Hypertensive disorders in pregnancy, pre-eclampsia, eclampsia Clinical Guideline

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AUTHORS

This Clinical Guideline has been developed by the Monash Women’s Maternity Guideline Development Group in consultation with Anaesthetics and Pharmacy and is predominately underpinned by the (2014) Society of Obstetric Medicine of Australia and New Zealand (SOMANZ) guidelines1 and NICE guideline [NG133] 2019.2

TARGET AUDIENCE and SETTING

Monash Health medical staff and midwives.
Pregnant and post-partum women who present with, or develop hypertensive disorders, pre-eclampsia and/or eclampsia.

CLINICAL GUIDELINE

Hypertension (defined as a systolic blood pressure (SBP) ≥ 140 mmHg and/or diastolic blood pressure (DBP) ≥ 90 mmHg on two occasions at least four hours apart) is a common medical problem encountered in pregnancy. It can be classified into four categories:

1. Pre-eclampsia/eclampsia
2. Gestational hypertension
3. Chronic hypertension; and
4. Pre-eclampsia superimposed on chronic hypertension.1

The definition and diagnostic criteria for each condition is based on the gestation at diagnosis and the presence of co-existing haematological, biochemical and/or feto-placental abnormalities. More details regarding these conditions can be found in the Society of Obstetric Medicine of Australia and New Zealand (SOMANZ) Guideline.1

Pre-eclampsia is a unique condition to human pregnancy, diagnosed after 20 weeks gestation. It is a multi-system disorder characterised by hypertension with associated involvement of one or more organ systems such as haematological, renal, hepatological, neurological and/or feto-placental compromise. Pre-eclampsia can be seen to affect 3-8 % of all pregnancies1,2,10-12 and can also develop, or continue into the postnatal period.

Risk factors associated with pre-eclampsia include a previous personal or family history, co-existing medical conditions (e.g. chronic hypertension, diabetes type 1 or type 2, antiphospholipid syndrome, renal disease, systemic lupus erythematosus), multiple pregnancy, nulliparity and obesity.1 The risk of pre-eclampsia is further increased when more than one risk factor is present.1

First trimester combined screening including maternal demographics, medical history and ultrasound and biochemical markers has higher detection rates and allows for better selection of high-risk women and is now offered by some private providers in Australia. This should be the preferred method of screening when available and, in general, women with predicted risk of 1:100 or more benefit from prophylaxis with low dose aspirin.

In women assessed with a moderate to high risk of developing pre-eclampsia, prophylaxis with low dose aspirin (150 mg/nocte)1,3,14-16 is recommended, ideally commencing early in pregnancy (e.g. at booking) and continued until 36 weeks. See: Aspirin to help prevent pre-eclampsia (patient information)
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Calcium supplementation (1.5 g/day)\(^1\)\(^2\) is also useful in women whose diet is deficient in calcium. See: Calcium in pregnancy (patient information)

There is a SOMANZ\(^2\) and National Collaborating Centre for Women’s and Children’s Health (NCC-WCH)\(^2\) consensus regarding classification of the degree of hypertension, but similar classification of preeclampsia is controversial. The (2014) International Society for the Study of Hypertension in Pregnancy (ISSHP) statement suggested there was general consensus that factors determining severity include difficulty in controlling blood pressure and deteriorating clinical condition including HELLP (Haemolysis, Elevated Liver enzymes and Low Platelets) syndrome, impeding eclampsia, worsening thrombocytopenia or worsening fetal growth restriction while there is less concern regarding increasing proteinuria.\(^3\) The NICE guideline (NG133) defines severe pre-eclampsia as pre-eclampsia with severe hypertension and/or with symptoms, and/or biochemical and/or haematological impairment.\(^2\)

**HELLP syndrome** represents a subset of women with severe pre-eclampsia characterised by Haemolysis, Elevated Liver enzymes (transaminases) and Low Platelets with or without other pre-eclamptic features.

Management of hypertensive disorders of pregnancy is largely dependent on severity, gestation and other coexisting maternal conditions and includes blood pressure control, fetal surveillance and monitoring for associated complications.

**Note:** Uncommon atypical presentations of pre-eclampsia (e.g., persistent symptoms in the setting of rising blood pressure that not yet meets criteria, or biochemical derangement with normal BP) should be escalated to senior medical staff (i.e. Senior Registrar or Consultant).

