Mid Essex Hospital Services NHS
NHS Trust

MANAGEMENT OF ECLAMPSIA AND SEVERE PRE-ECLAMPSIA	CLINICAL GUIDELINE Register number 05110 Status: Public

Developed in response to:	NICE guidelines, NHSLA requirement Review of Guideline
Contributes to CQC Core Standards No	C5a

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Version Number	3.2
Issuing Directorate	Obstetrics and Gynaecology
Approved by	Documents Ratification Approval Group
Approved on	27th October 2011
Implementation Date	21st November 2011
Executive Management Board Date	November 2011
Next Review Date	October 2014
Author/Contact for Information	Paula Hollis, Senior Midwife
Policy to be followed by (target staff)	**Midwives, Obstetricians, Anaesthetists A&E Nursing and Medical Staff**
Distribution Method	Intranet and Website. Notified on Staff Focus
Related Trust Policies (to be read in conjunction with)	04071 Standard Infection Prevention 04072 Hand Hygiene 11006 Management of Pre-eclampsia and Hypertension on the DAU 04227 Roles and Responsibilities of Staff Caesarean Section 04232 High Dependency Care and Arranging Transfer to Intensive Care 09095 Management of the Severely ill Pregnant Patient 06036 Maternity Record Keeping including Documentation in the Handheld Records 09062 Mandatory Training Policy for Maternity Services

Document Review History

Review No	Reviewed by	Review Date
1.0	Julie Bishop	July 2005
2.0	Simon Bishop	October 2008
2.1	Equality & Diversity Update. Audit Update in line with NHSLA	August 2009
2.2	Addition to section 11.4	February 2010
3.0	Paula Hollis	October 2011
3.1	Sarah Moon – Clarification to 10.6 and audit/monitoring sections	May 2012
3.2	Sarah Moon – Clarification to 6.2	September 2012

Staff are responsible for ensuring that they access the most up to date document and this will always be the version on the intranet.

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1.0 Purpose of Guideline

1.1 This guideline is aimed at all health care professionals working in the acute hospital setting who share in the provision of antenatal, labour and postnatal care, including midwives, obstetricians, anaesthetists, anaesthetic assistants/practitioners, nurses and trainees in above professions.

1.2 This guideline is intended to assist professionals in providing timely evidence based practice, ensuring optimum care and outcome for the mother and the fetus.

1.3 This guideline reflects emerging clinical and scientific advances. The information is designed to aid practitioners in making decisions about appropriate obstetric and gynaecological care but should not be construed as dictating an exclusive course of treatment or procedure - variations in practice may be warranted based on the individual needs of the patient.

2.0 Equality and Diversity

2.1 Mid Essex Hospitals is committed to the provision of a service that is fair, accessible and meets the needs of all individuals.

3.0 The Aims of Management

3.1 To provide one to one midwifery care in a high dependency environment on labour ward, with full monitoring.

3.2 High dependency patients to be cared for ideally in room 10, if not in rooms 7 or 9 (Refer to guidelines for High Dependency Care - Register no 04232).

3.3 To control blood pressure and maintain a diastolic of <95mm Hg or a mean arterial pressure (MAP) of <125 (millilitres of mercury) mm Hg, to avoid rapid swings in blood pressure.

3.4 To recognise when a convulsion is imminent, giving prophylaxis accordingly and to treat convulsion promptly if it occurs.

3.5 To maintain an average (over 4 hours) hourly urine output of 0.5mls/kg/hour.

3.6 To avoid renal failure.

3.7 To avoid fluid overload and pulmonary oedema. Accurate and timely fluid balance records must be maintained until the patient has a marked diuresis (usually within 72 hours of delivery)

3.8 To recognise when transfer to Intensive/High dependency care is appropriate and to effect this safely and efficiently.

3.9 To determine the optimum time to deliver the fetus.

4.0 Criteria for Managing Patients Using this Guideline

4.1 This guideline should be used for the following patients presenting with:

- Hypertension (>140/90) with proteinuria (>0.5g/l or >24) and at least one of the following:
- Significant headache
- Visual disturbance
- Epigastic pain
- Clonus (>2 beats)
- Platelet count <100x10
- AST > 50 Iu/L
- Elevated haematocrit > 0.47

4.2 Severe hypertension (systolic BP >170 mmHg or diastolic BP >110mmHg with proteinuria 72g/day or on urinalysis indicating 2+).

4.3 Eclampsia - clinicians should note that the serum uric acid level is important and if greater than 0.4 implies severe disease.

5.0 Definitions of Terminology

5.1 Severe pre-eclampsia (PET) Pre eclampsia is a systemic multi-organ disease process characterised by the classic triad of **hypertension, proteinuria, and oedema.** The diagnosis may be made in the presence of hypertension and proteinuria with or without oedema

5.2 **Hypertension** is defined as a sustained elevation of blood pressure to levels of 140mmHg systolic or 90mm Hg diastolic or greater. Elevated blood pressure must be present on at least two occasions, six or more hours apart.

5.3 **Proteinuria** is defined as urine protein exceeding 300mg per 24 hours, or a concentration of 0.1 grams per litre (on urinalysis indicating 1+).

5.4 **Oedema** supports the diagnosis of pre-eclampsia when it is generalised (occurring in the face or hands and not exclusively in the feet and ankles) and pronounced. It is the least reliable indicator of pre-eclampsia.

6.0 Roles and Responsibilities of Staff

6.1 On admission/diagnosis of severe pre-eclampsia, the following personnel should be involved:

6.2 **Consultant obstetrician** early involvement is required at consultant level in the management of patients with severe pre-eclampsia and eclampsia. The duty consultant should be informed and closely involved in formulating ongoing plan of care, and will provide onsite clinical expertise for junior staff. The consultant obstetrician should liaise with the consultant anaesthetist, paediatrician and labour ward co-ordinator.

6.3 **Obstetric registrar** is responsible for carrying out full physical and neurological assessment of the patient, assessing the fetal condition and documenting a clear plan of care in collaboration with anaesthetic and paediatric medical staff. The obstetric registrar should update the duty obstetric consultant regarding progress and any signs of deterioration in condition. The patient and her partner should be involved in the decision making process. The registrar should review the woman at least 4-hourly.
(Refer appendix A)

6.4 **Anaesthetic registrar** should review the patient from the anaesthetic point of view, in order to assess the appropriateness of performing a General Anaesthetic (GA) or regional anaesthetic block if operative delivery is likely or epidural if induction of labour is feasible. The anaesthetist will have a key role in monitoring fluid balance and maintaining clear airway and ventilation when seizures occur.

