received antihypertensive treatment and have just given birth, continue use of antenatal antihypertensive treatment.
1.5.3.9 If a woman has received methyldopa\textsuperscript{16} to treat pre-eclampsia, stop within 2 days of birth.

1.5.3.10 For women with pre-eclampsia who have recently given birth and are being discharged from hospital, write a care plan that includes all of the following:

- frequency of blood pressure monitoring
- thresholds for reducing or stopping treatment
- indications for early referral to primary care for blood pressure review.

1.5.3.11 In women who have pre-eclampsia and remain on antihypertensive treatment 2 weeks after discharge from hospital, perform medical review.

1.5.3.12 In women who have had pre-eclampsia perform medical review at the postnatal visit (6–8 weeks after the birth).

1.5.3.13 Refer women who have had pre-eclampsia and who still require antihypertensive treatment at the postnatal visit (6–8 weeks after the birth) for specialist assessment.

**Haematological and biochemical monitoring**

1.5.3.14 In women with mild or moderate pre-eclampsia or after step-down from critical care:

- measure platelet count, transaminases and serum creatinine 48–72 hours after birth or step-down
- do not repeat platelet count, transaminases or serum creatinine if results are normal at 48–72 hours.

\textsuperscript{16}Methyldopa is licensed for the treatment of hypertension and is already used widely in UK obstetric practice, but the SPC (August 2009) advises that its use in women who are, or may become, pregnant or who are breastfeeding their newborn infant requires that anticipated benefits be weighed against possible risks. Informed consent on the use of methyldopa in these situations should be obtained and documented.
1.5.3.15 In women with pre-eclampsia, repeat platelet count, transaminases and serum creatinine measurements as clinically indicated and at the postnatal visit (6–8 weeks after the birth) if biochemical and haematological indices are improving but stay within the abnormal range.

1.5.3.16 In women with pre-eclampsia, repeat platelet count, transaminases and serum creatinine measurements as clinically indicated if biochemical and haematological indices are not improving relative to pregnancy ranges.

1.5.3.17 In women with pre-eclampsia, carry out a urine dipstick test at the postnatal visit (6–8 weeks after the birth).

1.5.3.18 In women with pre-eclampsia who have recently given birth, do not measure fluid balance when creatinine is within the normal range.

1.5.3.19 In women who still require antihypertensive treatment at the postnatal visit (6–8 weeks after the birth) carry out further evaluation of renal function if urine protein is 2+ or more.

1.6 Fetal monitoring

1.6.1 Chronic hypertension

1.6.1.1 In women with chronic hypertension, carry out ultrasound fetal growth and amniotic fluid volume assessment and umbilical artery Doppler velocimetry between 28 and 30 weeks and between 32 and 34 weeks. If results are normal, do not repeat at more than 34 weeks, unless otherwise clinically indicated.

1.6.1.2 In women with chronic hypertension, do not carry out cardiotocography if fetal activity is normal.

1.6.2 Mild or moderate gestational hypertension

1.6.2.1 In women with mild or moderate gestational hypertension, carry out ultrasound fetal growth and amniotic fluid volume assessment and
umbilical artery Doppler velocimetry if diagnosis is confirmed at less than 34 weeks. If results are normal, do not repeat at more than 34 weeks, unless otherwise clinically indicated.

1.6.2.2 In women with mild or moderate gestational hypertension, do not carry out ultrasound fetal growth and amniotic fluid volume assessment and umbilical artery Doppler velocimetry if diagnosis is confirmed after 34 weeks, unless otherwise clinically indicated.

1.6.2.3 In women with mild or moderate gestational hypertension, do not carry out cardiotocography if fetal activity is normal.

1.6.3 **Severe gestational hypertension or pre-eclampsia**

1.6.3.1 Carry out cardiotocography at diagnosis of severe gestational hypertension or pre-eclampsia.

1.6.3.2 If conservative management of severe gestational hypertension or pre-eclampsia is planned carry out the following tests at diagnosis:

- ultrasound fetal growth and amniotic fluid volume assessment.
- umbilical artery Doppler velocimetry.

