

Document No: 196593

This is a controlled document. The electronic version of this document is the most up to date and in the case of conflict the electronic version prevails over any printed version. This document is for internal use only and may not be accessed or relied upon by 3rd parties for any purpose whatsoever.

TITLE: Pre-Eclampsia/Eclampsia Guideline

1. Purpose

Severe pre-eclampsia and eclampsia are relatively rare but serious, potentially life threatening, complications of pregnancy.

The aim of this guideline is to standardise the approach to the management of severe pre-eclampsia and eclampsia in the immediate pre and post delivery interval in order to improve the outcome for the mother and child.

Description

Hypertension in pregnancy is defined as:

Systolic BP \geq 140 mmHg and/or Diastolic BP \geq 90 mmHg (Korotkoff 5)

- Moderate Hypertension – diastolic BP \geq 100 mmHg on two occasions
- Severe hypertension - diastolic BP \geq 110 mmHg or sBP \geq 170 mmHg on two occasions
- Proteinuria \geq 0.3g of protein on 24 hour or PCR \geq 30 on spot urine
- Significant proteinuria \geq 1g/24 hrs
- Pre-eclampsia - Pregnancy induced hypertension in association with proteinuria
- Severe pre-eclampsia - Severe hypertension plus significant proteinuria or Moderate hypertension plus significant proteinuria with >2 other symptoms
- Eclampsia - one or more convulsions super imposed on pre-eclampsia
- HELLP Syndrome - Haemolysis, elevated liver enzymes and low platelet count

Clinical features of severe pre-eclampsia (in addition to hypertension and proteinuria) are:

- Symptoms of severe headache
- Visual disturbance
- Epigastric pain and / or vomiting
- Signs of clonus
- Papilloedema
- Liver tenderness
- Platelet count falling below 100×10^6 per litre
- Abnormal liver enzymes (ALT or AST rising to above 70 IU/L is clinically significant)
- HELLP Syndrome

Lakes District Health Board Maternity Services		Key Word: Pre-Eclampsia / Eclampsia, Preeclampsia		Document Number: 196593	
Authorised by: Dr Simon Ewen	Issue Date: March 2015	Review Date: March 2017	Version: 3	Page 1 of 12	

2. Scope

All Lakes District Health Board medical and midwifery staff

3. Definitions

ALT Alanine Transaminase
AST Aspartamine Transaminase
CTG Cardiotocograph
CVP Central Venous Pressure
ICU Intensive Care Unit
IV Intravenous
MSU Mid Stream Urine
PET Pre-eclampsia
SHO Senior House Officer

4. Procedure/Management

- General Principles

Senior Obstetric and Anaesthetic staff and experienced midwives should be involved in the assessment and management of women with severe pre-eclampsia and eclampsia. **The Consultant Obstetrician must be informed when such patients are admitted to hospital.**

- Symptoms

- Visual disturbance
- Headache
- Epigastric pain

- Signs

- Raised blood pressure
- Significant proteinuria, urine protein/creatinine ratio ≥ 30 mg/mmol
- Non dependent oedema, ie. hands and face
- Optic fundi (for haemorrhage)
- Hyper-reflexia, particularly sustained ankle clonus
- Liver edge or epigastric tenderness

Lakes District Health Board Maternity Services		Key Word: Pre-Eclampsia / Eclampsia, Preeclampsia		Document Number: 196593	
Authorised by: Dr Simon Ewen	Issue Date: March 2015	Review Date: March 2017	Version: 3	Page 2 of 12	

- When taking a blood pressure, the woman should be rested and sitting at a 45° angle. The blood pressure cuff should be of the appropriate size and should be placed at the level of the heart. Multiple readings should be used to confirm the diagnosis. Korotkoff phase 5 is the appropriate measurement of diastolic blood pressure. The method used should be consistent and documented. Automated methods need to be used with caution as they may give inaccurate blood pressure readings in pre-eclampsia.