6.5 **Consultant Anaesthetist** should be informed by the duty anaesthetist of any patient with severe pre eclampsia, and will personally provide expertise and clinical support in critical situations such as eclampsia. The consultant anaesthetist should liaise with the consultant obstetrician, paediatrician and labour ward co-ordinator.

6.6 **Labour Ward Co-ordinator** is responsible for the following:

- Assigning an experienced midwife to provide one to one midwifery care
- The labour ward co-ordinator should liaise with the consultant obstetrician, consultant anaesthetist, and the paediatrician
- To provide support and expertise to junior midwifery and obstetric staff
- In the event of eclampsia the coordinator should in collaboration with the most senior obstetric doctor present, consider delaying any ongoing elective operative lists until the patient's condition is stabilised, and/or the fetus is delivered
- Where appropriate and respecting confidentiality the patient's partner and family will be kept informed.

6.7 **The midwife** assigned to the patient will be responsible for monitoring and recording observations of vital signs at the appropriate interval and recording the following information:

- Maintain a fluid balance
- Ensure all prescribed medications are given at the appropriate time
- A patient at risk score i.e. the Maternity Early Obstetric Warning System (MEOWS) should be commenced
  (Refer to the guideline for the 'Management of the severely ill pregnant patient'; register number 09095)
- The midwife will monitor fetal well-being by recording the fetal heart continuously by cardiotocography (CTG) until advised by the obstetrician
- The midwife will ensure the patient is kept fully informed and refer to the obstetric registrar or consultant on call when there is deterioration in the patient's condition

- The midwife is responsible for ensuring all tests and investigations requested by the obstetrician are carried out and sent to the respective laboratory/department

- Once results are available the midwife will inform the obstetric registrar or consultant on call immediately

6.8 **Maternity Care Assistant** will support the midwife and doctor by ensuring relevant equipment is available, organising transport of urgent blood specimens, calling extra help when requested, and supporting the immediate family, including care of the baby if applicable.

6.9 **Operating department practitioner** will support the duty anaesthetist in crisis situations such as eclampsia.

6.10 **Neonatal Unit and paediatrician** if the fetus is premature or compromised by growth retardation and delivery is anticipated, where possible the duty paediatric registrar and a senior neonatal nurse should see the patient to explain the care and management that her baby may require following birth. This should include the likelihood of transfer to another hospital (i.e. if delivery is below 30 weeks gestation). The paediatrician should liaise with the consultant anaesthetist, consultant obstetrician and labour ward co-ordinator.

6.11 **Consultant Haematologist** should be informed at the earliest opportunity (if associated with major coagulopathy) in order that adequate supplies of blood and blood products are made available and sent with out delay.

7.0 Antenatal Monitoring

7.1 **Maternal** - Although the cause of pre-eclampsia is still poorly understood the following measures have been proved to reduce the risk of pre-eclampsia developing into severe forms of the disease i.e. severe pre-eclampsia /eclampsia:

7.2 Urinalysis for proteinuria at each antenatal appointment.

7.3 Monitoring of blood pressure at each antenatal visit (with appropriate size cuff.)

7.4 Providing patient with information regarding the signs and symptoms of pre-eclampsia. Pregnant patient with a headache of sufficient severity to seek medical advice, or with a recent onset of epigastric pain should have their blood pressure measured and urine tested for protein as a minimum precaution.

7.5 **Fetal** - Measurement of approximate fetal size by use of measuring uterine size.

7.6 **Signs and symptoms of severe PET** - Severe pre-eclampsia is characterised by the development of higher blood pressures, more significant proteinuria, and clinical symptoms resulting from involvement in the kidneys, brain, liver and cardiovascular system. Symptoms include:

- Blood pressure greater than (>)160-180 mmHg systolic, or > 110mmHg diastolic or mean arterial pressure (MAP) > 125mm Hg)
- Proteinuria greater than 5 grams in 24 hours
- Thrombocytopenia
- Elevated serum creatinine

- Elevated serum transanimases – aspartate transaminase (AST), alanine transaminase (ALT)
- Oliguria less than 500ml per 24 hours

7.7 Symptoms suggesting significant end-organ involvement such as:

- Visual disturbances, flashing lights
- Headache
- Epigastic pain
- Epigastic or liver edge tenderness
- Hyper-reflexia, clonus (>2 beats)
- Changes in optic fundi (often difficult to detect)

7.8 However, it should be noted that headache is a common symptom in pregnancy and conversely that eclamptic fits may occur without any of the above signs or symptoms.

7.9 Complications of severe pre-eclampsia and eclampsia:

- Haemolysis, elevated liver enzymes, low platlet count (HELLP syndrome)
- Disseminated intravascular coagulation (DIC)
- Renal failure
- Adult respiratory distress syndrome
- Sub capsular haemorrhage
- Rupture of hepatic capsule
- Intra uterine growth retardation (IUGR)
- Placental abruption
- Fetal or Maternal demise

8.0 Management of Severe Pre-eclampsia

8.1 Patients with blood pressure of 160/110 or greater, or other signs of severe pre-eclampsia, should be admitted to the labour ward preferably rooms 6, 11-15.

8.2 The patient should be assessed by an obstetrician no junior than a registrar.

8.3 The following assessments/investigations should be carried out:

Maternal

- Full neurological assessment including deep tendon reflexes
- Assessment of vital signs, including blood pressure, mean arterial pressure (MAP), pulse, respiration every 15-60 minutes until stable
- Insertion of indwelling catheter, checking for proteinuria and output hourly
- Accurate monitoring of fluid intake (see fluid regime below)
- Intravenous access with, consider
- Blood tests sent category 1
  (Refer to Appendix B)

Fetal

- Commence external fetal monitoring for contractions and fetal heart rate
- Administer two doses of betamethasone 12mg, given intramuscularly 24 hours apart, if the gestation is between 24-35 weeks gestation

- Ultrasound scan to determine fetal growth, liquor volume, doppler measurement of blood flow through umbilical vessels

8.5 **Fluid Regime for PET -** PET patients tend to be relatively intravenously fluid depleted but also leak fluid from their intra-vascular compartment due to capillary endothelial damage.