1.6.3.3 If the results of all fetal monitoring are normal in women with severe gestational hypertension or pre-eclampsia, do not routinely repeat cardiotocography more than weekly.

1.6.3.4 In women with severe gestational hypertension or pre-eclampsia, repeat cardiotocography if any of the following occur:

- a change in the woman’s perception of fetal movement
- vaginal bleeding
- abdominal pain
- deterioration in maternal condition.

1.6.3.5 In women with severe gestational hypertension or pre-eclampsia, do not routinely repeat ultrasound fetal growth and amniotic fluid...
assessment or umbilical artery Doppler velocimetry more than every 2 weeks.

1.6.3.6 If the results of any fetal monitoring in women with severe gestational hypertension or pre-eclampsia are abnormal, inform a consultant obstetrician.

1.6.3.7 For women with severe gestational hypertension or pre-eclampsia, write a care plan that includes all of the following:

- the timing and nature of future monitoring
- fetal indications for birth and whether and when antenatal steroids should be given
- discussion with neonatal paediatricians and obstetric anaesthetists.

1.6.4 Women at high risk of pre-eclampsia

1.6.4.1 In women who are at a high risk of pre-eclampsia (see 1.1.1.1), do not use uterine artery Doppler velocimetry.

1.6.4.2 Carry out ultrasound fetal growth and amniotic fluid volume assessment and umbilical artery Doppler velocimetry starting at between 28 and 30 weeks (or least 2 weeks before previous gestational age of onset if earlier than 28 weeks) and repeating 4 weeks later in women with previous:

- severe pre-eclampsia
- pre-eclampsia requiring birth before 34 weeks
- pre-eclampsia with a baby born <10th centile
- intrauterine death
- placental abruption.

1.6.4.3 In women who are at a high-risk of pre-eclampsia (see 1.1.1.1), do not carry out cardiotocography if fetal activity is normal.
1.7 **Intrapartum care**

Women with hypertensive disorders during pregnancy should be given advice and treatment in line with ‘Intrapartum care: management and delivery of care to women in labour’ (NICE clinical guideline 55), unless it specifically differs from recommendations in this guideline.

1.7.1 **Blood pressure**

1.7.1.1 Measure blood pressure hourly during labour in women with mild or moderate hypertension.

1.7.1.2 In women with hypertension in pregnancy, continue use of existing antihypertensive treatment during labour.

1.7.2 **Haematological and biochemical monitoring**

1.7.2.1 Determine the need for haematological and biochemical tests during labour in women with mild or moderate hypertension using the same criteria as in the antenatal period even if regional analgesia is being considered.

1.7.3 **Care during epidural analgesia**

1.7.3.1 Do not preload women who have severe pre-eclampsia with intravenous fluids before establishing low-dose epidural analgesia and combined spinal epidural analgesia.

1.7.4 **Management of the second stage of labour**

1.7.4.1 Do not routinely limit the duration of the second stage of labour:

- in women with stable mild or moderate hypertension or
- if blood pressure is controlled within target ranges in women with severe hypertension.

1.7.4.2 Advise operative birth in the second stage of labour for women with severe hypertension who have not responded to initial treatment.
1.8 Medical management of severe hypertension or severe pre-eclampsia in a critical care setting

1.8.1 Anticonvulsants

1.8.1.1 If a woman in a critical care setting who has severe hypertension or severe pre-eclampsia has or previously had an eclamptic fit, give intravenous magnesium sulphate.*

1.8.1.2 Consider giving intravenous magnesium sulphate* to women with severe pre-eclampsia who are in a critical care setting if birth is planned within 24 hours.

1.8.1.3 When considering magnesium sulphate* treatment, use the following as clinical features of severe pre-eclampsia:

- hypertension and proteinuria and
- symptoms of severe headache or
- liver tenderness or
- visual disturbance or
- platelet count falling to below $100 \times 10^9$ per litre or
- epigastric pain or vomiting or
- abnormal liver enzymes (ALT or AST rising to above 70 iu/litre) or
- signs of clonus or
- HELLP syndrome or
- papilloedema.