- Investigations

- Urinary Protein - Significant proteinuria = PCR \geq 30 mg/mmol
- MSU
- Strict fluid balance from admission monitoring input and output
- Ensure a current group and screen is available
- Full blood count and platelets
- Serum urate (\geq 0.36 mmol/l at term is pathological) upper limit = 0.0 number of weeks, eg 32 weeks = 0.32, maximum is 0.36.
- Renal function tests (serum creatinine > 90 mmol/l is abnormal)
- Liver function tests
- **Blood tests are to be taken as instructed by Senior Obstetrician**
- **Only do Coag screen if platelets are less than 150 or there is a significant fall**

- Assessment of the Fetus

Clinical – confirm gestation against early scans:

- Symphysis fundal height
- Fetal movements

Investigations:

- CTG
- Ultrasound scan for presentation, estimated fetal weight plotted on customised growth chart and liquor volume
- Umbilical artery doppler studies, if appropriate

Women in labour with severe pre-eclampsia should have continuous electronic fetal monitoring.

Conservative management requires CTG's 3 times a week, Growth ultrasound every two weeks, doppler and liquor volumes weekly.

Lakes District Health Board Maternity Services		Key Word: Pre-Eclampsia / Eclampsia, Preeclampsia		Document Number: 196593	
Authorised by: Dr Simon Ewen	Issue Date: March 2015	Review Date: March 2017	Version: 3	Page 3 of 12	

Indications for delivery in women with preeclampsia or gestational hypertension

Maternal	Fetal
Gestational age \geq 37 weeks	Placental abruption
Inability to control hypertension	Severe FGR
Deteriorating platelet count	Non-reassuring fetal status
Intravascular haemolysis	
Deteriorating liver function	
Deteriorating renal function	
Persistent neurological symptoms	
Persistent epigastric pain, nausea or vomiting with abnormal LFTs	
Pulmonary edema	

- Treatment of Acute Hypertension (Refer Appendix I)

When systolic blood pressure is \geq 170 mmhg or diastolic blood pressure \geq 110 mmhg, treat as indicated. In women with other markers of potentially severe disease, treatment can be considered at lower degrees of hypertension.

Agents:

- Labetalol (oral or IV)
- Nifedipine orally
- Hydralazine IV

Any of these agents can be used for acute management of severe hypertension. Labetalol has the theoretical advantage that it can be given initially by mouth in severe hypertension and then, if needed, intravenously. **The Consultant Obstetrician or Registrar must be informed if blood pressure requires acute treatment.**

Management should be discussed with the consultant as presently the choice of agent may also be influenced with the familiarity of the specialist with a particular drug. **Target blood pressure less than 100 diastolic but not less than 90.** Continuous CTG monitoring during treatment.

Lakes District Health Board Maternity Services		Key Word: Pre-Eclampsia / Eclampsia, Preeclampsia		Document Number: 196593	
Authorised by: Dr Simon Ewen	Issue Date: March 2015	Review Date: March 2017	Version: 3	Page 4 of 12	

- Dosage

Nifedipine

10mg orally, recheck blood pressure after 30 minutes and repeat dose if necessary. 10mg can be given orally every 30 minutes as necessary if blood pressure \geq 170 / 110 (max 40mg in total). Nifedipine should not be given sublingually. Do not use the slow release formulation.

Labetalol (contraindicated in asthmatics)

Initial dose of 100mg orally, recheck blood pressure after 30 minutes. If blood pressure \geq 170/110 a second oral dose of 100mg can be given. If there is no response then give Labetalol 50mg (10mls) bolus IV slowly over two minutes. Start Labetalol infusion via infusion Pump. 400mgs (4 ampules) added to 20mls of normal saline (remove 80mls from a 100ml bag of saline) to give a total volume of 100mls at concentration of 4mgs/ml. Start at 15mls / hour (1mg per minute), increasing by 15ml every 30 minutes to a maximum of 45mls / hour (3mg per minute).

Hydralazine (Contraindicated in SLE)

Initial control 5-10mg IV bolus initially and 5mg every 30 minutes until diastolic blood pressure < 100mmhg. After 20mg use second drug if blood pressure remains elevated above 160 / 110.

Maintenance: 2.5 – 5.0mg IV every 30 minutes as necessary if blood pressure \geq 170 / 110.

For all three agents the onset of effect should occur within 20 – 30 minutes. Diastolic blood pressure should ideally be maintained between 90 – 100mmhg. Refer Table on page 4.

A precipitous fall in blood pressure can be associated with a risk of placenta ischaemia and foetal compromise. Employ CTG monitoring during treatment.

Ongoing treatment for hypertension

Treatment of mild to moderate hypertension in the range 140-160/90-100 should be considered as option, above these levels treatment mandatory.

