Guideline No: 12  Pre-Eclampsia and Eclampsia

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<td>January 1999</td>
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MONITORING COMPLIANCE WITH THE GUIDELINE

<table>
<thead>
<tr>
<th>Minimum requirement to be monitored</th>
<th>Auditable Standards – See below</th>
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</thead>
<tbody>
<tr>
<td>Process for monitoring</td>
<td>Audit of Guideline</td>
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<td>Responsible individual/group/committee</td>
<td>Risk Management Department</td>
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<td>Frequency of monitoring</td>
<td>Audit 3 yearly of 8 sets of health care records of women with a diagnosis of severe pre-eclampsia and all patients diagnosed with eclampsia</td>
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<td>Responsible individual/group/committee for review of results</td>
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<td>Audit Lead</td>
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<td>Responsible individual/group/committee for monitoring of action plan</td>
<td>Divisional Clinical Governance Steering Group</td>
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COMPLIANT WITH:

1. NHSLA Standard 3.1
2. NHSLA Standard 3.2
3. NHSLA Standard 1.6

AUDITABLE STANDARDS

1. All women with a systolic over 150mm/Hg or diastolic over 100mm/Hg should have blood pressure recorded every 15 minutes
2. All women with a systolic over 150mm/Hg or diastolic over 100mm/Hg receive labetalol therapy
3. All women with severe PET/eclampsia are on total fluid balance restriction of 85ml/hr
4. Urinary output monitored in accordance with unit guideline
5. All women who meet the criteria for severe pre-eclampsia/eclampsia should receive magnesium sulphate for prevention and treatment of seizures and dosage managed as per guideline
6. All women who meet the criteria for severe pre-eclampsia/eclampsia should receive magnesium sulphate therapy for 24 hours post loading dose or post delivery whichever comes first
7. All women with severe PET/eclampsia have a documented delivery care plan which includes an assessment of fetal wellbeing
8. In all cases of eclampsia the consultant should attend
CONTENTS
1.0 INTRODUCTION................................................................................................................................. 4
2.0 GUIDELINE REGIME.................................................................................................................................. 4
  2.1 Diagnosis of severe pre-eclampsia and eclampsia........................................................................... 4
    2.1.1 Severe Pre-eclampsia .................................................................................................................... 4
    2.1.2 Eclampsia ....................................................................................................................................... 4
  2.2 Assessment of pre-eclampsia and eclampsia...................................................................................... 5
  2.3 Lines of Communication ..................................................................................................................... 5
  2.4 Blood pressure control in Severe Pre-eclampsia and Eclampsia .................................................... 6
  2.6 Fluid Balance in Severe Pre-eclampsia and Eclampsia ................................................................. 7
    2.6.1 Antenatal Fluid Management ........................................................................................................ 7
    2.6.2 Postpartum Fluid Management ..................................................................................................... 7
    2.6.3 Indications for Central Venous Pressure (CVP) Monitoring ..................................................... 8
    2.6.4 Special Problems .......................................................................................................................... 8
  2.7 Prevention / Control of Eclamptic Seizures .................................................................................... 9
  2.8 Fetal Assessment and Delivery Planning ........................................................................................ 10
  2.9 Thromboprophylaxis ....................................................................................................................... 10
  2.10 Third stage of labour ...................................................................................................................... 10
  2.11 Postnatal Follow Up ....................................................................................................................... 10
3.0 REFERENCES........................................................................................................................................... 11
4.0 RELATED DOCUMENTS....................................................................................................................... 11
1.0 INTRODUCTION

Pre-eclampsia is a common condition. The incidence is about 1 in 20 to 40 pregnancies. The condition is characterised by the presence of raised blood pressure (BP) and proteinuria.

Eclampsia complicates about 1 in 2000 pregnancies and may be unheralded. Eclampsia is an epileptiform seizure most commonly seen in the third trimester either in labour or postnatally. Preterm eclampsia is more likely to occur antenatally. In rare circumstances it can present in the second trimester. Raised blood pressure and proteinuria may only become apparent after eclampsia occurs.

If a seizure occurs it is important to exclude other causes of seizure including epilepsy, cerebrovascular event, infection and metabolic causes (e.g. hypoglycaemia)

2.0 GUIDELINE REGIME

2.1 Diagnosis of severe pre-eclampsia and eclampsia

2.1.1 Severe Pre-eclampsia

Pre-eclampsia is diagnosed as severe if there is;
- Mean Arterial Pressure (MAP) >125 mmHg for 3 consecutive readings OR one reading >140
- OR Systolic blood pressure >170 mmHg
- OR Diastolic blood pressure >110 mmHg
- AND significant proteinuria (>0.3g/24 hours). Dipstick urinalysis (≥++)

To calculate MAP = systolic - diastolic + diastolic
                          3

Whilst the MAP should not be taken as the automated MAP reading from the Dinamap monitor, the systolic and diastolic readings can be used for the above calculation. Manual sphygmomanometer readings can also be used.