1.8.1.4 Use the Collaborative trial regimen for administration of magnesium sulphate:* 

- loading dose of 4 g should be given by infusion pump over 5–10 minutes, followed by a further infusion of 1 g/hour maintained for 24 hours after the last seizure
• recurrent seizures should be treated with either a further bolus of 2 g magnesium sulphate* or an increase in the infusion rate to 1.5 g or 2.0 g/hour.

1.8.1.5 Do not use diazepam, phenytoin or lytic cocktail as an alternative to magnesium sulphate* in women with eclampsia.

1.8.2 Antihypertensives

1.8.2.1 Treat women with severe hypertension who are in critical care during pregnancy or after birth immediately with one of the following:

• labetalol (oral or intravenous)
• hydralazine (intravenous)
• nifedipine (oral).

1.8.2.2 In women with severe hypertension who are in critical care, monitor their response to treatment:

• to ensure that their blood pressure falls
• to identify adverse effects for both the woman and the fetus
• to modify treatment according to response.

1.8.2.3 Consider using up to 500 ml crystalloid fluid before or at the same time as the first dose of intravenous hydralazine in the antenatal period.

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17 Labetalol is licensed for the treatment of hypertension, including during pregnancy and is already used widely in UK obstetric practice, but the SPCs (August 2009) advise that it should only be used during the first trimester of pregnancy if the potential benefit outweighs the potential risk, and that breastfeeding is not recommended. Informed consent on the use of labetalol in these situations should be obtained and documented.

18 Nifedipine is licensed for the treatment of hypertension and is already used widely in UK obstetric practice, but the SPCs (August 2009) advise that it is contraindicated in pregnancy before week 20 and during breastfeeding, or that it must not be administered during the entire pregnancy and that the child should be weaned if treatment should be necessary during the lactation period, or that it should not be used in women who are or who may become pregnant and that it is not recommended during lactation, or that it should not be used in nursing mothers and women who are or who may become pregnant. Informed consent on the use of nifedipine in these situations should be obtained and documented.
1.8.2.4 In women with severe hypertension who are in critical care, keep systolic blood pressure below 150 mmHg and diastolic blood pressure between 80 and 100 mmHg.

1.8.3 Corticosteroids for fetal lung maturation

1.8.3.1 If birth is considered likely within 7 days in women with pre-eclampsia:

- give two doses of betamethasone* 12 mg intramuscularly 24 hours apart in women between 24 and 34 weeks
- consider giving two doses of betamethasone* 12 mg intramuscularly 24 hours apart in women at 35–36 weeks.

1.8.4 Corticosteroids in the management of HELLP syndrome

1.8.4.1 Do not use dexamethasone or betamethasone for the treatment of HELLP syndrome.

1.8.5 Fluid balance and volume expansion

1.8.5.1 Do not use volume expansion in women with severe pre-eclampsia except when hydralazine is the antenatal antihypertensive.

1.8.5.2 In women with severe pre-eclampsia, limit total fluids to 80 ml/hour.

1.8.6 Operative birth (caesarean section versus induction of labour)

1.8.6.1 Choose mode of birth for women with severe pre-eclampsia or eclampsia according to the clinical circumstances and the woman’s preference.

1.8.7 Indications for referral to critical care levels

1.8.7.1 Refer women with severe pre-eclampsia to the appropriate critical care setting using the following criteria:\textsuperscript{19}:

\textsuperscript{19}Adapted from Intensive Care Society, Standards and Guidelines 2002.
### Levels of Care