**Quick reference (summary of clinical practice recommendations)**

<table>
<thead>
<tr>
<th>Clinical practice recommendations</th>
<th>Section</th>
<th>Evidence level(^6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advise women at mod-high risk of pre-eclampsia to initiate low dose aspirin (ideally 150 mg) before 16 weeks, and continue until 36 weeks.(^1)(^3)(^14) See: Aspirin to help prevent pre-eclampsia patient information</td>
<td>N/A</td>
<td>I</td>
</tr>
<tr>
<td>Offer pharmacological treatment for mild to moderate hypertension if BP remains above 140/90 mmHg.(^2)</td>
<td>1.1</td>
<td>Consensus</td>
</tr>
<tr>
<td>Commence antihypertensive treatment in severe hypertension, defined as a SBP greater than or equal to 160 mmHg with or without DBP greater than or equal to 110 mmHg.(^1)</td>
<td>1.2</td>
<td>I</td>
</tr>
</tbody>
</table>
| Admit women to hospital or urgent assessment and management with:  
  - a SBP greater than or equal to 160 mmHg with or without DBP greater than or equal to 110 mmHg\(^1\)  
  - any maternal biochemical or haematological investigations that cause concern, for maternal or fetal wellbeing.\(^2\) | 1.2 | I |
| Aim for a sustained and gradual reduction in BP in the control of severe hypertension to a SBP of 130-140 mmHg and DBP 80–90 mmHg.\(^2\) | 1.2 | Consensus |
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<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Section</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dipstick testing is an appropriate screening test.¹</td>
<td>1.3</td>
<td>Consensus</td>
</tr>
<tr>
<td>Do a spot urine protein: creatinine ratio (PCR) for confirmation or exclusion of proteinuria when pre-eclampsia is suspected.¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is not necessary to repeat assessment of proteinuria once significant proteinuria is confirmed.¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The frequency, intensity and modality of fetal evaluation (including by umbilical artery Doppler) will depend on individual maternal and fetal characteristics.¹</td>
<td>1.3</td>
<td>Consensus</td>
</tr>
<tr>
<td>Offer one course of antenatal corticosteroid therapy to women at 24 + 0 to 34 + 6 weeks’ gestation who are at high risk for preterm birth within the next 7 days.⁴</td>
<td>2.3.3</td>
<td>I</td>
</tr>
<tr>
<td>Unless contraindicated, administer betamethasone (Celestone Chronodose®), as two intramuscular (IM) doses of 11.4 mg, 24 hours apart.¹ ⁴ Do not delay birth in severe cases of pre-eclampsia/eclampsia.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prompt caesarean section may be indicated following an eclamptic seizure and in cases of severe pre-eclampsia once the mother has been stabilised.¹</td>
<td>2.3.5</td>
<td>Consensus</td>
</tr>
<tr>
<td>Magnesium sulfate is the anticonvulsant of choice for the prevention and control of eclampsia.⁷</td>
<td>2.3.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Assess for oliguria (urine output &lt; 80 mL in 4 hours) at 4 hourly intervals in women with pre-eclampsia and eclampsia in the intrapartum and the immediate postpartum period.¹</td>
<td>2.3.4</td>
<td>Consensus</td>
</tr>
<tr>
<td>Ergometrine (including Syntometrine®) is not recommended in active third stage management.¹</td>
<td>2.3.5</td>
<td>Consensus</td>
</tr>
<tr>
<td>Postnatal women with a BP of less than 150/100 are suitable for discharge and follow-up in the community.¹ This will depend on the woman’s clinical factors.</td>
<td>2.3.7</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Recommendations using directive words such as ‘offer’, ‘should’, ‘advise’, ‘refer’ reflect a strong recommendation, usually where there is clear evidence of benefit.

Recommendations using words such as ‘consider’, ‘may, ‘or ‘could’ are used where the evidence of benefit is less certain.
1. Hypertension in pregnancy

Classification of hypertension in pregnancy

The classification of hypertension in pregnancy below is recognised by both SOMANZ and NICE for the purpose of guideline implementation.

<table>
<thead>
<tr>
<th>Degree of hypertension</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure range (mmHg)</td>
<td>140/90 to 149/99</td>
<td>150/100 to 159/109</td>
<td>160/110 or higher</td>
</tr>
</tbody>
</table>

Elevations of both SBP and DBP have been associated with adverse maternal and fetal outcomes.

