This booklet has been published by the Clinical Resource Efficiency Support Team (CREST).

CREST is a small committee of health care professionals established in 1988, under the auspices of the Central Medical Advisory Committee, to promote clinical efficiency in Northern Ireland while ensuring that the highest possible standard of care is maintained.

CREST wishes to thank Dr Harmini Sidhu, Consultant Obstetrician at Craigavon Area Hospital and the sub-group for producing the guidelines.

Further copies of this booklet can be obtained from:

The CREST Secretariat
Room 517
Dundonald House
Upper Newtownards Road
BELFAST BT4 3SF

Tel: 028 9052 4391

You can visit the CREST website at: www.n-i.nhs.uk/crest

ISBN 1-903982-01-4
# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 PREFACE</td>
<td>1</td>
</tr>
<tr>
<td>2.0 MANAGEMENT OF SEVERE PRE-ECLAMPSIA</td>
<td>2</td>
</tr>
<tr>
<td>3.0 MANAGEMENT OF IMMINENT ECLAMPSIA or ECLAMPSIA</td>
<td>6</td>
</tr>
<tr>
<td>3.1 General Measures</td>
<td>6</td>
</tr>
<tr>
<td>3.2 Medication for the Management of Seizures</td>
<td>7</td>
</tr>
<tr>
<td>3.3 Magnesium Sulphate Prophylaxis in Pre-eclampsia</td>
<td>9</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>10</td>
</tr>
<tr>
<td>RECOMMENDED READING</td>
<td>11</td>
</tr>
<tr>
<td>APPENDICES</td>
<td></td>
</tr>
<tr>
<td>Appendix 1 - Algorithm for the Management of Imminent Eclampsia or Éclampsia</td>
<td>12</td>
</tr>
<tr>
<td>Appendix 2 - Abbreviations</td>
<td>13</td>
</tr>
<tr>
<td>Appendix 3 - Emergency Box for Eclampsia</td>
<td>14</td>
</tr>
<tr>
<td>Appendix 4 - Patient Information</td>
<td>15</td>
</tr>
<tr>
<td>Appendix 5 - Membership of the CREST Sub-Group on the Management of Severe Pre-Eclampsia and Eclampsia</td>
<td>16</td>
</tr>
</tbody>
</table>

All statements in “italics” are direct quotes from the stated references
1.0 Preface

Obstetric emergency guidelines are drawn up to improve the consistency of management of pregnant women and their unborn children. As different teams of doctors and midwives are involved in the management of emergencies, standardisation should improve the efficiency of the unit. **They are not intended to replace the process of critical evaluation of every case and individualised decision making.** Consultant staff should always be involved in the decisions taken in the management of all obstetric emergencies but until such time as they are informed and available, these guidelines will help midwives and junior staff initiate immediate management.

"Women with pre-eclampsia, in common with others who have poorly understood diseases, have suffered from many treatments that ultimately turned out to be ineffective or even harmful, but which were difficult to question when they were in common use. ...Hardly any mothers or babies die directly from a first convulsion in hospital; they die, if at all, from the underlying disease"¹

These guidelines have been collated from what is currently practised in Labour Wards in Northern Ireland, using RCOG guidelines and evidence-based information where possible. As such, they will be open to audit as recommended in "Why Mothers Die".²

Review Date: 2004
2.0 MANAGEMENT OF SEVERE PRE-ECLAMPSIA

1. **Consider admission**
   - Systolic BP \( \geq 160 \text{ mmHg} \), or if
   - Diastolic BP \( \geq 100 \text{ mmHg} \), or if
   - Hypertension and proteinuria \( \geq + \), or if
   - Presence of symptoms, e.g., epigastric pain, with hypertension +/- proteinuria

2. **Inform:**
   - Obstetric registrar and consultant
   - Paediatric registrar and consultant
   - Anaesthetic registrar and consultant

3. **Assess & Monitor:**
   - Blood pressure
   - Generalised oedema
   - Symptoms
   - Optic fundi
   - Reflexes +/- clonus
   - Test urine for protein
   - Urinary output
   - Fluid balance charts

   Fetal cardiotocograph & ultrasound scan on admission
   Doppler studies if available

4. **Investigate:**
   - Blood: FBP & platelets
     - U & E
     - Urate
     - LFTs
     - Coagulation screen
     - Group & hold serum
   - Urine: MSSU
     - 24-hour urine collections for:
       - total protein and creatinine clearance
       - catecholamines
5. Principles of Management:

- **Treat hypertension if:**
  
  - Systolic BP ≥ 170 mmHg, or if
  - Diastolic BP ≥ 110 mmHg, or if
  - Mean Arterial Pressure ≥ 125 mmHg

  Aim to reduce BP to around 130-140/90-100 mmHg

  A rapid and precipitous fall in maternal blood pressure or maternal hypotension as a result of intravenous anti-hypertensive drugs may cause fetal heart rate abnormalities, especially in growth restricted/compromised fetuses

  Monitor FH with continuous CTG during and after administration of intravenous drugs for 30 minutes

**Drugs:**

**Hydralazine:** 10 mg IV slowly
Repeat doses: 5 mg IV at 20 minute intervals may be given if necessary (the effect of a single dose can last up to 6 hours)
If no lasting effect with boluses (assess over 20 minutes), consider an infusion at 2.0 mg/hour increasing by 0.5 mg/hour as required (2-20 mg/hour usually required)

**Close liaison with anaesthetists: may require plasma expansion**

**Labetalol:** If BP still uncontrolled, Labetalol 50 mg IV slowly; if necessary repeat after 20 minutes or erect IV infusion of 200 mg in 200 ml N Saline, starting at 40 mg/hour, increasing dose at 1/2 hourly intervals as required to a maximum of 160 mg/hour

If blood pressure does not respond to the above, discuss with senior renal physicians and anaesthetists

**Use of Nifedipine Antepartum:** Decision to administer nifedipine should be made by consultant staff
Oral route is safer and as effective as sublingual route
Dose: 10 mg orally. Monitor FH with CTG

**NOTE:** An interaction between nifedipine and magnesium sulphate has been reported to produce profound muscle weakness, maternal hypotension and fetal distress ³, ⁴, ⁵
• Initiate steroids if gestation $\leq$ 34 weeks (RCOG Guidelines) ⁶

• Consider the need for anticonvulsant therapy if eclampsia imminent

• Principles of fluid balance:

**BEWARE:** Iatrogenic fluid overload is the main cause of maternal death in Pre-eclampsia/Eclampsia ³

Maintenance fluids should be given as crystalloid but additional fluid (colloid) may be necessary prior to vasodilatation to prevent maternal hypotension and fetal compromise.⁷

Consideration should also be given to correcting hypovolaemia in women with oliguria

1. **Accurate recording of fluid balance** (including delivery and postpartum blood loss, input/output deficit)
2. **Maintenance crystalloid infusion** - 85 ml/hour, or urinary output in preceding hour plus 30 ml ⁷
3. **Selective colloid expansion** - prior to pharmacological vasodilatation; oliguria with low CVP
4. **Diuretics** - only for women with confirmed pulmonary oedema
5. **Selective monitoring of CVP**

• Consider the need for in utero/neonatal transfer: ⁷,⁸

If a maternity unit does not have access to HDU/ICU or is unable to cope with maternal complications, or is unable to cope with pre-term babies, it may be appropriate to consider antenatal transfer of the mother. However, maternal safety must not be jeopardized and each case should be considered on its clinical merits; in some cases it is safer to deliver the mother and then consider the need for transfer of mother and/or child

“Referral to a regional centre for advice and/or assistance should be considered in all cases of eclampsia, particularly where there are maternal complications” ⁷
• Delivery

**A team effort involving obstetricians, midwives, anaesthetists and paediatricians**

- The need for delivery is dependent on the maternal and fetal condition. Either caesarean section or induction of labour may be appropriate depending on the clinical findings.
- In eclampsia, the definitive treatment is delivery.
- “However, **it is inappropriate to deliver an unstable mother even if there is fetal distress.** Once seizures are controlled, severe hypertension treated and hypoxia corrected, delivery can be expedited”
- Ergometrine should not be used in severe pre-eclampsia and eclampsia.
- If delivery is by caesarean section: antibiotic prophylaxis.
- Consider prophylaxis against thromboembolism (RCOG Risk Assessment Guidelines).

**An early combined obstetric and anaesthetic approach to monitoring and management provides optimal care**

• **Principles of care after delivery**

- Maintain vigilance as the majority of eclamptic seizures occur after delivery.
- High dependency care should be provided as clinically indicated (24 hours minimum).
- Consider the need for admission to ICU.
- Monitoring should be undertaken by experienced staff: nurse/midwife should be allocated to provide one to one care, with input from senior medical staff.
- Maintain close attention to fluid balance.
- Reduce anti-hypertensive medication as indicated.