<table>
<thead>
<tr>
<th>Level 3</th>
<th>Severe pre-eclampsia and needing ventilation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 2</td>
<td>Step down from level 3 or severe pre-eclampsia with any of the following complications:</td>
</tr>
<tr>
<td></td>
<td>– eclampsia</td>
</tr>
<tr>
<td></td>
<td>– HELLP syndrome</td>
</tr>
<tr>
<td></td>
<td>– haemorrhage</td>
</tr>
<tr>
<td></td>
<td>– hyperkalaemia</td>
</tr>
<tr>
<td></td>
<td>– severe oliguria</td>
</tr>
<tr>
<td></td>
<td>– coagulation support</td>
</tr>
<tr>
<td></td>
<td>– Intravenous antihypertensive treatment</td>
</tr>
<tr>
<td></td>
<td>– initial stabilisation of severe hypertension</td>
</tr>
<tr>
<td></td>
<td>– evidence of cardiac failure</td>
</tr>
<tr>
<td></td>
<td>– abnormal neurology</td>
</tr>
<tr>
<td>Level 1</td>
<td>– Mild or moderate pre-eclampsia</td>
</tr>
<tr>
<td></td>
<td>– Ongoing conservative antenatal management of severe pre-term hypertension</td>
</tr>
<tr>
<td></td>
<td>– Step-down treatment after the birth</td>
</tr>
</tbody>
</table>

1.9 **Advice at discharge from maternity care**

1.9.1 **Long-term risk of cardiovascular disease**

1.9.1.1 Advise women who have had pre-eclampsia that they are at increased risk of developing high blood pressure and its complications in later life and that they should have their blood pressure measured annually.

1.9.1.2 Advise women who have had gestational hypertension that they should have their blood pressure measured at least every 5 years.

1.9.2 **Long-term risk of end-stage renal disease**

1.9.2.1 Advise women with a history of pre-eclampsia who have no proteinuria and no hypertension at the postnatal visit (6–8 weeks after the birth) that although the relative risk of renal disease is increased the absolute risk is low and no further follow-up is necessary.
1.9.3  Thrombophilia and the risk of pre-eclampsia
1.9.3.1 Do not routinely perform screening for thrombophilia in women who have had pre-eclampsia.

1.9.4  Risk of recurrence of hypertensive disorders of pregnancy
1.9.4.1 Inform women that if they had gestational hypertension in their first pregnancy, their risk of developing:
   - gestational hypertension in their next pregnancy is on average 1 in 3 (32%)
   - pre-eclampsia in their next pregnancy is 1 in 33 (3%).
1.9.4.2 Inform women that if they had pre-eclampsia in their first pregnancy, their risk of developing:
   - gestational hypertension in their next pregnancy is 1 in 4 (26%)
   - pre-eclampsia in their next pregnancy is around 1 in 7 (14.5%)
   - pre-eclampsia in their next pregnancy is 1 in 4 (25%) if their pre-eclampsia was complicated by severe pre-eclampsia, HELLP syndrome or eclampsia and led to birth before 34 weeks, and 1 in 2 (55%) if it led to birth before 28–30 weeks.

1.9.5  Inter-pregnancy interval and recurrence of hypertensive disorders of pregnancy
1.9.5.1 Inform women who have had pre-eclampsia that there is no additional risk of recurrence with inter-pregnancy interval up to 10 years.

1.9.6  Body mass index and recurrence of hypertensive disorders of pregnancy
1.9.6.1 Advise women who have had pre-eclampsia to achieve and keep a BMI within the healthy range before their next pregnancy (18.5–24.9 kg/m², ‘Obesity’, NICE clinical guideline 43).
2 Notes on the scope of the guidance

NICE guidelines are developed in accordance with a scope that defines what the guideline will and will not cover. The scope of this guideline is available from www.nice.org.uk/NICEtoadddetails.

This guideline covers women who present with hypertensive disorders for the first time during pregnancy; women who have pre-existing hypertension and are planning pregnancy or are pregnant; and women who are pregnant and at increased risk of developing hypertensive disorders during pregnancy. It also covers the fetus until birth.

It does not cover women with hypertension and diabetes or infants of women who have had hypertensive disorders during pregnancy.

How this guideline was developed

NICE commissioned the National Collaborating Centre for Women’s and Children’s Health to develop this guideline. The Centre established a guideline development group (see appendix A), which reviewed the evidence and developed the recommendations. An independent guideline review panel oversaw the development of the guideline (see appendix B).