8.6 The aim of fluid management is to maintain a urine output of more than 0.5ml/kg/hr (averaged out over four hour period) but to avoid fluid overload and pulmonary oedema.

8.7 Maintain fluid: Up to 85 ml crystalloid intravenously per hour or urine output in preceding hour plus 30ml. This must include the fluid contained in any drug infusions.

8.8 A CVP (central venous pressure) lines should only be inserted on the maternity unit with the involvement of the consultant anaesthetist. This procedure should be carried out under ultrasound in order to help identify the correct placement site.

8.9 **Urine Output -** If output falls below 30-40-ml/ hour for four hours, inform the obstetric registrar and anaesthetist for further management.

8.10 Repeat creatinine and potassium levels.

8.11 If oliguria persists consider CVP monitoring and transfer to ITU.

8.12 Post caesarean, the syntocinon infusion management will be 40i.u (international units) of syntocinon in 40 ml of normal saline 0.9%. The rate of infusion will be 10mls/hour. This replaces 40i.u. syntocinon in 500mls hartmanns at a rate of 125mls/hour. This ensures the 85ml/hour total hourly input is maintained.

9.0 Management of Labour and Delivery

9.1 Delivery is the only known cure for pre-eclampsia. Decisions regarding the timing and mode of delivery are based on a combination of maternal and fetal factors.

9.2 Fetal factors include gestational age, evidence of lung maturity, and signs of fetal compromise.

9.3 Maternal factors include the degree to which the hypertension is controllable and any clinical or laboratory signs of impending decomposition.

9.4 A vaginal examination may be done to determine if the cervix is favourable for induction. This will depend on gestation and general maternal condition.
(Refer to Appendix C)

9.5 Ensure that a full blood count (FBC) and coagulation screen have been taken within 4 hours so that a regional block can be offered safely. If platelets are above 100 with no haematological evidence of progressive fall in platelets consider epidural for analgesia in labour.

9.6 A long labour is contraindicated with PET and caesarean section should be preferred sooner rather than later.

9.7 If labour is quick, a normal delivery may be achieved and at this point there is no restriction on clear non-fizzy oral fluids.

9.8 Continuous fetal monitoring is required during labour, by fetal scalp electrode if the quality of the trace by abdominal transducer is difficult to interpret.

9.9 Prolonged pushing may generate further rises in blood pressure.

9.10 Instrumental delivery is indicated if second stage does not proceed quickly. Active pushing should be short (30 minutes) with evidence of progress and stable blood pressure.

9.11 **3rd Stage Management –** intravenous (IVI) syntocinon® 5 units should be given following delivery. Syntometrine® or ergometrine must not be given as their administration will raise blood pressure and may cause a cerebral vascular accident.

10.0 Management of Postnatal Period

10.1 All patients managed according to these guidelines need high dependency nursing for at least 24 hours. ITU/HDU (intensive therapy unit/high dependency unit) admission should be arranged if this is not possible at the Consultant-led Unit, based at Broomfield Hospital.

10.2 Anti -hypertensive treatment should be reduced gradually; it must be remembered that the condition may initially worsen in the immediate postpartum period. The greatest risk of eclampsia occurs within the first 24 hours following delivery.

10.3 Patients who develop hypertension during pregnancy should be carefully re-evaluated during the immediate postpartum months and counselled with respect to future pregnancies.

10.4 Any laboratory abnormality or physical finding that has not returned to normal before post delivery discharge should be reassessed at post partum-follow up with the patient's obstetrician.

10.5 The expectation is that hypertension and other signs or symptoms or organ dysfunction associated with severe pre-eclampsia will have remitted by the 6 weeks post partum check.

10.6 Following discharge from hospital patients diagnosed with severe pre-eclampsia (i.e. treated with magnesium sulphate) during their pregnancy should be given a blood form to check their LFT's, U&E's and clotting studies (to be taken 5 weeks hence). Furthermore, a postnatal appointment should be made with the patient's obstetric consultant for 6 weeks post delivery, to attend the antenatal clinic.

10.7 Patients who have had pre-eclampsia are more prone to hypertensive complications in subsequent pregnancies. The risk increases with manifestation of severe-pre-eclampsia developing in early pregnancy compared with late pregnancy.

10.8 Factors increasing recurrence of pre-eclampsia in future pregnancies are:

- Multigravida who conceive with a new partner (even if normotensive with previous pregnancies)
- Patients with early-onset severe pre-eclampsia

10.9 Factors increasing the likelihood of hypertension in later life are:

- Nulliparous patients with pre-eclampsia or eclampsia manifesting hypertension in subsequent pregnancies
- Multiparous patients who develop the disorder
- Severe early onset of any parity

10.10 Patients with early onset severe pre-eclampsia may harbour metabolic abnormalities or risk factors associated with vascular thrombosis. These include activated protein C resistance (Factor V Leiden) antiphospholipid antibodies, hyperhomocysteinemia, and protein S deficiency. Therefore, patients with a history of early-onset severe pre-eclampsia should be evaluated for evidence of prior thromboembolic disease, and should be tested for the above diseases.

11.0 Pharmacological Management of Blood Pressure in Severe Pre-eclampsia

11.1 The aim of management is to achieve a **diastolic pressure of < 95 mmHg or a mean arterial pressure of < 125**

11.2 Mean arterial pressure (MAP) is a more useful guide to therapy as it is measured more accurately by the Dynamap than a diastolic pressure

11.3 Methods available for the control of blood pressure include **epidural analgesia and anti-hypertensive drugs.**

11.4 The drugs of choice for the management of hypertension chronologically listed below:

- **Labetalol** IVI
  (Refer to Appendix E for protocol)

- **Hydralazine** intravenously (IVI)
  (Refer to Appendix D for protocol)

- **Nifedipine** 10 mg oral, repeat every 20 minutes, up to a maximum dose of 120 mg in 24 hours

- **Labetolol** 200mg oral, up to a maximum of 800mg daily

11.5 The aim is to achieve a gradual reduction in blood pressure through careful dose increments but to avoid a rapid fall in blood pressure; infusions therefore, must be titrated carefully to achieve the desired result. Both intravenous drugs may be given in small bolus doses of 5mg prior to commencing an infusion.