Treatment of mild to moderate hypertension

Antihypertensive therapy does not prevent pre-eclampsia or the associated adverse perinatal outcomes, but it decreases by half the incidence of development of severe hypertension among women with mild hypertension.

Arguments against treatment include that there is little risk to the mother in having relatively mild hypertension for a short time; that fetal perfusion is dependent upon adequate maternal BP; and that lowering BP suppresses an important sign of the severity or progression of pre-eclampsia. Uncontrolled hypertension is however, a frequent trigger for expediting birth and controlling hypertension may allow prolongation of pregnancy. In addition, it is possible that treatment of even mild-moderate hypertension will lead to a clinically relevant reduction in the risk of pre-eclampsia and fetal or neonatal death, particularly early pregnancy loss.

The NICE Guideline (NG133) now recommend offering treatment for any persistent hypertension greater than 140/90. The Control of Hypertension in Pregnancy Study (CHIP) trial suggests this is safe.

Treatment of severe hypertension

Antihypertensive treatment should be commenced in all women with a SBP greater than or equal to 160 mm Hg and or a DBP greater than or equal to 110 mm Hg because of the risk of maternal intracerebral haemorrhage and eclampsia.

Severe hypertension requiring urgent treatment (SBP 170 mmHg)

This is defined as a SBP greater than or equal to 170 mmHg with or without DBP greater than or equal to 110 mmHg. This represents a level of BP above which the risk of maternal morbidity and mortality is increased. This degree of hypertension requires urgent assessment and management. Increasing evidence exists that cerebral perfusion pressure is altered in pregnant women making them more susceptible to cerebral haemorrhage, posterior reversible encephalopathy syndrome and hypertensive encephalopathy.

The objective in controlling hypertension in pregnancy is for a sustained and gradual reduction in BP to a SBP of 130–140 mmHg and a DBP of 80–90 mmHg. The CHIPS trial showed significantly less severe hypertension in women with tight control than in those with less tight control.
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1.1 Medication options for managing mild to moderate hypertension

Target BP should be a SBP of 130-140 mmHg and a DBP of 80-90 mmHg.

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Dose (all oral route)</th>
<th>Cautions and side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyldopa</td>
<td>250-750 mg tds</td>
<td>Slow onset of action over 24 hrs. May cause dry mouth, sedation, blurred vision. Use with caution in women with a history of depression. Avoid postpartum for this reason.</td>
</tr>
<tr>
<td>Labetalol</td>
<td>100-400 mg QID</td>
<td>Bradycardia, bronchospasm, headache, nausea and scalp tingling which usually resolve within 24 hours. Use with caution in women with a history of asthma.</td>
</tr>
<tr>
<td>Nifedipine XR  (slow release)</td>
<td>20-60 mg bd</td>
<td>Severe headache in first 24 hours. Flushing, tachycardia, peripheral oedema, constipation.</td>
</tr>
<tr>
<td>Hydralazine</td>
<td>25-50 mg tds</td>
<td>Flushing, headache, nausea, lupus-like syndrome. Where oral hydralazine is contemplated it is likely to be in the setting of resistant HT on multiple other oral agents and senior input is therefore mandatory before commencing oral hydralazine.</td>
</tr>
</tbody>
</table>

Postnatal medication

Though angiotensin converting enzyme (ACE) inhibitors and angiotensin receptor blockers are contraindicated in pregnancy, 1,2 enalapril is particularly appropriate in postnatal women with pre-existing hypertension who will continue on an agent long-term. 1,2 Caution should be exercised where renal impairment exists as ACE inhibitors use can further impair renal function. From evidence available, in most cases enalapril is clearly the agent of choice, 2.5 mg - 5 mg daily. It does not appear to negatively impact on a ‘term’ baby or lactation and therefore it should be our main ACE inhibitor preference. Other ACE inhibitors have less supportive evidence (particularly with neonatal exposure via breastmilk) and should be avoided at this time. Please seek advice from Monash Medicines in this regard. Telephone: 9594 2361, Mon-Fri 9 am-5 pm.

