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*Review*

# Guidelines for the management of hypertensive disorders of pregnancy 2008

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This is the Executive Summary of updated guidelines developed by the Society of Obstetric Medicine of Australia and New Zealand for the management of hypertensive diseases of pregnancy. They address a number of challenging areas including the definition of severe hypertension, the use of automated blood pressure monitors, the definition of non-proteinuric pre-eclampsia and measuring proteinuria. Controversial management issues are addressed such as the treatment of severe hypertension and other significant manifestations of pre-eclampsia, the role of expectant management in pre-eclampsia remote from term, thromboprophylaxis, appropriate fluid therapy, the role of prophylactic magnesium sulfate and anaesthetic issues for women with pre-eclampsia. The guidelines stress the need for experienced team management for women with pre-eclampsia and mandatory hospital protocols for treatment of hypertension and eclampsia. New areas addressed in the guidelines include recommended protocols for maternal and fetal investigation of women with hypertension, preconception management for women at risk of pre-eclampsia, auditing outcomes in women with hypertensive diseases of pregnancy and long-term screening for women with previous pre-eclampsia.

**Key words:** Guidelines, hypertension, management, pre-eclampsia, pregnancy.

## Introduction

These are the recommendations of a multidisciplinary working party convened by the Society of Obstetric Medicine of Australia and New Zealand. They reflect current medical literature and the clinical experience of members of the working party.

The following summarises the contents of the guidelines. This may prove useful as a guide but should be used in conjunction with the body of this report.

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## Definition of hypertension in pregnancy

**Hypertension in pregnancy** is defined as: systolic blood pressure greater than or equal to 140 mmHg and/or diastolic blood pressure greater than or equal to 90 mmHg (Korotkoff 5).

- Elevations of both systolic and diastolic blood pressures have been associated with adverse fetal outcome and therefore both are important.
- Detecting a rise in blood pressure from 'booking' or preconception blood pressure (> 30/15 mmHg) should lead to closer monitoring but is not diagnostic of hypertension in pregnancy.
- **Severe hypertension in pregnancy** is defined as a systolic blood pressure greater than or equal to 170 mmHg and/or diastolic blood pressure greater than or equal to 110 mmHg. This degree of hypertension requires urgent assessment and management.

**Table 1** Ongoing investigation of women with hypertension in pregnancy

| | Modality | Frequency |
|---|---|---|
| Chronic hypertension | Urinalysis for protein | Each visit |
| | Pre-eclampsia bloods | If sudden increase in blood pressure or new proteinuria |
| Gestational hypertension | Urinalysis for protein | One to two times per week |
| | Pre-eclampsia bloods | Weekly |
| Pre-eclampsia | Urinalysis for protein | At time of diagnosis: if non-proteinuric, repeat daily |
| | Pre-eclampsia bloods | Twice weekly or more frequent if unstable |

- **White Coat hypertension** is defined as hypertension in a clinical setting with normal blood pressure away from this setting.

## Recording blood pressure in pregnancy

The systolic blood pressure is accepted as the first sound heard (K1) and the diastolic blood pressure the disappearance of sounds completely (K5). Where K5 is absent, K4 (muffling) should be accepted.

- Correct cuff size is important for accurate blood pressure recording.
- Mercury sphygmomanometers remain the gold standard for measurement of blood pressure in pregnancy.
- Automated blood pressure recorders and aneroid sphygmomanometers may be used but are prone to error and should be calibrated on a regular basis and validated against mercury sphygmomanometry for individual patient use.

## Classification of hypertensive disorders in pregnancy

The classification is as follows:

- Pre-eclampsia–eclampsia
- Gestational hypertension
- Chronic hypertension
  - Essential
  - Secondary
  - White Coat
- Pre-eclampsia superimposed on chronic hypertension

**a) Pre-eclampsia**

A diagnosis of pre-eclampsia can be made when hypertension arises after 20 weeks gestation and is accompanied by *one or more* of the following:

- Renal involvement
  - Significant proteinuria – dipstick proteinuria subsequently confirmed by a spot urine protein/creatinine ratio ≥ 30 mg/mmol
  - Serum or plasma creatinine ≥ 90 μmol/L
  - Oliguria
- Haematological involvement
  - Thrombocytopenia
  - Haemolysis
  - Disseminated intravascular coagulation
- Liver involvement
  - Raised serum transaminases
  - Severe epigastric or right upper quadrant pain
- Neurological involvement
  - Convulsions (eclampsia)
  - Hyperreflexia with sustained clonus
  - Severe headache
  - Persistent visual disturbances (photopsia, scotomata, cortical blindness, retinal vasospasm)
  - Stroke
- Pulmonary oedema
- Fetal growth restriction
- Placental abruption