Atenolol, angiotensin converting enzyme inhibitors (ace inhibitors), angiotension-blocking drugs (ARB) and diuretics should be avoided.

- Eclampsia / Severe Pre-Eclampsia (Magnesium Sulphate)
(Refer Appendix I)

Magnesium Sulphate (no longer Diazepam) is the drug of choice for severe pre-eclampsia and eclampsia. It should also be considered for women with pre-eclampsia for whom there is concern about the risk of eclampsia.

Lakes District Health Board Maternity Services		Key Word: Pre-Eclampsia / Eclampsia, Preeclampsia		Document Number: 196593	
Authorised by: Dr Simon Ewen	Issue Date: March 2015	Review Date: March 2017	Version: 3	Page 5 of 12	

Basic principles of Airways, Breathing and Circulation apply for the acute eclamptic fit. All patients should have continuous pulse oximetry.

- Drug Action

Magnesium Sulphate depresses the central nervous system and controls convulsions by blocking neuromuscular transmission. It also has a mild diuretic effect and a slight hypotensive action.

- Uses

- Eclampsia
- Prophylactially in severe pre-eclampsia to prevent seizures i.e. severe PET

- Presentation

There is an eclampsia emergency box kept in drug room on birthing unit.
49.3% MgSO₄ in 5ml ampoules (2.47gms per 5ml, or = 1g per 2ml)

- Drug Incompatibilities

- Aminophylline
- Sodium Bicarbonate
- Any Calcium preparation
- Chlorpromazine
- Potentiates all muscle relaxants which may be given in general anaesthetic for caesarean section, necessitating full reduced dosage

- Contraindications

Renal impairment

Relative contraindications in patients with:

- Heart conditions
- Any degree of heart block

- Dose

Loading dose by giving 4gms IV over 5-10 minutes by slow IV bolus (8mls of 49.3% MgSO₄ Sulphate diluted with 32mls of normal saline to a total volume of 40mls).

Lakes District Health Board Maternity Services		Key Word: Pre-Eclampsia / Eclampsia, Preeclampsia		Document Number: 196593	
Authorised by: Dr Simon Ewen	Issue Date: March 2015	Review Date: March 2017	Version: 3	Page 6 of 12	

- Maintenance Infusion

Establish a maintenance infusion of 1gm per hour, ie. Draw 40mls of MgSO₄ (8 amps) into a 50mls syringe and infuse via a syringe driver at 2mls/hr = Mg 1g. Attach MgSO₄ infusion to the mainline infusion.

Magnesium Sulphate is usually continued for 24 hours post delivery.

Provided that the renal function is adequate, with this regime there is no need for magnesium levels as it is almost impossible to produce toxic levels of magnesium.

Stop infusion and call obstetrician if any of the following occur:

- Urinary output remains <30mls per hour (Magnesium Sulphate is excreted by the kidneys)
- The knee jerk reflexes disappear
- Respiratory rate falls below 16 breaths per minute
- SPO₂ falls below 94%

In this circumstance the SHO should send blood for immediate serum magnesium levels. The therapeutic range is 1.7 – 3.5mmol / litre. Abolishment of knee jerk 3.5mmol / litre, respiratory arrest 5 – 7.5mmol / litre. Cardiac arrest 15mmol / litre.

If there are major concerns over respiratory depression, consider calcium gluconate 10% (1g/10ml). Give 10ml over 10 minutes IV.

Meticulous control of the infusion is mandatory

- Antidote

If loss of knee jerk does not return within one hour of stopping the Magnesium Infusion or respiratory depression is observed, immediately call the Consultant. Administer 1gm of Calcium Gluconate IV (10mls of 10% solution) over three minutes intravenously.

- Monitoring

- Midwife special until delivery and for the first 24 hours post partum
- Half hourly blood pressure, pulse and respirations until stable, then hourly
- Fluid balance record
- Indwelling urinary catheter with hourly urine measurements
- Patellar tendon reflex should be monitored hourly for its presence
- Four hourly temperature recordings

Lakes District Health Board Maternity Services		Key Word: Pre-Eclampsia / Eclampsia, Preeclampsia		Document Number: 196593	
Authorised by: Dr Simon Ewen	Issue Date: March 2015	Review Date: March 2017	Version: 3	Page 7 of 12	

- Recurrent Eclampsia (Fits)

Further fitting after the first seizure should be managed by either giving a further bolus of 2gms Magnesium Sulphate (4mls of 49.3% MgSO₄ Sulphate diluted with 16mls of normal saline to a total volume of 20mls) or an increase in the infusion rate to 1.5g or 2.0g/ hour. Serum levels should be checked in this situation. This is also an indication to consider the patient for admission to ICU. Consultant Obstetrician and Anaesthetist to be consulted to take responsibility for decision making.