1.2. Medication options for managing severe hypertension

Treatment objective: Commence treatment promptly aiming for a sustained and gradual reduction in BP to a SBP of 130-140 mmHg and a DBP of 80-90 mmHg. Care should be taken to avoid a precipitous fall in BP after antihypertensive treatment, as this may impair maternal and or placental perfusion with the attendant fetal and maternal consequences. 1
<table>
<thead>
<tr>
<th>Medicine</th>
<th>Dose / route</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV Fluid bolus</td>
<td>Consider administering 250 - 500 mL of crystalloid IV (e.g. sodium chloride 0.9%) or compound sodium lactate (Hartmann’s solution*) over 15 minutes prior to the administration of the first dose of hydralazine.</td>
<td>May be helpful in reducing the risk of maternal hypotension but fetal benefit unclear.</td>
</tr>
<tr>
<td>Nifedipine (oral)</td>
<td>Administer 10-20 mg nifedipine stat. Repeat as required after 45 mins (maximum dose 40 mg).</td>
<td>Oral medication of choice. Onset of action 30-45 min.</td>
</tr>
<tr>
<td>Labetalol (IV)</td>
<td>Bolus dose: • Intermittent bolus dose of 20 mg undiluted, IV, over 2 minutes. • Repeat as required after 10 mins, up to 4 times (max dose 80 mg).</td>
<td>Maximum effect within 5 minutes after each dose. Observations: Continuous CTG monitoring. Observations every 5 minutes during bolus doses. Observations every 15 minutes during continuous infusion until stable over one hour, then hourly. Consider the oral regime if appropriate.</td>
</tr>
<tr>
<td>Labetalol (oral)</td>
<td>Bolus IV labetalol must be administered by medical staff: • Continuous infusion via syringe pump (undiluted) • Consider if blood pressure still uncontrolled after 4 bolus doses (80 mg). • Start at 20 mg/hr. • Increase infusion rate as required by 20 mg/hr every 20 minutes until the optimum BP achieved or the maximum rate is reached (160 mg/hr). 200 - 400 mg QID.</td>
<td></td>
</tr>
<tr>
<td>Hydralazine (IV)</td>
<td>Bolus dose (20 mg hydralazine in 20 mL sodium chloride 0.9%, (1 mg/mL)) • Administer 5 -10 mg (5-10 mL) IV, over 5 minutes. • Repeat dose as required every 20 minutes, until target BP achieved (max dose 30 mg). <strong>Note: Bolus IV hydralazine must be administered by medical staff.</strong> Continuous infusion via syringe pump (40 mg hydralazine in 40 mL sodium chloride 0.9%, (1 mg/mL): • Consider if BP is still uncontrolled after 30 mg IV hydralazine. • Start infusion rate at 10 mg/hr.</td>
<td>Smooth muscle dilator. Maternal side effects: headache, tachycardia, palpitations, gastrointestinal disturbance, flushing, hypotension. <strong>Observations:</strong> as per IV labetalol above.</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Maternal investigations</th>
<th>Fetal surveillance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chronic hypertension</strong></td>
<td></td>
</tr>
<tr>
<td>At each visit, assess for proteinuria*</td>
<td></td>
</tr>
<tr>
<td>If sudden increase in BP or new proteinuria, perform pre-eclampsia blood screen.**</td>
<td></td>
</tr>
<tr>
<td>Organise early dating ultrasound in first trimester.</td>
<td></td>
</tr>
<tr>
<td>US for fetal growth/amniotic fluid index (AFI)/Doppler in 3rd trimester; repeat as indicated.</td>
<td></td>
</tr>
<tr>
<td><strong>Gestational hypertension</strong></td>
<td></td>
</tr>
<tr>
<td>Assess for proteinuria at each visit.</td>
<td></td>
</tr>
<tr>
<td>Perform bloods for pre-eclampsia screen 4 weekly or as indicated.</td>
<td></td>
</tr>
<tr>
<td>US for fetal growth/AFI/Doppler at time of diagnosis</td>
<td></td>
</tr>
<tr>
<td>Repeat every 3-4 weeks.</td>
<td></td>
</tr>
</tbody>
</table>

* Urinalysis by dipstick followed by spot urine PCR if ≥1+ proteinuria noted.¹

Significant proteinuria - Spot urine PCR greater than or equal to 30 mg/mmol.² UTP/Cr ratio greater than or equal to 0.03 g /mmol.

Note: Once significant proteinuria has been detected, there is no established role for serial testing as the severity or progress of proteinuria should not alter management decisions.

** Pre-eclampsia blood screen

- full blood examination (FBE)
- urea, electrolytes and creatinine (UEC)
- liver function (LFT)
- uric acid (UA) +/- coagulation studies if clinically indicated (e.g. if platelets < 100 x10⁹/L, abnormal LFT’s or falling Hb).