11.6 Side effects of hydralazine include headache, flushing and dizziness, which may be confused with fulminating pre-eclampsia.

11.7 Labetalol infusion should be given in addition to the hydralazine if more than 40mg/hr of hydralazine is needed or a tachycardia of > 120/min develops.

11.8 The drug of choice for management of eclampsia is:

- Magnesium sulphate ($MgSO_{4)}$
  (Refer to Appendix G)

11.9 Magnesium sulphate is the drug of choice for the treatment and prevention of recurrent seizures in eclamptic patients. The results of the collaborative eclampsia trial show that women with magnesium sulphate have fewer seizures compared with women treated with diazepam or phenytoin. Intramuscular injections are painful and are complicated by local abscess formation in 0.5% of cases.

11.10 Because it is difficult to predict which patients will progress to having eclamptic seizures, **patient with severe pre-eclampsia are often treated prophylactically with $MgSO_4$.**

11.11 Patient should be informed that the intravenous bolus of magnesium sulphate may cause temporary tingling and warmth in the extremities, facial flushing and may experience a metallic taste in the mouth.

12.0 Characteristics of Eclampsia

12.1 Eclampsia is the occurrence of seizures in a patient with pre-eclampsia or coma, not attributable to any other cause.

12.2 Eclampsia is characterised by the appearance of seizures in a patient that usually has pre-clampsia. Eclampsia is a life-threatening emergency and requires proper care to avoid compounding morbidity or increasing mortality.

12.3 The clinical course eclamptic seizures develop quickly but in stages:

- General vagueness
- Twitching
- Facial congestion
- Deepening loss of consciousness
- Tonic phase of deep muscular rigidity developing to a rhythmic muscular contractions and relaxation.

12.4 These events last about one to one and a half minutes, during which time the patient is without respiratory effort. Eventually the seizure ends with the woman in a coma, but breathing. Finally the patient may begin to gain consciousness but is confused and agitated.

13.0 Management of Eclampsia

13.1 Pull emergency call-bell to alert other members of staff to emergency. Consider crash call (**code red**) via switchboard, confirming the ward and bed number.

13.2 Do not attempt to shorten or abolish the initial convulsion by using drugs such as diazepam or phenytoin. These drugs lead to respiratory depression, aspiration, or frank respiratory arrest, particularly when they are given repetitively or used in combination with magnesium sulphate.

13.3 Protect the airway and minimize the risk of aspiration by placing the women head down and on her side and suctioning any foam and secretions from her mouth.

13.4 Administer oxygen 10 litres/min.

13.5 Prevent maternal injury, providing close observation, soft padding and use of side rails on the bed may help prevent injury.

13.6 Obtain intravenous access (a cut down set may be required)

13.7 Give intravenous loading dose of magnesium sulphate 4g, given over 20 minutes followed by a maintenance infusion of 1g/hour continued for at least 24 hours after last seizure.

13.8 Recurrent seizures should be treated by a further bolus of magnesium sulphate 2g. (Refer to appendix F)

13.8 Attach the following monitoring: pulse oximetry / electrocardiograph (ECG) / dinamap.

13.9 Have the emergency crash trolley ready nearby.

13.10 Be prepared to intubate the patient (remove head of bed) in event of apnoea, severe respiratory depression or loss of airway reflexes.

13.11 If repeated seizures occur despite magnesium, options include diazepam (10mg IV) or thiopentone (50mg IV). Thiopentone is an anaesthetic induction agent and as such should only be administered by a qualified anaesthetist.

13.12 Further seizures should be managed by intermittent positive pressure ventilation and muscle relaxation.

13.13 Blood pressure control should be managed as for severe pre-eclampsia. (Refer to point 11.0)

13.14 Fluid balance control should be managed as for severe pre-eclampsia. (Refer to point 8.5 and 3.4)

14.0 Care of the fetus during Eclampsia

14.1 During an eclamptic seizure, the fetus will frequently manifest bradycardia due to hypoxia, since the mother is not breathing and the uterine arteries are in severe vasospasm. In the absence of other severe medical or obstetric complications, the fetus usually recovers and may have a good outcome despite the eclampsia.

14.2 Delivery following eclampsia is the definitive treatment for eclampsia.

14.3 Attempts to prolong pregnancy in order to improve fetal maturity are unlikely to be of value.

14.4 It is inappropriate to deliver an unstable mother even if there is fetal distress.

14.5 Once seizures are controlled, severe hypertension treated, and hypoxia corrected, delivery can be expedited.

14.6 Vaginal delivery should be considered but caesarean section is likely to be required in primigravidae remote from term with an unfavourable cervix.

15.0 Postnatal Care of Eclampsia

15.1 Following delivery, the patient should be assessed by the consultant obstetrician and consultant anaesthetist and decision made to transfer to ITU or to provide high dependency care on the Labour Ward. High dependency care should be continued for a minimum of 24 hours.

15.2 Patients and partners are often traumatised and unprepared for the unexpected outcome, requiring extra care and support by all clinicians and carers.

15.3 Most patients who suffer seizures will have no recollection of events and should be given the opportunity to discuss the events surrounding her care.

15.4 Extra midwifery support should be provided in the community possibly extending postnatal visits until the patient feels confident in her recovery and care of her baby.

15.5 During the immediate postnatal period the patient may be too unwell to breast-feed her baby and every effort should be made to help initiate lactation.

15.6 The baby may be transferred to the neonatal unit (NNU) for care if the patient is too unwell or if the mother is transferred to ITU.

15.7 Every effort should be made to involve the immediate family in caring for the baby and at the earliest opportunity encouraging maternal bonding and initiation of breast-feeding (if this method of feeding is the wish of the mother).

15.8 All professionals should endeavour to keep the patient and her family closely informed of events and progress. Whilst an inpatient (prior to discharge) the consultant involved in her care should visit, in order to answer any immediate concerns that the woman and her partner may have.