Correct cuff sizes must be used which cover two thirds of the upper arm. Incorrect choice of cuff size will give inaccurate readings.

2.1.2 Eclampsia

Eclampsia is an epileptiform seizure - the exact pathophysiology is not clear. It may be preceded by symptoms of headache and/or visual disturbances. There may not be any elevated blood pressure prior to the seizures and hypertension may not become apparent until after the seizure. It can occur at anytime during the pregnancy including postpartum.
2.2  Assessment of pre-eclampsia and eclampsia

Basic investigations should therefore include:
- Serum electrolytes (Sodium, Potassium, Urea, Creatinine, Urate)
- Liver function tests (Albumin, ALT)
- Full Blood count (Haemoglobin, White Cell Count, Platelets)
- Clotting (PT, KCCT ± fibrinogen, FDP's)
- Group and save serum

These should be done daily or more frequently if abnormal (6 hourly if on High Dependency Unit chart or in labour to monitor worsening disease e.g. developing HELLP).

Pre-eclampsia can have effects on several body systems and each of these should be assessed for the development of potential complications. These include:

1. Neurological – ask about symptoms (Headaches/visual disturbances) check reflexes and fundi
2. Renal – Monitor fluid balance, urea, creatinine, electrolytes, document symptoms of thirst. A 24 hour urinary protein collection should be commenced if delivery is not imminent
3. Liver – check for epigastric/Right upper quadrant discomfort, monitor liver enzymes, bilirubin levels
4. Respiratory – monitor respiratory rate, \(O_2\) saturation, exclude pulmonary oedema
5. Coagulation – check platelets, coagulation screen
6. Cardiovascular – pulse, blood pressure, haemoglobin. A blood film may be helpful to demonstrate haemolysis if suspected

2.3  Lines of Communication

It is imperative that if any patient is diagnosed with severe pre-eclampsia or eclampsia (inpatient and outpatient) the attending midwife informs the labour ward co-ordinator, who should inform the obstetric team, if not already alerted.

The obstetric registrar should inform the paediatrician, labour ward anaesthetist and consultant obstetrician.

If this occurs at an early gestation (i.e. <34 weeks) the paediatrician should inform their consultant colleague.

The haematologist, renal physician and intensive care physician may also need to be involved in the care of the woman.
If an eclamptic fit occurs in the hospital setting an obstetric crash call 2222 should be instigated the consultant obstetrician must be present in all cases. If it occurs in the community setting arrange emergency transfer by dialling 999.

2.4 Blood pressure control in Severe Pre-eclampsia and Eclampsia

Blood pressure should be monitored every 15 minutes until control is achieved. This frequency may then be reduced to hourly monitoring or less frequent periods according to the woman’s condition.

The antihypertensive agent of choice is labetalol. (Labetalol should be used with caution in women with known asthma).

If the blood pressure exceeds either systolic 150 mmHg or diastolic 100 mmHg then labetalol may be used to control blood pressure; either the oral or intravenous route may be used. Most women will have their blood pressure controlled with oral labetalol.

Hypotension should be avoided to prevent under perfusion of the placental bed.

Severe hypertension should be treated immediately with a stat dose of 200 mg oral labetalol, which may be repeated after an hour if necessary, to maintain a systolic blood pressure less than 150 mmHg and diastolic 80-100 mmHg. Further oral labetalol may be given 6-8 hourly.

An intravenous infusion (IV) of labetalol may also be used to control blood pressure. If blood pressure is very high or patient can not tolerate oral medication (e.g. due to vomiting) or no response to oral labetalol then an IV bolus of 50mg labetalol over 1 minute should be given, repeated after 5 minutes if needed (see below).

2.5 Labetalol Infusion Management

Preparation of infusion:
Remove 40mL from a 100 ml bag of 0.9% sodium chloride
Add 40mL x labetalol injection 5mg/mL (2 x 20mL ampoules) to give final concentration of 2mg/mL solution (infusion has 24 hours stability).

Start at 10mL /hour (= 20mg/hour).
Double rate every 30 minutes until MAP < 120 mmHg
Up to a maximum rate of 80mL / hour (=160 mg / hour).