In addition to the antihypertensive regime, admitted women with acute severe hypertension (SBP >170 mmHg) require:

- two large bore IV cannulas
- continuous CTG until CTG is normal and blood pressure is under control
- indwelling urinary catheter burette to aid hourly measurements
- half hourly maternal observations.

The CTG should be recommended if BP raises to 160/110, with escalation for medical review.

1.3 Maternal investigations and fetal surveillance

The following are the recommendations for maternal investigations and fetal surveillance in women with hypertension in pregnancy.
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1.4 Transfer of care (pregnancy)

Hypertension, of any classification, is an exclusion for midwife led care and shared care affiliate. Women developing hypertension during pregnancy are to be referred to specialist obstetrician care, as per local procedures, for the remainder of their pregnancy.

2 Pre-eclampsia

2.1 Assessment and investigation

Initial assessment and investigations (should be performed in hospital):

Maternal assessment

- Take a thorough history, with particular enquiry about pre-eclampsia symptoms (e.g. severe headache, visual disturbance, epigastric or right upper quadrant pain, sudden swelling of face hands or feet).
- Vital signs: BP, pulse rate (PR), respiratory rate (RR) and temperature. [Note: correct BP cuff size is important].
- General examination, including abdominal palpation (fetal lie, presentation, size) and neurological examination.

Maternal investigations

- Urinalysis +/- mid-stream urine and spot urine protein: creatinine ratio (if FWT ≥ 1+ proteinuria).
- Pre-eclampsia biochemical screen (Full blood examination (FBE), Urea, electrolytes and creatinine (UEC), Liver function tests (LFT), Uric acid (UA) +/- clotting).

Fetal assessment (depending on gestational age) may include:

- CTG (> 28 weeks gestation).
- Ultrasound:
  - Fetal biometry
  - Amniotic Fluid Index (AFI)
  - Fetal Doppler studies (including umbilical artery, middle cerebral artery +/- ductus venosus)
  - Biophysical profile (BPP).

Ongoing outpatient maternal and fetal surveillance

<table>
<thead>
<tr>
<th>Maternal investigations</th>
<th>Fetal surveillance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-eclampsia</td>
<td>Assess for proteinuria only at time of diagnosis and do not repeat once significant proteinuria is confirmed.</td>
</tr>
<tr>
<td></td>
<td>US for fetal growth/AFI/Doppler at diagnosis. If normal repeat every 2 weeks.²</td>
</tr>
<tr>
<td></td>
<td>Continue surveillance (BPP, Doppler’s) weekly.</td>
</tr>
</tbody>
</table>

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Perform weekly pre-eclampsia bloods (or more frequently if indicated).
Weekly pregnancy care clinic.

Or, if IUGR is noted (as per guideline). Consider CTG twice weekly if > 28 weeks gestation and an inpatient. There is no evidence that routine CTG improves outcomes in these cases if there is no other indication.

Should investigation and surveillance need to be more intensive and frequent than the above recommendations, based upon gestation, severity and rate at which the condition progresses, inpatient admission is likely to be warranted. Women diagnosed with pre-eclampsia who have outpatient monitoring need to be educated regarding the progressive nature of pre-eclampsia and present promptly for assessment should she develop pre-eclamptic symptoms.

2.2 Transfer of care

Admitted women with pre-eclampsia, including those on magnesium sulfate, may require transfer to another hospital so as to optimise the outcome for either or both mother and fetus. A decision regarding transfer is largely dependent on gestation, maternal condition, staffing level, site capacity and resources. Any such decision is to be made in consultation with senior medical staff at the respective transferring and receiving hospitals.

2.3 Management of pre-eclampsia

Hypertension should be controlled in women with pre-eclampsia as per the recommendations above for management of hypertension in pregnancy.

In labour, regional anaesthesia can be a useful adjunct for lowering of blood pressure and should be taken into account when administering antihypertensives.

Note: Uncommon atypical presentations of pre-eclampsia (e.g., persistent symptoms in the setting of rising BP that not yet meet criteria, or biochemical derangement with normal BP) should be escalated to senior medical staff (i.e. Senior Registrar or Consultant).