• **Follow-up**

- Long-term follow-up to make sure that blood pressure resolves.
- Specific investigations: anti-phospholipid antibodies, lupus anticoagulant and thrombophilia screen. If eclampsia has occurred, consider CT scan of head.
- Discussion with mother concerning what has happened and its significance for the future.
- Inform general practitioner and community midwives.
3.0 MANAGEMENT OF IMMINENT ECLAMPSIA OR ECLAMPSIA

3.1 General Measures

DO NOT LEAVE PATIENT ALONE

CALL FOR HELP - duty obstetric & anaesthetic registrars; senior midwife

INFORM CONSULTANTS - obstetrician & anaesthetist on call

Is it safe to approach the patient? - consider hazards around patient that will affect your safety

Prevent maternal injury during convulsion - place in semi-prone position

- **Airway:**
  - Assess
  - Maintain patency
  - Apply oxygen

- **Breathing:**
  - Assess
  - Protect airway
  - Ventilate as required

- **Circulation:**
  - Evaluate pulse & BP
  - If absent, initiate CPR and call arrest team
  - Left lateral tilt
  - Secure IV access as soon as safely possible
  - Attach pulse oximeter, ECG & automatic BP monitors

  - Urinary catheter - hourly urinometer readings
  - Fluid input / output chart

Observations & Investigations:

- As per Management of Severe Pre-eclampsia
- Consider blood gases

Check for aspiration:

- Lungs should always be auscultated after the convulsion has ended
3.2. Medication for the Management of Seizures

The vast majority of the initial seizures are self-limiting

MAGNESIUM SULPHATE is the anticonvulsant drug of choice

Avoid polypharmacy to treat seizures - increases risk of respiratory arrest

After ABC:

Loading Dose: 4 g IV over 10-15 minutes
Add 8 ml of 50% MgSO4 solution to 12 ml of N Saline
= 4 g in 20 ml = 20% solution

Maintenance Dose: 1 g per hour
Add 25 g MgSO4 (50 ml) to 250 ml N Saline
1 g MgSO4 = 12 ml per hour IV
1 g/hour is infused for 24 hours after last fit provided that:

• respiratory rate > 16 breaths/minute
• urine output > 25 ml/hour, and
• patellar reflexes are present

Administer via infusion pump

REMEMBER TO SUBTRACT VOLUME INFUSED FROM TOTAL MAINTENANCE INFUSION VOLUME (85 ml/hour)

A higher maintenance dose may be required initially to prevent recurrent seizures - consultant must make this decision

If seizure continues, or if seizures recur, give a second bolus of magnesium sulphate:

2-4 g depending on weight of patient, over 5-10 minutes
(2 g if < 70 kg and 4 g if > 70 kg)
ONE STAT DOSE ONLY

If seizures continue despite a further bolus of magnesium sulphate, “options then include diazepam (10 mg) or thiopentone (50 mg IV). Intubation may become necessary in such women to protect the airway and ensure adequate oxygenation. Further seizures should be managed by intermittent positive pressure ventilation and muscle relaxation.”
When using Magnesium Sulphate:

**Monitor:**
- Hourly urine output
- Respiratory rate, oxygen saturation & patellar reflexes - every 10 minutes for first two hours and then every 30 minutes
- Check serum magnesium levels every day if infusion is continued for > 24 hours

**Request MgSO₄ levels if:**
- Respiratory rate < 16 breaths/minute (CARE: lower rate may be appropriate if on opiates)
- Urine output < 25 ml/hour for 4 hours
- Loss of patellar reflexes
- Further seizures occur

**Magnesium Levels:**

**Therapeutic**

2.0-4.0 mmol/l

With increasing magnesium levels, the following may occur:

- Feeling of warmth, flushing, double vision, slurred speech.........................3.8-5.0 mmol/l
- Loss of tendon reflexes........................................>5.0 mmol/l
- Respiratory depression........................................>6.0 mmol/l
- Respiratory arrest.............................................6.3-7.1 mmol/l
- Cardiac arrest..................................................>12.0 mmol/l

**Magnesium Toxicity:**

- **Urine output < 100 ml in 4 hours:** If no clinical signs of magnesium toxicity, decrease rate to 0.5 g/hour
- Review overall management with attention to fluid balance and blood loss
- **Absent patellar reflexes:** Stop MgSO₄ infusion until reflexes return
- **Respiratory depression:** Stop MgSO₄ infusion
  - Give oxygen via facemask and place in recovery position because of impaired level of consciousness
  - Monitor closely
- **Respiratory arrest:** Stop MgSO₄ infusion
  - Give IV Calcium gluconate
  - Intubate and ventilate immediately
- **Cardiac arrest:** Commence CPR
  - Stop MgSO₄ infusion
  - Give IV Calcium gluconate
  - Intubate and ventilate immediately
  - If antenatal, immediate delivery

**Antidote:**

10% Calcium gluconate 10 ml IV over 10 minutes
3.3 Magnesium Sulphate Prophylaxis in Pre-eclampsia

Even for women with severe pre-eclampsia, the risk of eclampsia is low - around 1%. The risk of eclampsia is probably reduced by magnesium sulphate, but, even if this reduction is by 50%, very large numbers of women will need to be treated to prevent a single fit.