Note:

- Proteinuria is not mandatory to make the clinical diagnosis.
- Hyperuricaemia is a common but not diagnostic feature of pre-eclampsia.
- The HELLP syndrome (haemolysis, elevated liver enzymes and a low platelet count) represents a particular presentation of severe pre-eclampsia and separating it as a distinct disorder is not helpful.

**b) Gestational hypertension** is diagnosed when de novo hypertension occurs after 20 weeks gestation, without any of the above features of pre-eclampsia.

**c) Chronic hypertension** is hypertension present before 20 weeks gestation, or documented pre-pregnancy.

**d) Chronic hypertension with superimposed pre-eclampsia** is diagnosed when women with a previous diagnosis of chronic hypertension develop any of the above systemic features of pre-eclampsia after 20 weeks gestation.

## Investigation of new onset hypertension after 20 weeks of pregnancy (Table 1)

- Assess clinically for signs and symptoms of pre-eclampsia.
- Women with apparent pre-eclampsia should be admitted to hospital at initial presentation. In appropriate units, subsequent management in a day assessment unit may be appropriate.
- Severe hypertension, headache, epigastric pain, nausea and vomiting or concern about fetal well-being should lead to urgent admission and management.
- Subsequent management will be based on the results of ongoing blood pressure measurement and these investigations (Tables 1,5).

The following investigations should be performed in all patients:

- Urine dipstick testing for proteinuria, with quantitation by laboratory methods if ≥ '1+' (30 mg/dL).



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**Table 2** Indications for delivery in women with pre-eclampsia or gestational hypertension

| Maternal | Fetal |
|---|---|
| Gestational age ≥ term | Severe fetal growth restriction |
| Inability to control hypertension | Non-reassuring fetal status |
| Deteriorating platelet count | |
| Deteriorating liver function | |
| Deteriorating renal function | |
| Placental abruption | |
| Persistent neurological symptoms or eclampsia | |
| Persistent epigastric pain, nausea or vomiting with abnormal liver function tests | |
| Acute pulmonary oedema | |

- Pre-eclampsia bloods: Full blood count, urea, creatinine, electrolytes, liver function.
- Ultrasound assessment of fetal growth, amniotic fluid volume and umbilical artery flow.

Among women referred for assessment of new onset hypertension, a number will have normal blood pressure and investigations. These women are considered to have transient or labile hypertension. Repeat assessment should be arranged within three to seven days as many will subsequently develop pre-eclampsia.

## Management of pre-eclampsia and gestational hypertension

Assess need for delivery (Table 2)

- Maternal indications for delivery
- Fetal indications for delivery

- Control severe hypertension and other maternal derangements before subjecting the woman to the stresses of delivery.
- Administer antenatal corticosteroids for lung maturation where appropriate.

Note: A team approach, involving obstetrician, midwife, neonatologist, anaesthetist and physician provides the best chance of achieving a successful outcome for mother and baby.

### *Hypertension*

- Commence antihypertensive treatment:
  - Urgent treatment if systolic ≥ 170 mmHg or 110 diastolic (Table 3)
  - All patients with systolic ≥ 160 mmHg systolic or 100 mmHg diastolic (Table 4)

**Table 3** Urgent blood pressure lowering for severe hypertension ≥ 170/110 mmHg. NB Nifedipine capsules are not available in Australia

| | Dose | Route | Onset of action |
|---|---|---|---|
| Labetalol | 20–50 mg | i.v. bolus over 2 min | 5–min, repeat after 15–30 min |
| Nifedipine | 5 mg capsule | Oral | 10–20 min, repeat after 30 min |
| | 10 mg tablet | | 30–45 min, repeat after 45 min |
| Hydralazine | 5–10 mg | i.v. bolus | 20 min, repeat after 30 min |
| Diazoxide | 15–45 mg, max 300 mg | i.v. rapid bolus | 3–5 min, repeat after 5 min |