15.9 Following discharge from hospital patients diagnosed with eclampsia during their pregnancy should be given a blood form to check their LFT's, U&E's and clotting studies (to be taken 5 weeks hence). Furthermore, a postnatal appointment should be made with the patient's obstetric consultant for 6 weeks post delivery, to attend the antenatal clinic.

15.10 The patient may benefit from contacting self-help groups.
(Refer to Appendix G)

16.0 Transfer to Intensive Care

To be read in conjunction with: Guideline for High Dependency Care/Transfer to ITU (Register no: 04232)

16.1 This is arranged by the duty anaesthetist, in consultation with the on call consultant anaesthetist, consultant obstetrician and Intensive Care consultant and should be considered if:

16.2 The patient is having recurrent convulsions despite therapeutic levels of anticonvulsant.

16.3 The patient has a diastolic BP consistently above 110mmHg or MAP above 125mmHg despite full treatment with hydralazine and beta-blockers.

16.4 There is **any** respiratory problem i.e. pulmonary oedema, airway oedema or loss of protective reflexes.

16.5 The blood pressure is very unstable with very high **or** low swings.

16.6 The following should be carried out to ensure safe transfer:

16.7 The consultant anaesthetist and consultant obstetrician should already have agreed the need for transfer after discussion with the intensive care consultant.

16.8 Emergency ambulance transfer should be arranged with Essex Ambulance Service.

16.9 The sister in charge of the intensive care unit should be informed of the transfer and should arrange for a bed to be prepared.

16.10 The intensive care duty anaesthetist should be informed of the imminent arrival and state of the patient.

16.11 Full resuscitation drugs and equipment should be collected from labour ward.

16.12 Any blood cross-matched for the patient and forms should travel with the woman.

16.13 The duty obstetric anaesthetist or consultant, together with the obstetric department practitioner (ODP) and an experienced midwife must accompany the woman in the ambulance.

16.14 The Intensive Care consultant should be informed as the patient leaves the Maternity Hospital.

17.0 Anaesthetic Guidelines

17.1 Oral intake and antacid prophylaxis**.** All patients treated under the severe pre-eclampsia guidelines are regarded as being at high risk of needing obstetric intervention and must therefore be kept nil by mouth, at least until post delivery.

17.2 They must also receive 150 milligrams (mg) ranitidine 6 hourly, orally.

17.3 At the time of the decision to perform a LSCS patients should receive 10mg of metoclopramide IV.

17.4 30 (millilitres) ml of 0.3M sodium citrate should be given immediately before induction of general anaesthesia.

17.5 Labour management - epidural is the preferred method of analgesia, sited by an experienced anaesthetist.

17.6 Preload with 500mls hartmanns over 15 minutes prior to block.

17.7 Thereafter continue with hartmanns up to 80ml / hour unless oliguric

17.8 Top-ups should be given carefully and incrementally to minimise the risk of hypotension.

17.9 Contraindications of an epidural:

- Platelet count <100,000 x 10^9/L
- Abnormal clotting
- Informed maternal refusal

17.10 Caesarean section - spinal block is the preferred method of anaesthesia sited by an experienced anaesthetist
(Refer to 17.9 for contraindications)

17.11 Fluid preload – For an elective caesarean section, preload with 500 ml hartmanns over 15 minutes prior to block

17.12 Emergency caesarean section (CS) Extend block without additional preload if a functioning block exists. If a functioning block has not been established, then either a regional technique with preload of 500 ml hartmanns or general anaesthesia should be employed depending on urgency of CS.

17.13 Managing hypotension - hypotension is best managed with vasopressors, thus avoiding excess fluid loading. This can be achieved with phenylephrine infusion or by bolus doses of ephedrine, according to the clinician's preference.

17.14 General anaesthesia - In addition to the chosen standard procedure, an attempt to attenuate the pressor response to laryngoscopy and intubation should be made.

17.15 Esmolol 2mg /kilogramme (kg) given intravenously 2 minutes prior to induction of anaesthesia is the recommended drug.

17.16 Great care should be taken at extubation, as airway obstruction due to oedema may be a serious hazard. If there is any doubt, admission to ITU and delayed extubation should be arranged.

18.0 Record Keeping

18.1 The standard of all the entries entered into the patient's handheld records should be of a high professional standard and should reflect the guidance stated in the guideline entitled 'Maternity record keeping including documentation in the handheld records'; register number 06036.

19.0 Staffing and Training

19.1 All midwifery and obstetric staff must attend yearly mandatory training which includes skills and drills training, maternal resuscitation and early recognition of the ill patient. (Refer to 'Mandatory training policy for Maternity Services (incorporating training need analysis'; register number 09062)

19.2 All midwifery and obstetric staff are to ensure that their knowledge and skills are up-to-date in order to complete their portfolio for appraisal.

20.0 Infection Prevention

20.1 All staff should follow Trust guidelines on infection prevention by ensuring that they effectively 'decontaminate their hands' before and after each procedure.

20.2 All staff should ensure that they follow Trust guidelines on infection prevention, using Aseptic Non-Touch Technique (ANTT) when carrying out procedures i.e. obtaining blood samples and conducting epidural procedures.

21.0 Audit and Monitoring

21.1 Audit of compliance with this guideline will be considered on an annual audit basis in accordance with the Clinical Audit Strategy and Policy, the Maternity annual audit

work plan and the NHSLA/CNST requirements. The Audit Lead in liaison with the Risk Management Group will identify a lead for the audit.

21.2 As a minimum the following specific requirements will be monitored:

- Assessment and diagnosis of severe pre-eclampsia and eclampsia
- Clear lines of communication between the consultant obstetrician, consultant anaesthetist, paediatrician and labour ward coordinator
- Blood pressure control and fluid balance
- Prevention and/or control of eclamptic seizures
- Fetal assessment and delivery planning
- Postnatal follow up
- Process for audit, multidisciplinary review of audit results and subsequent monitoring of action plans

21.3 A review of a suitable sample of health records of patients to include the minimum requirements as highlighted in point 21.2 will be audited. A minimum compliance 75% is required for each requirement. Where concerns are identified more frequent audit will be undertaken.

21.4 The findings of the audit will be reported to and approved by the Maternity Risk Management Group (MRMG) and an action plan with named leads and timescales will be developed to address any identified deficiencies. Performance against the action plan will be monitored by this group at subsequent meetings.