Labetalol is unlicensed for intravenous use at concentrations of 2mg/mL but it is necessary to enable potential maximum intravenous doses and maintain fluid restrict to 85ml/hr. (Intravenous Labetalol used in the above concentrations is therefore the responsibility of the prescribing practitioner).

If diastolic falls < 90 mmHg reduce rate every 30 minutes
Target: Keep Diastolic about 90 mmHg but MAP < 120 mmHg

N.B. Excessive maternal bradycardia may be seen rarely with labetalol, particularly with bolus treatment. This can be treated with IV atropine sulphate in divided doses of 600 micrograms to a maximum of 2400 micrograms. The on-call anaesthetist should be called if significant bradycardia is identified.

If the blood pressure is very high (Systolic >170mmHg) labetalol can be administered at the discretion of the senior obstetrician on site as a bolus; 50mg (10mL of 5mg/mL ampoule) given slowly over one minute, repeated after 5 minutes if needed, to a maximum of four doses.

Alternative antihypertensives are:
- Oral nifedipine - 10mg stat repeated 6 hourly to maintain target blood pressure or
- Intravenous hydralazine – 5 to 10mg IV by slow intravenous injection stat repeated at 20-minute intervals with 5mg doses. If necessary an infusion may be used – starting at 2mg/hour with a maximum of 20mg/hour.
- If intravenous hydralazine is used then a bolus of intravenous crystalloid (250- 500mls) may be used to prevent hypotension in the antenatal period.

2.6 Fluid Balance in Severe Pre-eclampsia and Eclampsia

2.6.1 Antenatal Fluid Management
Careful fluid balance is aimed at avoiding fluid overload. Total fluid input should be limited to 85ml/hour (approximately 1ml/kg/hr) this total includes oral input which should not exceed 30mls/hour given the higher risk of caesarean section.

For Example - If syntocinon® is used it should be at high concentration and the volume of fluid included in the total input.

2.6.2 Postpartum Fluid Management
Following delivery the woman should be fluid restricted in order to wait for the natural diuresis which occurs sometime around 36-48 hours post delivery. Total intravenous fluid should be given at 85 ml/hr: Hartmanns solution or equivalent plus other infusions of drugs.

Oral fluids should be restricted, particularly prior to the diuresis at 36-48 hours. Once tolerating more than 85ml/hour oral fluids IV fluids can be stopped. Urine output should be recorded hourly and each 4-hour block should be totalled and recorded on the chart. Each 4-hour block should total in excess of 100 ml. If two consecutive 4-hour blocks fail to achieve 100ml each then further action as detailed below is appropriate.
**EITHER**

1) If total input is more than 750 ml in excess of output since delivery or in the last 24 hours (whichever is the shorter) then 20 mg of IV frusemide should be given

**OR**

2) If total input is less than 750 ml in excess of output since starting delivery or in the last 24 hours (whichever is the shorter) then an infusion of 250ml of Isoplex® over 20 minutes should be given. The urine output should then be watched until the end of the next four-hour block. If the urine output is still low then 20mg of IV frusemide should be given. If after the frusemide a diuresis in excess of 250 ml occurs in the next hour the fluid should be replaced with 250ml of Isoplex® in addition to baseline fluids.

If the urine output fails to respond to frusemide in either situation then advice from a consultant renal physician should be sought.

**2.6.3 Indications for Central Venous Pressure (CVP) Monitoring**

A CVP may be indicated if blood loss is excessive or delivery is complicated by other factors such as abruptio placentae.

The Confidential Enquiry 2000-2002 suggested a lower threshold for central monitoring. In cases where close fluid balance measurements are likely to be inaccurate due to the difficulties of measuring blood loss early recourse to CVP monitoring would be appropriate. This should be a multidisciplinary decision and the Consultant Anaesthetist and Obstetrician should be involved.

**2.6.4 Special Problems**

If persisting oliguria requiring fluid challenge or frusemide occurs then the electrolytes need to be carefully assessed and checked six hourly. If there is concern over a rising creatinine and or potassium the case should be discussed with a consultant renal physician.

If the woman has dropping oxygen saturation it is most likely to be due to fluid overload and pulmonary oedema. Input and output should be assessed together with either clinical or invasive assessment of the fluid balance. However the most appropriate treatment is likely to be frusemide and oxygen. If there is no diuresis and the oxygen saturation does not rise then renal referral should be considered.