“Magnesium sulphate is the anticonvulsant of choice for the treatment of eclampsia. For pre-eclampsia there is insufficient evidence to assess whether, overall, prophylactic anticonvulsants do more good than harm. If an anticonvulsant is to be used, magnesium sulphate is the best choice and is now being evaluated in a large trial.” (Magpie Trial)
REFERENCES


2. Department of Health, Welsh Office, Scottish Office and Department of Health, Department of Health and Social Services, Northern Ireland
   Chapter 3, pp 36-46. London HMSO, 1999


15. Duley L, Neilson JP. Magnesium sulphate and pre-eclampsia. *BMJ* 1999; 319: 3-4


**RECOMMENDED READING**


Management of IMMINENT ECLAMPSIA or ECLAMPSIA

**DO NOT LEAVE PATIENT ALONE**
Place in semi-prone position
Call for HELP • Duty obstetric & anaesthetic registrars; senior midwife
Inform consultants – obstetrician and anaesthetist on-call

**AIRWAY**
• Assess
• Maintain patency
• Apply oxygen

**BREATHING**
• Assess
• Protect airway
• Ventilate as required

**CIRCULATION**
• Evaluate pulse & BP
  If absent, initiate CPR & call the arrest team
  Secure IV access as soon as safely possible

**CONTROL SEIZURES**
• Loading dose MgSO₄ : 4 g MgSO₄ in 20% solution IV over 10-15 minutes
  Add 8 ml of 50% MgSO₄ solution to 12 ml N Saline

• Maintenance dose MgSO₄ : 1 g per hour infusion
  Add 25 g MgSO₄ (50 ml) to 250 ml N Saline
  1 g MgSO₄ = 12 ml per hour IV

• If seizures continue/recur: MgSO₄ 2 g ≤ 70kg; 4 g ≥ 70 kg IV as per loading dose over 5-10 minutes. If fails: Diazepam 10 ml IV or Thiopentone 50 mg IV and IPPV

• Monitor: Hourly urine output
  Respiratory rate, O₂ saturation & patellar reflexes - every 10 minutes for first 2 hours and then every 30 minutes
  Check serum magnesium levels daily if infusion is continued for > 24 hours

• Stop infusion: Check magnesium levels and review management with consultant if:
  Urine output < 100 ml in 4 hours
  or if Patellar reflexes are absent
  or if Respiratory rate < 16 breaths/minute
  or if Oxygen saturation < 90%

• Antidote: 10% Calcium gluconate 10 ml IV over 10 minutes

**CONTROL HYPERTENSION**
• Treat hypertension if systolic BP ≥ 170 mmHg or diastolic BP ≥ 110 mmHg or MAP ≥ 125 mmHg
  Aim to reduce BP to around 130-140/90-100 mmHg Beware maternal hypotension and fetal heart rate abnormalities – monitor FH with continuous CTG

• HYDALAZINE: 10 mg IV slowly
  Repeated doses of HYDALAZINE 5 mg IV 20 minutes apart may be given if necessary
  Close liaison with anaesthetists: may require plasma expansion

• LABETALOL: 50 mg IV slowly if BP still uncontrolled
  If necessary repeat after 20 minutes or erect IV infusion: 200 mg in 200 ml N Saline at 40 mg/hr, increasing dose at 1/2 hourly intervals as required to a maximum of 160 mg/hr

• There is no place for the continuation of pregnancy if eclampsia occurs
  **STABILISE THE MOTHER BEFORE DELIVERY**

• DELIVERY IS A TEAM EFFORT involving obstetricians, midwives, anaesthetists & paediatricians
  Ergometrine should not be used in severe pre-eclampsia and eclampsia
  Consider prophylaxis against thromboembolism
  Maintain vigilance as the majority of eclamptic seizures occur after delivery
# Appendix 2

## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>Blood pressure</td>
</tr>
<tr>
<td>CPR</td>
<td>Cardio-pulmonary resuscitation</td>
</tr>
<tr>
<td>CTG</td>
<td>Cardiotocography</td>
</tr>
<tr>
<td>CT</td>
<td>Computer assisted tomography</td>
</tr>
<tr>
<td>CVP</td>
<td>Central venous pressure</td>
</tr>
<tr>
<td>ECG</td>
<td>Electrocardiograph</td>
</tr>
<tr>
<td>FBP</td>
<td>Full blood picture</td>
</tr>
<tr>
<td>FH</td>
<td>Fetal heart</td>
</tr>
<tr>
<td>HDU</td>
<td>High dependency unit</td>
</tr>
<tr>
<td>ICU</td>
<td>Intensive care unit</td>
</tr>
<tr>
<td>IPPV</td>
<td>Intermittent positive pressure ventilation</td>
</tr>
<tr>
<td>IV</td>
<td>Intravenous</td>
</tr>
<tr>
<td>LFTs</td>
<td>Liver function tests</td>
</tr>
<tr>
<td>MAP</td>
<td>Mean arterial pressure</td>
</tr>
<tr>
<td>MgSO₄</td>
<td>Magnesium sulphate</td>
</tr>
<tr>
<td>MSSU</td>
<td>Mid-stream sample of urine</td>
</tr>
<tr>
<td>RCOG</td>
<td>Royal College of Obstetricians and Gynaecologists</td>
</tr>
<tr>
<td>U &amp; E</td>
<td>Urea &amp; Electrolytes</td>
</tr>
</tbody>
</table>
Appendix 3

Emergency box for eclampsia

1. **Drugs**

   - Magnesium sulphate 50%, 5 g in 10 ml ampoule x 10 amps
   - Calcium gluconate 10%, 8.9 mg in 10 ml ampoule x 2 amps
   - Hydralazine 20 mg in 1 ml ampoule x 2 amps
   - Labetalol 200 mg in 20 ml ampoule x 1 amp
   - Sodium chloride 10 ml ampoule x 10 amps

2. **Intravenous fluids**

   - 250 ml bag of Sodium chloride x 2
   - 1 litre of Hartmann’s solution x 1
   - IVAC giving set x 1
   - IV blood giving set x 1

3. **Venous access**

   - 20G Cannula (pink) x 2
   - 18G Cannula (green) x 2
   - 16G Cannula (grey) x 2
   - Tourniquet x 1
   - Fixation tape x 1 roll

4. **Airway equipment**

   - Guedel airways: sizes 4, 3, and 2
   - Laedal bag, mask and valve
   - Green oxygen tubing 2 meters
   - Yankeur sucker

5. **Other equipment**

   - 50 ml syringe x 2
   - 20 ml syringe x 2
   - 10 ml syringe x 2
   - Green needles x 2
   - Reflex hammer x 1
**Patient Information**

Patient information packs can be obtained from:

**ACTION ON PRE-ECLAMPSIA (PEC)**
31-33 College Road,
Harrow, Middx HA1 1EJ
Tel: 020-8863 3271
Fax: 020-8424 0653
Helpline: 020-8427 4217
Website: [www.apec.org.uk](http://www.apec.org.uk)
E-mail: info@apec.org.uk
REGISTERED CHARITY NO. 1013557
Membership of the CREST Sub-Group on the Management of Severe Pre-eclampsia and Eclampsia

Chair
Dr H Sidhu  Consultant Obstetrician, Craigavon Area Hospital

Members
Dr I Bali  Consultant Anaesthetist, Antrim Area Hospital
Mrs E Bannon  Midwifery Manager, Royal Group of Hospitals
Dr K Fitzpatrick  Consultant Anaesthetist, Belfast City Hospital
Miss B Gillen  Clinical Midwifery Specialist, Altnagelvin Area Hospital
Dr A Hamilton  Consultant Obstetrician, Craigavon Area Hospital
Dr A Harper  Consultant Obstetrician, Royal Group of Hospitals
Dr D Hill  Consultant Anaesthetist, Ulster Community Hospitals
Dr M Hogan  Consultant Paediatrician, Craigavon Area Hospital
Ms H Kyle  Delivery Suite Manager, Royal Group of Hospitals
Dr M McCarthy  Senior Medical Officer, DHSSPS
Dr G Mock  Senior Medical Officer, DHSSPS
Miss C Murphy  Midwifery Manager, Daisy Hill Hospital
Mr M O’Hare  Consultant Obstetrician, Daisy Hill Hospital
Mrs A Taylor  Midwifery Manager, Altnagelvin Area Hospital
Mr G Hannan  CREST Secretariat
Miss A Lowry