2.3.1 Seizure prophylaxis

Magnesium sulfate is recommended for seizure prophylaxis in women with pre-eclampsia where required.1-3 For administration see: Magnesium sulfate administration (Maternity)

2.3.2 Intrapartum - blood tests in severe pre-eclampsia

Consider intermittent pre-eclampsia blood tests in labouring women with severe pre-eclampsia and in those on magnesium sulfate if appropriate. This can be performed at a frequency based on the woman’s clinical circumstance.
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2.3.3  Fetal maturation

Maternal corticosteroid administration (betamethasone or dexamethasone) is recommended to accelerate fetal lung maturation for women at risk of preterm birth. Studies have shown corticosteroids reduce adverse neonatal outcomes, including respiratory distress syndrome and death, with no increased risk of maternal death, chorioamnionitis or sepsis.

The recent Society of Obstetricians and Gynaecologists of Canada (SOGC September 2018) guideline No.364 recommend:

- A single course of corticosteroids is strongly recommended for pregnant women between 24 + 0 weeks and 34 +6 weeks gestation, who are at high risk of preterm birth within 7 days.4
- Betamethasone (Celestone Chronodose®), given as two IM doses of 11.4 mg, 24 hours apart.

Women should be informed of the potential for a transient reduction in fetal movements and advised to consult with their health care professional if this occurs (Strong, Low).4

Magnesium sulfate is now recommended to support fetal neuroprotection for all women less than 30 weeks gestation in whom birth is imminent within the next 24 hours (Level 1).1,8 See: Magnesium sulfate administration (maternity)

2.3.4  Fluid balance

Careful maternal fluid balance is required in all women with pre-eclampsia.

In severe pre-eclampsia maternal fluid retention can lead to severe acute pulmonary oedema. Strict fluid balance is imperative to avoid risk of fluid overload. Fluid input should be restricted to normal requirements, which is usually about 80 mL/hr or 1 mL/kg/hr. Urine output should be measured and recorded every hour, via an indwelling urinary catheter (IDC) with an hourly urometer.

Where urine output is < 80 mL in total over 4 consecutive hours, medical review is necessary to assess renal function.1 It is important to know that oliguria in the intrapartum and immediate post-partum period is common and physiological. Fluid therapy is unnecessary unless there is evidence of renal impairment (such as a rising serum creatinine).

In the presence of sustained oliguria and renal impairment consider transfer to HDU / ICU for more intensive haemodynamic monitoring. Diuretic use should be avoided in the absence of pulmonary oedema.1

2.3.5  Birth plan

Timing of birth in women with pre-eclampsia

As the only definitive treatment for pre-eclampsia is to birth, careful consideration should be given to the timing in women with this condition. This can be a difficult decision as the prognoses for mother and fetus are generally opposing with prolongation of pregnancy.
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At gestations < 34 weeks, if the maternal and fetal condition permits, stabilize the maternal condition with expectant management. If a planned birth is necessary offer a course of corticosteroids, and if indicated magnesium sulfate, with time to take effect and minimise the risks of prematurity for the fetus. 

From 34-36 weeks’ gestation continue careful surveillance unless indicators for planned earlier birth.

Planned early birth is recommended where:
- gestation > 37 weeks
- inability to control hypertension
- severe pre-eclampsia (deteriorating organ function)
- neurological complications (severe intractable headache, repeated visual scotomata, nausea or vomiting, epigastric pain) or eclampsia
- pulmonary oedema
- placenta abruption (immediately)
- non-reassuring fetal status.

Mode of birth
The mode of birth is dependent on factors such as fetal and maternal condition, gestation, cervical dilatation and anticipated time interval. Generally, prompt birth by caesarean section is indicated following an eclamptic seizure and in cases of severe pre-eclampsia following maternal stabilization. Without these acute emergency situations, induction and / or augmentation of labour should be considered.

Oxytocin (Syntocinon®) 10 units IM or 5 units by a ‘slow’ IV bolus is recommended for active management of the third stage of labour. Ergometrine (including Syntometrine®) should be avoided.

2.3.6. Post birth management

It is reasonable to expect that the woman’s condition will steadily improve following birth. However, in addition to routine postpartum management, women with hypertensive disease in pregnancy need:
- Blood pressure control with anti-hypertensive therapy (target BP < 140/90 mmHg). See: Postnatal medication.
- Monitoring of deranged biochemistry.

In situations where magnesium sulfate has been given for seizure prevention the infusion should continue for 24 hours after birth. Strict fluid balance should also be maintained until a good diuresis has occurred.

Debriefing regarding the birth should include counselling about future risk of recurrence in subsequent pregnancies, as well as hypertension and cardiovascular disease risks in later life. Emphasis should be placed on weight management, healthy lifestyle and appropriate referral to obstetric-led care for subsequent pregnancies. Reduce antihypertensive(s) if the blood pressure falls below 120/80.