There is more information about how NICE clinical guidelines are developed on the NICE website (www.nice.org.uk/guidelinesprocess). A booklet, ‘How NICE clinical guidelines are developed: an overview for stakeholders, the public and the NHS’ (fourth edition, published 2009), is available from NICE publications (phone 0845 003 7783 or email publications@nice.org.uk and quote reference N1739).

3 Implementation

NICE has developed tools to help organisations implement this guidance (see www.nice.org.uk/CGXX).
4 Research recommendations

The Guideline Development Group has made the following recommendations for research, based on its review of evidence, to improve NICE guidance and patient care in the future. The Guideline Development Group’s full set of research recommendations is detailed in the full guideline (see section 5).

4.1 Reducing the risk of hypertensive disorders in pregnancy

How clinically and cost effective is calcium supplementation (compared with placebo) for the prevention of pre-eclampsia in women at both moderate and high risk of pre-eclampsia?

Why this is important

Pre-eclampsia and gestational hypertension represent common pregnancy complications. Although large studies on the use of calcium supplementation to prevent hypertensive disorders during pregnancy have been carried out, the variation in populations and calcium status at entry to the studies have made it impossible to reach a conclusion on the value of such treatment in any setting. Calcium supplementation as a treatment is cheap, likely to be well tolerated, and likely to be safe for both the woman and the fetus, although this needs to be confirmed. Even a modest effect would be potentially important given the simplicity of the treatment. Randomised controlled trials are needed to examine risk reduction in women at moderate and high risk of pre-eclampsia, and to re-examine risk reduction in women at low risk of pre-eclampsia. The trials should consider maternal diet and calcium status and they should evaluate both maternal outcomes (incidence of hypertensive diseases during pregnancy, including severe disease) and neonatal outcomes (neonatal morbidity, infant growth and development).
4.2 **Postnatal care of women with chronic hypertension**

How safe are commonly used antihypertensive agents when used by women who are breastfeeding?

**Why this is important**

With the increasing incidence of hypertensive disorders during pregnancy, more women will potentially be exposed to antihypertensive medication. Most of the relevant drugs are not licensed for use in pregnancy. For most drugs there is no information on its presence in human breast milk, or if such a presence has any clinical effect. As a result, women may either be denied effective treatment in the postnatal period or advised against breastfeeding. Studies should measure the concentration of relevant drugs and their metabolites in breast milk, taking account of drug pharmacokinetics (peak levels and elimination) and comparing neonatal behaviour and physiological variables in women using each drug with those in women who choose not to breastfeed. Studies should follow women and their babies long enough to exclude cumulative effects and they should be large enough to provide reassurance to licensing and drug regulating authorities.

4.3 **Assessment of proteinuria in hypertensive disorders of pregnancy**

What is the best method to assess the presence and amount of proteinuria in women with new hypertension during pregnancy?

**Why this is important**

Most of the adverse outcomes of hypertension during pregnancy occur in women with pre-eclampsia. The test to determine the diagnosis is the key test in any assessment of new hypertension. Current use of dipsticks and 24-hour urine collection is challenged by modern near patient testing and by a lack of association between values traditionally regarded as abnormal and clinical outcomes.
4.4 Treatment of hypertension

What is the role of assessing biochemical or haematological parameters at diagnosis of new hypertension in pregnancy and during surveillance of new hypertension?

Why this is important

Pre-eclampsia is a multisystem disorder, but it is not clear whether routine assessment of a range of biochemical or haematological parameters aids clinical care or is sufficiently discriminatory to allow better targeted care. Information on which assessments might be useful is incomplete and there are confusing data on whether clinical outcomes are changed.

Large prospective studies should be carried out that examine a range of parameters singly and serially (renal function, liver function, coagulation, measurement of proteinuria) in women with new hypertension. These studies should use properly validated pregnancy values and examine the prediction of clinically important outcomes (severe pre-eclampsia and its maternal and fetal complications).