21.5 The audit report will be reported to the monthly Maternity Directorate Governance Meeting (MDGM) and significant concerns relating to compliance will be entered on the local Risk Assurance Framework.

21.6 Key findings and learning points from the audit will be submitted to the Patient Safety Group within the integrated learning report.

21.7 Key findings and learning points will be disseminated to relevant staff.

22.0 Guideline Management

22.1 As an integral part of the knowledge, skills framework, staff are appraised annually to ensure competency in computer skills and the ability to access the current approved guidelines via the Trust's intranet site.

22.2 Quarterly memos are sent to line managers to disseminate to their staff the most currently approved guidelines available via the intranet and clinical guideline folders, located in each designated clinical area.

22.3 Guideline monitors have been nominated to each clinical area to ensure a system whereby obsolete guidelines are archived and newly approved guidelines are now downloaded from the intranet and filed appropriately in the guideline folders. 'Spot checks' are performed on all clinical guidelines quarterly.

22.4 Quarterly Clinical Practices group meetings are held to discuss ‘guidelines’. During this meeting the practice development midwife can highlight any areas for further training; possibly involving ‘workshops’ or to be included in future ‘skills and drills’ mandatory training sessions.

23.0 Communication

23.1 A quarterly ‘maternity newsletter’ is issued and available to all staff including an update on the latest ‘guidelines’ information such as a list of newly approved guidelines for staff to acknowledge and familiarise themselves with and practice accordingly.

23.2 Approved guidelines are published monthly in the Trust’s Focus Magazine that is sent via email to all staff.

23.3 Approved guidelines will be disseminated to appropriate staff quarterly via email.

23.4 Regular memos are posted on the guideline notice boards in each clinical area to notify staff of the latest revised guidelines and how to access guidelines via the intranet or clinical guideline folders.

24.0 Auditable Standards

24.1 Rate of documented involvement by the consultant obstetrician and the anaesthetist in an acute management.

24.2 The proportion of patients with the full complement of appropriate investigations.

24.3 The proportion of patients in whom fluid has been restricted to 85 ml/hour.

24.4 The proportion of patients receiving the appropriate magnesium sulphate prophylaxis.

24.5 The proportion of patients with eclampsia that are treated with magnesium sulphate.

24.6 The proportion of patients that attend a postnatal review and/or pre-conceptual counselling.

25.0 Risk Management

25.1 A ‘risk event form’ should be completed by a member of staff involved in the immediate care of the patients in the event of severe pre-eclampsia and /or eclampsia. The form is sent to the Labour Ward manager.

25.2 The Labour Ward Co-ordinator is responsible for informing the Labour Ward Manager and the Maternity Risk Manager of any patient who has eclampsia.

25.3 Eclampsia has to be reported to the United Kingdom Obstetric Surveillance System - Maternity Risk Manager will notify UKOSS on a monthly basis of any women with eclampsia.

26.0 References

National Institute for Clinical Excellence (2010) NICE Guideline. Hypertension in Pregnancy - The Management of Hypertensive Disorders in Pregnancy.

Royal College of Obstetricians and Gynaecologists (2010) Management of Eclampsia Green Top Guideline. RCOG

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National Confidential Enquiry (2001) Why Mothers Die. CEMACH.

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Appendix A

MID ESSEX HOSPITAL SERVICES NHS TRUST

Women's Children's and Sexual Health Directorate

Admission Guidelines for Patients with Severe Pre-eclampsia

1. Bed rest

2. Vital signs (blood pressure, pulse, resps and 02 sats) all documented on the relevant observation chart which incorporates the MEOWS.

3. Deep tendon reflexes and neurological checks at least hourly until stable.

4. Foley catheter, urine output and dipsticks to check protein hourly

5. Intravenous(IVI) fluids to maximum of 85ml/hr; to monitor urine output 0.5ml/kg/hr, total input (IVI and oral) should not exceed 85ml/hr.

6. Continuous cardiotocograph monitoring

7. Tests - Full blood count (FBC), liver function tests (LFT's), Clotting, Urea and electrolytes (U&E's), uric acid

8. Medication:

    - Magnesium Sulphate
    - For diastolic BP greater than110 give **one** of the following to achieve diastolic BP 90-100:

        i. Hydralazine IVI (see Appendix C)

        ii. Labetalol IVI (see Appendix D)