2.3.7 Discharge and follow-up
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Suitability for discharge to community care should take into account blood pressure control, evidence of resolving biochemical derangement and usual postpartum issues (e.g. feeding, lochia and pain management). The timing of discharge is to be made in consultation with senior obstetric staff. Women with a blood pressure reading of 140/90 or lower are suitable for discharge and follow-up in the community.

Women with severe pre-eclampsia, eclampsia or other complicated cases of hypertensive disorders should be reviewed 6-8 weeks post-discharge. This can happen at the outpatient clinic at the hospital or with the woman’s GP or specialist obstetrician in their private rooms. In general, women with severely preterm birth, eclampsia or need for ICU or intrapartum magnesium sulfate should be seen by a senior registrar or consultant obstetrician for their postnatal review.

3 Eclampsia

There are four main aspects to care of the woman who sustains eclampsia: resuscitation, prevention of further seizures, control of hypertension and birth.

3.1 Resuscitation

Call for HELP

Protect the woman from harm and move her to the recovery position. These seizures are usually self-limited.

Call a Code Pink (to ensure the obstetric consultant on-call is notified) and call the site anaesthetist in charge directly for urgent anaesthetic assistance. Consider the need for a MET call or Code Blue according to the clinical situation.

Magnesium sulfate is definitely the anticonvulsant of choice for treatment of eclampsia. However, a prolonged, generalized seizure may be due to other intracerebral pathology (e.g. haemorrhage secondary to uncontrolled hypertension) in which case, benzodiazepines are appropriate. Consider intravenous diazepam (2 mg/min to a maximum of 10 mg) or clonazepam (1-2 mg over 2-5 mins).1

Following cessation of the seizure:

- Check the airway and clear if necessary.
- Check for breathing and if present administer oxygen.
- Check the respiratory rate, oxygen saturations, BP and pulse rate.
- Obtain IV access.

3.2 Prevention of seizures

Magnesium sulfate is the anticonvulsant of choice for the prevention of eclamptic seizures.1,3

Monash Health uses pre-mixed IV bags of 25 g magnesium sulfate in 50 mL water for injection. Following appropriate resuscitation, commence treatment with magnesium sulfate given as a 4 g loading dose over 20 minutes, followed by an infusion of 1 g/hr.

In the event of further seizure(s), an additional 2 g of magnesium sulfate is to be given IV over 10 minutes for each episode. The magnesium sulfate infusion rate may be increased to 2-3 g/hr.
Hypertensive disorders in pregnancy, pre-eclampsia, eclampsia Clinical Guideline

- See: Magnesium sulfate administration (Maternity) procedure.
- Continue the magnesium sulfate maintenance infusion for 24 hours following birth or the last eclamptic seizure.

3.3 Control of hypertension

As per 1.1 with target BP < 130-140/80-90 mmHg

3.4 Monitoring and investigations

3.4.1 Maternal monitoring

- As per Magnesium sulfate administration (Maternity) procedure.
- Additional attention should be given to uterine activity, neurological irritability and signs of coagulopathy or haemorrhage.
- Document on the Maternity Observation and Response Chart (MORC) (MRF13)
- Commence Fluid Balance on EMR (If EMR is not available on the Adult Fluid Balance Chart (MRK45).
- Ensure clear documentation of events in EMR (If EMR is not available on Progress Notes (MRJO1).

3.4.2 Fetal monitoring

- When the eclamptic seizure has ceased, and the maternal condition including blood pressure is stable, consider applying a cardiotocograph (CTG) and performing further fetal assessment as required.

3.5 Birth – timing and mode

As per 2.3.5

3.6 Post birth management

As per 2.3.6

3.7 Discharge and follow up

As per 2.3.7

- It is important to consider other causes for seizures in pregnancy after stabilization of the patient. Differential diagnoses for similar presentations include epilepsy, intracranial haemorrhage, meningitis, cerebral venous thrombosis, space-occupying lesions, metabolic disorders, head trauma and drug or alcohol-related issues.
- Persistent neurological symptoms merit imaging of the brain and appropriate referral.

4. Eclampsia Flowchart
**Hypertensive disorders in pregnancy, pre-eclampsia, eclampsia Clinical Guideline**

**Immediate management**

- Call for help.
- During seizure: protect the woman from harm and position her in the recovery position.
- Airway: ensure airway is clear.
- Breathing: if breathing give high flow O₂, check RR and SaO₂
- Circulation: BP, pulse, obtain IV access.