- Criteria for Transfer to ICU

Anaesthetic and Obstetric Consultant and duty midwife should always jointly discuss possible transfer to ICU. These indications will almost always be after the delivery of the baby.

- Persisting convulsions
- Blood pressure > 170 systolic, > 110 diastolic despite Nifedipine and Labetalol
- Pulmonary oedema with oliguria
- Compromised myocardial function
- Deteriorating coagulopathy, renal or hepatic function.

- Fluid Management

- **Introduction**

Women with severe pre-eclampsia typically have a deficit in their intravascular volume of about a litre and additional deficits can occur due to decreased intake, blood loss, increase requirements, eg. labour. Adequate circulating intravascular volumes are assumed when the urine output of >30mls per hour occurs. This urine output is adequate to maintain renal perfusion and imposes no risk of acute tubular necrosis.

- **Maintenance Fluids**

Fluid restriction is advisable to reduce the risk of fluid overload in the intrapartum and post partum periods. In usual circumstances total fluids should be limited to 80mls / hour or 1ml / kg / hr. Thereafter, fluid management as per Fluid Management Flow Chart (Appendix I).

- **Analgesia During Labour**

Severe pre-eclampsia is not a contraindication for epidural and analgesia providing the platelet count is > 100. Any woman with a lower platelet count or abnormal clotting should be discussed with the consultant and anaesthetist. Caesarean section requires a platelet count > 50 and transfusion may be necessary under CVL control.

Lakes District Health Board Maternity Services		Key Word: Pre-Eclampsia / Eclampsia, Preeclampsia		Document Number: 196593	
Authorised by: Dr Simon Ewen	Issue Date: March 2015	Review Date: March 2017	Version: 3	Page 8 of 12	

All women with proteinuria hypertension should have these indices checked on admission to the birthing unit otherwise delay in implementing epidural analgesia may occur.

- **Third Stage in Post Partum Management**

Third stage should be managed with 5 units of IV Syntocinon given slowly. Ergometrine or Syntometrine should not be given as this can further increase the blood pressure.

If syntocinon infusion indicated 40u in 500ml saline over 125 ml/hour.

If there is post partum haemorrhage due to atony use Carboprost 250 micrograms intramuscularly or intramyometrial.
Refer PPH guidelines.

After delivery mothers who have been on the protocol, should be kept under observation in the Birthing Unit or ICU until the condition stabilises, with careful monitoring of blood pressure, fluid balance and symptoms.

Anti-hypertension treatment should be continued. VTE prophylaxis required per guideline, care with thrombocytopenia.

Remember that after delivery, pre-eclampsia often gets worse before it gets better. 44% of eclampsia occurs post partum and therefore women should have a careful review before discharge from hospital.

Anti hypertensive medication should be continued after delivery as dictated by the blood pressure. It may be necessary to remain on treatment for up to three months, although most women can have treatment stopped before this.

Women with persisting hypertension and proteinuria at six weeks may have renal disease and should be considered for further investigation. Most women with severe pre-eclampsia or eclampsia will need inpatient care of a minimum of four days following delivery.

- **Postnatal Follow Up**

An assessment of blood pressure and proteinuria via the General Practitioner over six weeks postnatal checks are recommended. If hypertension or proteinuria persists then further investigation is recommended.

Women whose pregnancies have been complicated by severe pre-eclampsia or eclampsia should be offered a formal postnatal review to discuss the events of the pregnancy.

Lakes District Health Board Maternity Services		Key Word: Pre-Eclampsia / Eclampsia, Preeclampsia		Document Number: 196593	
Authorised by: Dr Simon Ewen	Issue Date: March 2015	Review Date: March 2017	Version: 3	Page 9 of 12	

Pre-conceptual counselling should be offered in any future pregnancy so the events that occurred, any risk factors, and preventative therapies can be discussed.