        iii. Nifedipine 10mg orally (PO) repeat every 20 minutes

Appendix B

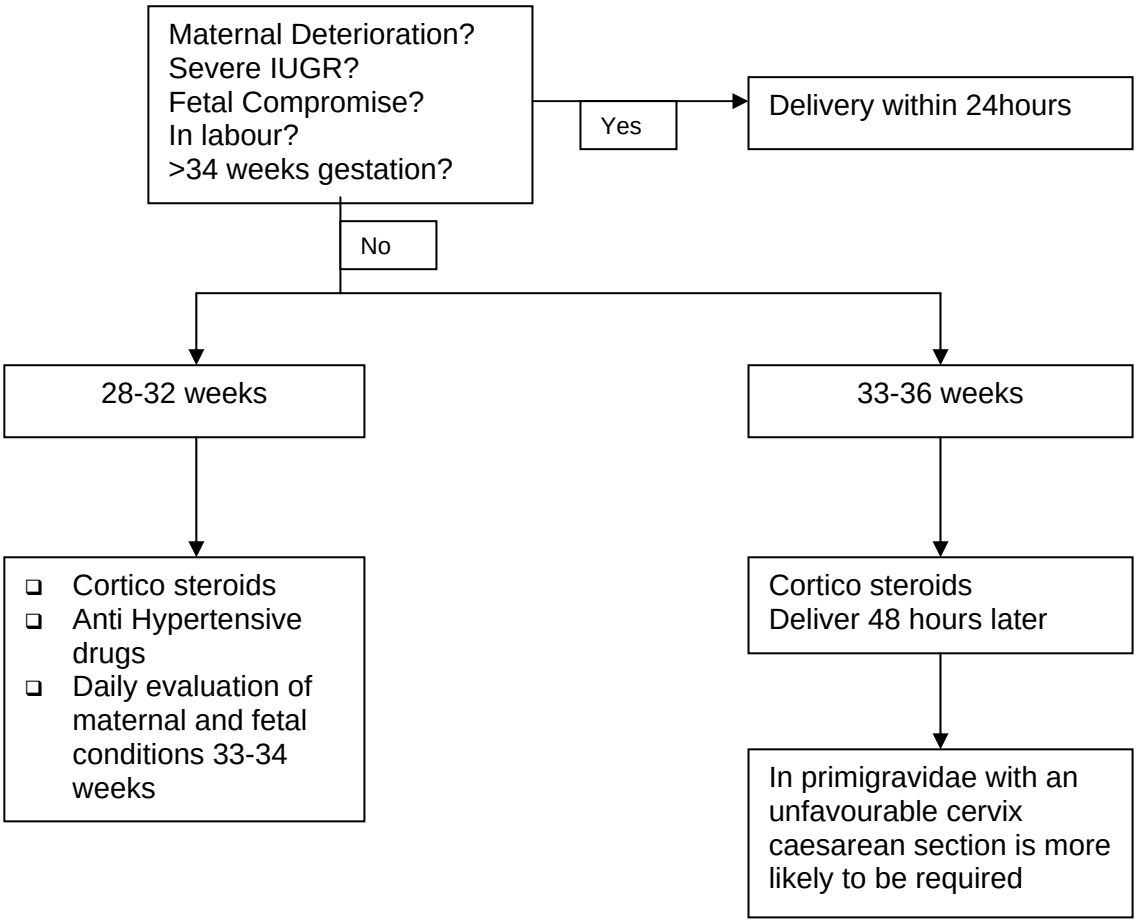
Blood Tests for Investigation

Haematology:	
Full blood count	EDTA (purple bottle)
Coagulation screen	Blue bottle
Group and Save	Pink bottle
Biochemistry:	
Liver Function tests	)
Urea & Electrolytes	) Rust coloured bottle
All above tests will be repeated as necessary, until normalising levels resume	

Appendix C

MID ESSEX HOSPITAL SERVICES NHS TRUST
Women's Children's and Sexual Health Directorate

Delivery Decisions in Severe Pre eclampsia



Appendix D

MID ESSEX HOSPITAL SERVICES NHS TRUST
Women's Children's and Sexual Health Directorate

Drug Protocol for Intravenous Hydralazine

1.0 Bolus dose: Reconstitute 1 ampule of hydrallizine 20mgs with 1ml of sterile water. This should then be further diluted with 10mls of 0.9% sodium chloride.

1.1 **Give an intravenous bolus of 5mg (2.5mls) over 5 minutes**

- If a reduction in diastolic to a mean arterial pressure (MAPS) of < 125 mmHg and <100mmHg diastolic is not achieved within 20 minutes; further 5 -10mg increments can be given by slow IV bolus until this is achieved **(up to a maximum cumulative dose of 20 mg)**

1.2 The effect of a single dose can last up to six hours.

1.3 If the MAP remains above 125 mmHg and pulse rate is > 120 beats per minute or if 20mg of hydralazine in total has been given; the Labetalol Protocol should be followed.

1.4 If no lasting effect with the administration of bolus doses, consider an infusion at 2mg/hour increasing by 0.5mg/hour as required (2 - 20 mg/hour is usually required).

2.0 Preparation for Continuous Infusion using Syringe Pump

2.1 Add 50mg hydralazine in 50mls of 0.9 % normal saline.

2.2 Start infusion at 5mgs per hour (5mls per hour), increasing to a maximum rate of 20mgs per hour.

2.3 The infusion should be titrated against the maternal blood pressure, to achieve a mean arterial pressure (MAP) of 125 mmHg and < 100 diastolic mmHg.

2.4 Close observation of maternal blood pressure must be maintained during this infusion.

2.6 Administration of this drug may precipitate fetal distress and therefore continuous fetal monitoring is essential.

2.7 Anaesthetic team should be informed as plasma expansion and invasive monitoring may be necessary.

3.0 Post delivery

3.1 The hydralazine should be reduced after 4 hours by 1mg/hour and oral administration of antihypertensives should be considered such as Labetalol. Methlydopa should be avoided post-delivery because of its mood-lowering side effects.

TREATMENT PACKS OF THIS DRUG ALONG WITH THE DRUG REGIEME ARE STORED IN A SELF CONTAINED BOX IN THE LOCKED CLEAN UTILITY BY THE CD DRUG CUPBOARD ON LABOUR WARD.

Appendix E

MID ESSEX HOSPITAL SERVICES NHS TRUST
Women's Children's and Sexual Health Directorate

Drug Protocol for Intravenous Labetalol

1.0 **Labetalol** should be avoided in patients wth asthma as it may precipitate bronchospasm.

1.1 **If indicated give an intravenous bolus dose of 50mgs over a period of at least one minute.** This does not need diluting. If necessary further doses of 50mgs may be repeated at five minute intervals until a satisfactory response occurs. The total dose should not exceed 200mgs.

2.0 Preparation for Continuous Infusion

2.1 Dilute one ampule of labetolol (100mgs) in 100mls of 5% Dextrose.

2.2 Using the Infusomat pump, start the infusion at 20 mg/hour (set pump at 20 ml/hour) the dose can be doubled every thirty minutes to a maximum of 160 mg/hour (160ml/hour).

- 20mls=20mg
- 40mls=40mg
- 80mls=80mg
- 160mls=160 mg

2.3 The aim of treatment is to control the blood pressure, but to avoid a rapid fall in blood pressure. Infusions must therefore be titrated carefully to achieve the desired result.

3.0 Contra-indications to Labetalol

- Asthma
- Heart block
- Heart failure

3.1 Administration of this drug may precipitate fetal distress and therefore continuous fetal monitoring is essential.

TREATMENT PACKS OF THIS DRUG ALONG WITH THE DRUG REGIEME ARE STORED IN A SELF CONTAINED BOX IN THE LOCKED CLEAN UTILITY BY THE CD DRUG CUPBOARD ON LABOUR WARD.