**Call a Code Pink, and call the Anaesthetist in charge directly for urgent ANAESTHETIC support**

Consider the need for a MET call or Code Blue according to the clinical situation.

**Loading dose of magnesium sulfate**

(see Magnesium sulfate administration procedure)

- Magnesium sulfate 4 g IV over 20 mins.

**Maintenance dose**

- Magnesium sulfate 1 g/hr IV for 24 hrs.

**For recurrent seizures**

- Further magnesium sulfate 2 g IV over 10 mins.
- Consider increasing the infusion rate to 2-3 g/hr.
- Continue magnesium sulfate for 24 hours following birth or the last eclamptic seizure.

**Treat hypertension if: SBP = or > 160 and DBP = or > 110**

During pregnancy aim for SBP (130-140 mmHg) and DBP (80-90 mmHg)

Consider 250-500 mL initial IV fluid bolus if appropriate.

Administer either:

- **Labetalol**: 20 mg IV bolus over 2 mins. Repeat as required every 10 mins. Maximum dose 80 mg. Or
- **Nifedipine**: Oral 10-20 mg stat. Repeat as required after 45 mins (maximum dose 40 mg). Or
- **Hydralazine**: IV 5-10 mg (5-10 mL), over 5 minutes. Repeat same dose as required every 20 minutes, until target BP achieved (max dose 30 mg).

Consider maintenance infusion of either labetalol or hydralazine.

(Refer control of hypertension in preeclampsia)

Combination therapy may be required to control hypertension.

**Once eclampsia has occurred, expedite the birth.**

- Stabilise the mother first.
- Mode of birth depends on both maternal and fetal wellbeing, fetal presentation, gestation and cervical favourability.
- Obstetric team to liaise with anaesthetic, neonatal and ICU/HDU teams.

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### Levels of evidence

<table>
<thead>
<tr>
<th>Level</th>
<th>Intervention</th>
<th>Diagnostic accuracy</th>
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<tbody>
<tr>
<td>I</td>
<td>A systematic review of level II studies</td>
<td>A systematic review of level II studies</td>
</tr>
<tr>
<td>II</td>
<td>A randomised controlled trial</td>
<td>A study of test accuracy with independent, blinded comparison with a valid reference standard, among consecutive persons with a defined clinical presentation</td>
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<tr>
<td>III-1</td>
<td>A pseudo-randomised controlled trial</td>
<td>A study of test accuracy with independent, blinded comparison with a valid reference standard, among non-consecutive persons with a defined clinical presentation</td>
</tr>
</tbody>
</table>
| III-2 | A comparative study with concurrent controls:  

- non-randomised experimental trial  
- cohort study  
- case-control study  
Interrupted time series without a parallel control group | A comparison with reference standard that does not meet the criteria required for Level II and III-1 evidence |
| III-3 | A comparative study without concurrent controls:  

- historical control study  
- two or more single arm study  
Interrupted time series without a parallel control group | Diagnostic case-control study |
| IV    | Case series with either post-test or pre-test outcomes | Study of diagnostic yield (no reference standard) |

*Refer to full reference for the evidence hierarchy of prognosis, aetiology and screening interventions.

Consensus: This is an additional level of evidence used here, for example, from published guidelines that have involved extensive consultation and deliberation, where specific recommendations have been agreed upon by consensus of the contributors.

Clinical Practice Points: aim to provide health professionals with guidance that is succinct, easily understood and practical. They are the result of consensus on what good practice is, made by members of an expert group working with that particular topic.
6. REFERENCES


Hypertensive disorders in pregnancy, pre-eclampsia, eclampsia Clinical Guideline

DOI: 10.1016/j.ejogrb.2013.05.005. Epub 2013 Jun 7.


Retrieved from: https://www.karger.com/Article/Pdf/336662


Related resources

Pre-eclampsia (patient information)
Pre-eclampsia Khmer (patient information)
Pre-eclampsia – Vietnamese (patient information)

Your pregnancy – what to expect and what you can do (includes ‘Signs and symptoms to take seriously’)
Hypertensive disorders in pregnancy, pre-eclampsia, eclampsia Clinical Guideline

**Eclampsia box contents - Implementation Tool**

**Magnesium sulfate administration (Maternity)**

**Escalation - when to notify the obstetric consultant**

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