**Table 4** Guidelines for selecting oral antihypertensive drug treatment in pregnancy

| Drug | Dose | Action | Contraindications | Practice points |
|---|---|---|---|---|
| Methyldopa | 250–750 mg tds | Central | Depression | Slow onset of action over 24 hours. Dry mouth, sedation, depression, blurred vision |
| Clonidine | 75–300 μg tds | | | Withdrawal effect with clonidine. |
| Labetalol | 100–400 mg tds | β-blocker with | Asthma, chronic airways | Bradycardia, bronchospasm, headache, |
| Oxprenolol | 20–160 mg tds | vasodilator effects. | limitation, heart block. | nausea, scalp tingling which usually resolves within 24–48 h (labetalol only). |
| Nifedipine | 20 mg bd–60 mg SR bd | Calcium channel antagonist | Aortic stenosis | Severe headache associated with flushing and tachycardia. Peripheral oedema, constipation. |
| Prazosin | 0.5–5 mg tds | α-blocker | | First-dose effect – orthostatic hypotension. |


 

- Antihypertensive treatment may also be commenced in women with systolic BP 140–159 mmHg or diastolic 90–99 mmHg depending on local practice.
- The concurrent administration of longer acting oral agents (Table 4) will achieve a sustained blood pressure lowering effect.

It is recommended that protocols for the management of severe hypertension should be readily accessible in all obstetric units.

### *Thromboprophylaxis*

- Graduated compression stockings should be considered for all inpatients, with or without prophylactic low molecular weight heparin.
- Low molecular weight heparin is indicated if there is nephrotic syndrome (serum albumin < 30 g/L, urine protein/creatinine ratio > 250 mg/mmol), provided serum creatinine and platelet count are normal.

### *Intravenous fluids*

Administration of fluid at a rate greater than normal requirements (60 mL/h) should only be considered for:

- Women with severe pre-eclampsia immediately prior to parenteral vasodilators, regional anaesthesia or immediate delivery.
- Initial management in women with oliguria where there is a suspected or confirmed deficit in intravascular volume.
- Appropriate blood product replacement is necessary when there has been haemorrhage, as in cases of placental abruption.

Each unit should have its own agreed protocol for fluid management in pre-eclamptic women in these settings and during labour.

### *Eclampsia*

Comprehensive protocols for the management of eclampsia (and severe hypertension) should be available in all appropriate areas.

There are four main aspects to care of the woman who sustains eclampsia.

**1. Resuscitation**

**2. Prevention of further seizures**

- Treatment should be commenced with magnesium sulfate (4 g over 10–15 min) followed by an infusion (1–2 g/h) for 24–48 h. There is no need to measure serum magnesium levels provided renal function is normal.
- In the event of a further seizure, a further 2–4 g of magnesium sulfate is given IV over ten minutes.
- Intravenous diazepam (2 mg/min to maximum of 10 mg) or clonazepam (1–2 mg over two to five minutes) may be given while the magnesium sulfate is being prepared if the seizure is prolonged.
- Magnesium infusion should not be used for more than 12 h in women with oliguria or renal impairment and serum magnesium levels should be monitored during this time.

**3. Control of hypertension**

- Control of severe hypertension to levels below 160/100 mmHg by parenteral therapy is essential.

**4. Delivery**

- Arrangements for delivery should be decided once the woman's condition is stable.
- In the meantime, close fetal monitoring should be maintained.

### *Prevention of eclampsia in the woman with pre-eclampsia*

The drug of choice for the prevention of eclampsia is magnesium sulfate given as described above. Although there is good evidence for the efficacy of this therapy, the case for its routine administration in women with pre-eclampsia in countries with low maternal and perinatal mortality rates is less compelling. It is appropriate for individual units to determine their own protocols and monitor outcomes.

### *Hepatic and haematological manifestations*

- Epigastric or right upper quadrant pain may subside (albeit temporarily) after blood pressure lowering, particularly with vasodilators.
- Thrombocytopenia may require platelet transfusion at the time of Caesarean delivery or in the case of post-partum hemorrhage, wound or vulval hematoma or other bleeding. In the presence of bleeding, administer 6 units of platelets if the platelet count is below $40 \times 10^9$/L.
- Fresh frozen plasma is required for management of coagulopathy as indicated by active bleeding and a prolonged activated partial thromboplastin time or international normalised ratio.
- Steroid therapy (other than for fetal lung maturation) is not indicated for the management of thrombocytopenia or hepatic dysfunction.