Appendix F

MID ESSEX HOSPITAL SERVICES NHS TRUST
Women's Children's and Sexual Health Directorate

Considerations for the use of Magnesium Sulphate ($MgSO_4$)

1.0 General considerations before commencing administration of magnesium sulphate (MgS04).

1.1 MgS04 overdose causes loss of deep tendon reflexes, followed by respiratory depression
and ultimately respiratory arrest. Calcium gluconate (treatment for respiratory depression due to overdose of $MgSO_4$).
(Refer to Appendix G)

1.2 Overdose is more likely if there is poor renal function. Blood levels must be monitored.

1.3 Therapy can be monitored clinically

2.0 Clinical Monitoring (commence high dependency chart)

- Check deep tendon reflexes after loading then hourly (use reflexes at elbow or wrist if epidural in progress)
- Hourly respiratory rate (should be > 14 / minute)
- Continuous pulse oximetry
- Half-hourly BP and MAP recordings
- Hourly urine output – strict fluid balance. If the patient is oliguric only the loading dose should be given.

2.1 If tendon reflexes are absent, no further magnesium should be given until plasma concentrations are known.

2.2 The drug must be given slowly; the patient will first feel warm.

2.3 If given too fast, the patient will be will be nauseated and vomit. If this happens stop the infusion until the symptoms subside and the patient is no longer nauseated.

The maintenance infusion should be terminated and urgent magnesium blood levels should be sent off and the Anaesthetist informed if:

- The patella reflex is lost
- The respiratory rate is less than 14 / minute
- Oxygen saturation is persistently less than 95% on air or oxygen

Appendix G

MID ESSEX HOSPITAL SERVICES NHS TRUST
Women's Children's and Sexual Health Directorate

1.0 Drug Protocol for Magnesium Sulphate ($mgso_4$) for Severe Pre-eclampsia and Eclampsia

1.1 An IV bolus dose of $MgS0_4$, 4g is given over 20 minutes, followed by maintenance infusion of 1g per hour for 24 hours. Then review the case.

1.2 In the event of further convulsions a further bolus dose of 2g Mgs04 can be given over 5 minutes.

2.0 Preparation

2.1 Reconstitute 2 ampoules of magnesium sulphate (each containing 5g of magnesium sulphate in 10 ml) with 30 ml of sodium chloride 0.9% in a luer lock 50 ml syringe. This makes a solution of 50mls of 20% magnesium sulphate i.e. 5mls contains 1g magnesium sulphate.

3.0 Loading Dose

3.1 Give 4g of the 20% magnesium sulphate solution over 20minutes.
4g $MgSO_4$ = 20 ml over 20 minutes

3.2 Use a Braun Syringe Driver following the manufacturers instructions for loading the Syringe.

3.3 Set rate to 60mls per hour
Set the VTBI to 20 mls (20mls = 4gms)
Set the time to 20 minutes (should automatically display this)

3.4 The syringe driver will alarm and stop after 20 minutes.

4.0 Maintenance Dose

4.1 1g magnesium sulphate (5mls) per hour for at least 24 hours then review.

4.2 Set rate to 5mls per hour
Set VTBI to 50mls (total amount in full syringe)
Time should be calculated to ten hours Nb: syringe will need changing twice in 24hr Period.

4.2 It can be continued at this rate unless the knee jerks are abolished, urine output falls below 50ml in 2 hours or if the respiratory rate falls below 14 / minute. Magnesium administration must be stopped if oliguria persists.

4.3 Magnesium sulphate should be continued for at least 24 hours (in the absence of any of the above signs) and in cases of eclampsia treatment should continue 24 hours following last seizure.

5.0 Contraindications

5.1 For cases involving cardiac disease and acute renal failure, IV diazepam should be used instead: Initial dose -10mg, followed by 2.5mg / hour.

TREATMENT PACKS OF THIS DRUG ALONG WITH THE DRUG REGIEME ARE STORED IN A SELF CONTAINED BOX IN THE LOCKED CLEAN UTILITY BY THE CD DRUG CUPBOARD ON LABOUR WARD.

Appendix H

MID ESSEX HOSPITAL SERVICES NHS TRUST
Women's Children's and Sexual Health Directorate

Drug Protocol for Calcium Gluconate

1.0 Treatment for respiratory depression due to overdose of $MgSO_4$.

1.1 Significant respiratory depression should be treated with calcium gluconate, 1g IV should be given slowly over ten minutes (10 ml 10% solution).

1.2 This should only be given under Consultant supervision.

CALCIUM GLUCONATE IS KEEP IN THE MAGNESIUM SULPHATE TREATMENT BOX.

Appendix I

MID ESSEX HOSPITAL SERVICES NHS TRUST
Women Childrens and Sexual Health Directorate

Reducing Errors in Blood Pressure Management

1.0 Use accurate equipment (mercury sphygmomanometer or validated alternative method).

1.1 Use setting or semi-reclining position so that the arm to be used is at the level of the heart.

1.2 Do not take the blood pressure in the upper arm with the woman on her side as this will give falsely lower readings.

1.3 Use appropriate size of cuff: standard size (13x23cm) for an arm circumference of up to 33cm, a large size (33x15cm for an arm circumference between 31 and 41cm and a thigh cuff (18x36cm) for an arm circumference of 41cm or more. There is less error introduced by using too large cuff than too small a cuff.

1.4 Deflate the cuff slowly, at a rate of 2mmHg to 3mmHg per second, taking at last 30 seconds to complete the whole deflation.

1.5 Use Korotkoff V (disappearance of heart sounds) for measurements of diastolic pressure, as this subject to less intra-observer and inter-observer variation than Korotkoff IV (muffling of heart sounds) and seems to correlate best with intra-arterial pressure in pregnancy. In the 15% of pregnant women whose diastolic pressure falls to zero before the last sound is heard, then both phase IV and V readings should be recorded (i.e. 148/80/0mmHg).

1.6 Measure to the nearest mmHg to avoid digit preference.

1.7 Obtain an estimated systolic pressure by palpation, to avoid auscultatory gap.

1.8 If two readings are necessary. Use the average of the readings and not just the lowest reading. This will minimise threshold avoidance (the tendency to repeat a reading until one that is below a known threshold is recorded that requires no action).

Appendix J

Information Regarding Self-help Groups

- Action on Pre Eclampsia (APEC)
  84-88 Pinner Road
  Harrow
  Middlesex
  HA1 4HZ
  Tel: 020 8863 3271
  Email: info@apec.org.uk
  Helpline: 020 8427 4217
  www.apec.org.uk