- Intra-Uterine Transfer

If intra-uterine transfer is deemed safe and necessary, then the following applies:

- If preterm delivery is likely to be imminent after transfer and the gestational age is > 25 weeks and < 34 weeks, the first dose of steroids should be given prior to transfer
- The patient's blood pressure and condition should be stabilised and thoroughly assessed before a decision is made to transfer
- The patient should be transferred with an appropriately qualified doctor in attendance
- On occasions an anaesthetist may need to accompany the woman
- Resuscitation equipment for the transfer is required
- The mode of transport will depend on local circumstances but in general the most rapid of mode should be used

Medical Equipment for Transit

- Pulse Oximetry
- Oxygen cylinder / masks
- Syringes / needles
- Magnesium Sulphate
- Nifedipine capsules
- Diazepam (for intravenous injection)
- BBA transfer bag

Observations in Transit

- 15 minute observation
- Blood pressure
- Pulse
- Respiratory rate
- Level of consciousness if the woman has had sedation

Lakes District Health Board Maternity Services		Key Word: Pre-Eclampsia / Eclampsia, Preeclampsia		Document Number: 196593	
Authorised by: Dr Simon Ewen	Issue Date: March 2015	Review Date: March 2017	Version: 3	Page 10 of 12	

5. Equipment Used

- Pre-eclampsia box containing required equipment and drugs is kept in Birthing Unit dispensary.

6. Related Documentation

- Appendix 1: IV Administration of Magnesium Sulphate (MgSO₄) for Pre-Eclampsia and Eclampsia
- ICU neuro chart
- Transfer document

7. References

- Hypertension in pregnancy NICE clinical guideline 107 January 2011
- The SOMANZ guideline for the management of Hypertensive disorders of pregnancy 2014

Authorised by:

Dr Simon Ewen
Head of Department, Obstetrics/Gynaecology

Lakes District Health Board Maternity Services		Key Word: Pre-Eclampsia / Eclampsia, Preeclampsia		Document Number: 196593	
Authorised by: Dr Simon Ewen	Issue Date: March 2015	Review Date: March 2017	Version: 3	Page 11 of 12	

Processed by: Kavitha K

APPENDIX I

Appendix 1: IV Administration of Magnesium Sulphate (MgSO₄) For Pre-Eclampsia and Eclampsia

OBSERVATIONS

Keep patient nil by mouth. Nurse in a quiet, dark room. Restrict visitors to prevent worsening of Cerebral irritation
Use ICU Observation sheet
Continuous Oxygen saturation (SpO₂) maintain above 94%
Initially record Pulse, Blood Pressure, Respirations Every 15 minutes (Hourly Vital signs once Stable) 4 hourly Temperature
Vital signs more frequently if abnormal eg: Severe hypertension
Hourly Urine Output
Continuous Fetal Monitoring if antenatal

LOADING DOSE

Draw 8 mls (4g) of 49.3% MgSO₄ (need 2 ampoules) into a 50ml syringe
Add 32mls of Normal saline = 40mls
Give IV bolus dose slowly over 5-10 minutes
Should be administered by the Obstetrician /SHO

MAINTENANCE INFUSION

Infuse Mainline Hartmanns Solution at 78mls / hr via Baxter Pump
Draw 40mls of MgSO₄ (8 amps) into a 50mls syringe and infuse via a syringe driver at 2mls/hr = 1g (Obtain Syringe driver from SCBU)
Attached MgSO₄ infusion to the mainline infusion.
Total fluid intake should be 80mls/hr (IV and Oral)
Stop infusion if respiratory rate < 16 or loss of patellar reflex or urinary output < 30ml/hr

BLOOD TESTS

6 hourly Blood Tests CBC, U & E, Creatinine, LFT's, Uric Acid, (State the above on the Blood Form) Group and hold if not done already Coagulation if Platelets are <100

ANTIDOTE

If Respiratory rate is < 12 or Loss of Patellar tendon reflex for > 1 hr Give Calcium Gluconate 1g = 10mls IV over 3 mins should be administered by The Obstetrician / SHO

Lakes District Health Board Maternity Services	Key Word: Pre-Eclampsia / Eclampsia, Preeclampsia	Document Number: 196593		
Authorised by: Dr Simon Ewen	Issue Date: March 2015	Review Date: March 2017	Version: 3	Page 12 of 12