Cases requiring large volumes of colloid such as fresh frozen plasma, blood or platelets can lead to fluid overload. Significant haemorrhage or HELLP needs to be managed by someone with plenty of experience. It is never difficult putting more fluid in, but getting it out can be a real problem. CVP line would be essential to help guide fluid management in these cases.
2.7 **Prevention / Control of Eclamptic Seizures**

Eclampsia is an epileptiform seizure - the exact pathophysiology is not clear. Magnesium sulphate is used to treat and prevent eclamptic seizures in patients with severe pre-eclampsia and eclampsia.

Loading dose of magnesium sulphate 4 g i.v. (*slowly* over 10 minutes).

Dilute one magnesium Sulphate B.P. (5g in 10 mls ampule) with 10 ml water for injection to a total volume of 20 ml in a 20 ml syringe. Give manually 16 mls of this solution as loading dose (N.B. 1 g = 4 ml of this dilution)

**Maintenance dose:**

Use 1 g per hour (if urine output < 100 ml / 4 hrs, reduce to 0.5 g per hour).

(Dilute two magnesium Sulphate B.P. (5g in 10 mls ampoules), with 30 ml water for injection to total 50 ml in a 50 ml syringe).

N.B. 5 ml (= 1 g) per hour in syringe driver (50 ml syringe)

2.5 ml (= 0.5 g) per hour in syringe driver (50 ml syringe)

Infusions of magnesium sulphate are continued for 24 hours post loading dose or delivery which ever comes first

**Further seizures:**

If a further seizure occurs 2 g IV magnesium sulphate can be given. If seizures continue patient should be managed in intensive care and consideration given to CT imaging of brain and liaison with Walton Centre for Neurology.

**Alterations to maintenance dose:**

- **Oliguria** (<100 ml / 4 hours) reduce maintenance dose to 0.5 g / hr (= 2.5 ml / hr)

- **Urea** (>10 mmol / l) reduce maintenance dose to 0.25 g / hr (1.25 ml / hr) and check blood magnesium level every 2 - 4 hours

- **ALT** (>250 international units / l) measure magnesium levels every 2 - 4 hours

**Levels of Mg S0₄ at which adverse effects occur:**

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<th>Symptoms</th>
<th>Level magnesium sulphate mmol/l</th>
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<tr>
<td>Warmth/flushing/diplopia/slurred speech</td>
<td>3.8-5.0</td>
</tr>
<tr>
<td>Loss of tendon reflex</td>
<td>&gt;5.0</td>
</tr>
<tr>
<td>Respiratory depression</td>
<td>&gt;6.0</td>
</tr>
<tr>
<td>Respiratory arrest</td>
<td>6.3-7.0</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>&gt;12</td>
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Pre-eclampsia and eclampsia – clinical guideline, v7

Principal author: M Ellard

Approved by Medicines Clinical Guideline Subcommittee: February 2013
If the above occurs magnesium sulphate infusion should be stopped immediately and in the event of a cardiorespiratory arrest the antidote to magnesium sulphate is calcium gluconate 10mls of 10% given IV over 10 minutes.

2.8 Fetal Assessment and Delivery Planning
The decision on timing and mode of delivery is dependent on;

- Maternal condition (eclampsia, blood pressure control, blood results, signs of neurological compromise)
- Gestational Age
- Fetal wellbeing – monitoring may include ultrasound scan for growth restriction, biophysical profile including fetal doppler studies and amniotic fluid volume or continuous CTG. The extent of fetal wellbeing will be determined by gestational age, maternal wellbeing and if the mother is antenatal or in labour.
- Bishop score
The timing and mode of delivery is decided by the consultant obstetrician, once the above assessment has been made and a documented plan of care is written in the health care record.

2.9 Thromboprophylaxis
Women with severe pre-eclampsia/eclampsia are at high risk of venous embolism. All women placed on the pre-eclampsia protocol should have a minimum of TED stockings and low molecular weight heparin (LMWH) prescribed this should be based on a consultant’s decision.

2.10 Third stage of labour
Syntoncinon® 5 units/IV should be used for the third stage of labour as syntometrine® is contraindicated in the cases of women with hypertension.

2.11 Postnatal Follow Up
Postnatally most women’s blood pressure will return to normal within a couple of days. Any woman who developed severe PET/eclampsia will be reviewed by a senior obstetrician before ward discharge and where appropriate a plan of care will be documented.

The majority of women who do require postnatal antihypertensives can be managed by their general practitioner. However in certain cases a consultant postnatal follow-up is more appropriate, as listed below:

- Early onset PET (<34 weeks)
- Development of renal complications – persistent proteinuria
- Eclampsia or neurological complications
- Suspicion of underlying maternal disease
- Maternal request
- Consultant request
3.0 REFERENCES


4.0 RELATED DOCUMENTS
Not applicable