If parameters with sufficient prediction are identified, randomised controlled trials should be devised to compare the effect of knowledge of these compared with no knowledge on clinical maternal and perinatal outcomes. Trial results should be incorporated in health economic models to assess cost effectiveness.

4.5 Timing of birth: pre-eclampsia

When should women with mild or moderate pre-eclampsia give birth?

Why this is important

There is a ‘grey’ zone for mild or moderate pre-eclampsia between 34 and 37 weeks when the timing of birth is not clear.

Women with mild or moderate pre-eclampsia may progress to severe disease with its risks, but it is not clear whether these risks outweigh or should outweigh the risks of planned late preterm birth for the baby. Neonatal
services are under constant pressure and planned preterm birth without clear benefit to either woman or infant would have costs.

Randomised controlled trials should be carried out that compare policies of immediate planned birth between 34 and 36 + 6 weeks in women with mild or moderate pre-eclampsia with expectant management and birth for clinical progression. Outcomes should include severe pre-eclampsia and its complications, need for critical care, maternal satisfaction, neonatal morbidity and mortality, and health economics. Trials need to be large enough to examine less common complications in the woman.

5 Other versions of this guideline

5.1 Full guideline

The full guideline, ‘Hypertension in pregnancy’ contains details of the methods and evidence used to develop the guideline. It is published by the National Collaborating Centre for Women’s and Children’s Health and is available from (www.ncc-wch.org.uk) and our website (www.nice.org.uk/CGXXfullguideline).

[Note: these details will apply to the published full guideline.]

5.2 Quick reference guide

A quick reference guide for healthcare professionals is available from www.nice.org.uk/CGXXquickrefguide

For printed copies, phone NICE publications on 0845 003 7783 or email publications@nice.org.uk (quote reference number N1XXX). [Note: these details will apply when the guideline is published.]

5.3 ‘Understanding NICE guidance’

A summary for patients and carers (‘Understanding NICE guidance’) is available from www.nice.org.uk/CGXXpublicinfo

For printed copies, phone NICE publications on 0845 003 7783 or email publications@nice.org.uk (quote reference number N1XXX). [Note: these details will apply when the guideline is published.]
6 Related NICE guidance

Published


7 Updating the guideline

NICE clinical guidelines are updated so that recommendations take into account important new information. New evidence is checked 3 years after publication, and healthcare professionals and patients are asked for their views; we use this information to decide whether all or part of a guideline needs updating. If important new evidence is published at other times, we may decide to do a more rapid update of some recommendations.
Appendix A: The Guideline Development Group

Chris Barry
Portfolio General Practitioner (GP), Swindon, Wiltshire

Rachel Fielding
Deputy Director of Midwifery, North Bristol NHS Trust

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Jane Hawdon
Consultant Neonatologist, University College London Hospitals NHS Foundation Trust

Surbhi Malhotra
Consultant Anaesthetist, St Mary's Hospital, London

Fiona Milne
Trustee, Action on Pre-eclampsia (patient/carer member)

Susan Mitchinson
Retired Senior Lecturer (patient/carer member)

Lynda Mulhair
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Adam North
Senior Paediatric Pharmacist, Royal Brompton and Harefield NHS Foundation Trust, London

Derek Tuffnell
Consultant Obstetrician, Bradford Royal Infirmary

James Walker
Professor in Obstetrics and Gynaecology, University of Leeds
DRAFT FOR CONSULTATION

Stephen Walkinshaw
Consultant in Maternal and Fetal Medicine, Liverpool Women’s Hospital (GDG chair)

David Williams
Consultant Obstetric Physician, University College London Hospitals NHS Foundation Trust
Appendix B: The Guideline Review Panel

The Guideline Review Panel is an independent panel that oversees the development of the guideline and takes responsibility for monitoring adherence to NICE guideline development processes. In particular, the panel ensures that stakeholder comments have been adequately considered and responded to. The panel includes members from the following perspectives: primary care, secondary care, lay, public health and industry.

[NICE to add]

[Name; style = Unnumbered bold heading]
[job title and location; style = NICE normal]