## Fetal surveillance (Table 5)

## Resolution of pre-eclampsia

- After delivery, all clinical and laboratory derangements of pre-eclampsia recover, but there is often a delay of several days, and sometimes longer, in return to normality.
- Hypertension may persist for days, weeks or even up to three months and will require monitoring and slow withdrawal of antihypertensive therapy.
- All women who develop pre-eclampsia and gestational hypertension are at risk of these disorders in future pregnancies and should receive appropriate counselling before embarking upon another pregnancy.

## Management of chronic hypertension in pregnancy

- Women with chronic hypertension have an increased risk of accelerated hypertension in the third trimester,



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**Table 5** Protocol for fetal surveillance in women with hypertension in pregnancy

| | Modality | Frequency |
|---|---|---|
| Chronic hypertension | Early dating US | First trimester |
| | US for fetal growth/AFV/UAD | As per clinical assessment |
| Gestational hypertension | US for fetal growth/AFV/UAD | At time of diagnosis and 3–4 weekly |
| Pre-eclampsia | US for fetal growth/AFV/UAD | At time of diagnosis and 2–3 weekly |
| | CTG | Twice weekly |
| | CTG | Twice weekly |
| Pre-eclampsia with FGR | US for AFV/UAD | On admission and twice weekly |

AFV, amniotic fluid volume; CTG, cardiotocography; FGR, fetal growth restriction; UAD, umbilical artery Doppler flow; US, ultrasound.

superimposed pre-eclampsia, fetal growth restriction, placental abruption, premature delivery and stillbirth.
- The woman with chronic hypertension should be observed frequently during pregnancy by an obstetrician and by a physician familiar with the management of hypertension in pregnancy.
- Treatment of chronic hypertension is associated with a significant reduction in severe hypertension but has not been shown to alter the risk of superimposed pre-eclampsia, preterm delivery, placental abruption or perinatal death.
- Treatment should definitely be started when the blood pressure consistently reaches or exceeds 160 mmHg systolic and/or 100 mmHg diastolic. Treatment at BP levels between 140 and 159 mmHg systolic and/or 90–99 mmHg diastolic is also common practice, with good documented outcomes.
- The drugs used for treatment of chronic hypertension are the same as those recommended for pre-eclampsia and gestational hypertension (Table 4).

## Anaesthetic considerations in hypertensive disorders of pregnancy

- Whenever possible an anaesthetist should be informed about a woman with severe pre-eclampsia well prior to labour or operative delivery.
- For labour and delivery, epidural analgesia is a useful adjunct to antihypertensive therapy for blood pressure control and it improves renal and uteroplacental blood flow.
- Regional anaesthesia is preferred to general anaesthesia for caesarean section, especially as airway problems including laryngeal edema may be increased.
- Women who develop organ failure require intensive monitoring and medical management, either within a high dependency or intensive care setting.

## Preconception management and prophylaxis for women at risk of pre-eclampsia

Many susceptibility factors for pre-eclampsia have been identified but to date no accurate predictive tool, using either clinical or laboratory markers, has been developed. Recurrence rates vary from 6% to 55% with the greatest risk in women with early onset pre-eclampsia and chronic hypertension.
- Aspirin in doses between 50–150 mg daily is associated with a reduction in the rate of pre-eclampsia, delivery prior to 34 weeks as well as preterm birth and perinatal death.
- Calcium supplementation (1.5 g/day) should be offered to women at increased risk of pre-eclampsia, particularly in those with a low dietary calcium intake.

## Auditing outcomes in women with hypertensive disorders of pregnancy

It is appropriate for all hospitals managing women with hypertensive disorders of pregnancy to monitor and review their maternal and fetal/neonatal outcome data. These data should be used to formulate appropriate quality improvement strategies.

## Long-term consequences of hypertensive disorders of pregnancy

Women who have been diagnosed with either pre-eclampsia or gestational hypertension are at increased risk of subsequent cardiovascular morbidity including hypertension, stroke and coronary heart disease.

It is recommended that all women with previous pre-eclampsia or hypertension in pregnancy have an annual blood pressure check and regular (five yearly or more frequent if indicated) assessment of other cardiovascular risk factors including serum lipids and blood glucose.

The full text of these Guidelines (referenced) is available at www.somanz.org.au.


 