Yorkshire Regional severe pre-eclampsia guidelines March 2005

Indicators of severe disease

The criteria for managing a patient with these guidelines are subjective to a certain degree. However, the following are indicators of severe disease and justify close assessment and monitoring. They would not necessarily lead to delivery but may do so, also they are not the only entry requirements.

1. Eclampsia.

2. Severe Hypertension: Systolic Blood pressure over 170mmHg
or Diastolic Blood Pressure over 110mmHg
(3 blood pressure readings in a 15 minute period)

   with at least proteinuria of a +
   or 1g on a semi-quantitative assessment

3. Moderate Hypertension: Systolic Blood pressure over 140 mmHg
or Diastolic Blood pressure over 90 mmHg
(3 blood pressure readings in a 45 minute period)

   with at least proteinuria ++
   or 3g on a semi-quantitative assessment

   and any of the following;

   symptoms of headache
   visual disturbance
   epigastric pain
   signs of clonus
   papilloedema
   liver tenderness
   platelet count falling to below 100 x 10 9/l
   Alanine amino transferase (ALT) rising to above 50iu/l
**General measures**

The woman should be managed in a quiet, well-lit room in a high dependency care type situation. Ideally there should be one on one midwifery care. After initial assessment charts should be commenced to record all physiological monitoring and investigation results. All charts should be for a continuous 24-hour period of high dependency care. A new chart should not be started until the previous one has a full 24-hour assessment. All treatments should be recorded. The Consultant Obstetrician and the Consultant Anaesthetist should be informed in order that they can be involved at an early stage in management. (1)

When oral treatment is possible it should be regarded as the route of choice. An intravenous cannula should always be inserted, but not necessarily used for infusing drugs or fluid. If intravenous fluid is given it should be by controlled volumetric pump.

**Basic investigations**

Blood should be sent for:

- Serum electrolytes (Na, K, Urea, Creatinine, Urate)
- Liver function tests (Albumin, ALT)
- Full Blood count (Hb, WCC, Plts)
- Clotting (PT, KCCT ± fibrinogen, FDP’s)
- Group and save serum

All tests should be checked daily or more frequently if abnormal.

In some units alternative equivalent tests may be appropriate.

Footnote: the YOCCG 24 hour charts have been developed in conjunction with the guidelines and are therefore the ideal tool for recording care.
**Monitoring**

Blood pressure and pulse should be measured each 15 minutes for a minimum of four hours until stabilized and then half hourly.

An indwelling catheter should be inserted and urine output measured hourly whenever intravenous fluids are given. All urine should be tested for proteinuria four hourly.

Oxygen saturation should be measured continuously and charted hourly. If saturation falls below 95% then medical review is essential.

Fluid balance should be monitored very carefully. Detailed Input and Output recordings should be charted.

Respiratory rate should be measured hourly.

Temperature should be measured four hourly.

When present CVP should be measured continuously and charted with the blood pressure.

Fetal well being should be assessed carefully. In the initial stages this will be with a cardiotocograph but consideration should be given to assessing the fetus with a growth scan, liquor assessment and umbilical artery doppler flow velocity waveform.

Footnote:
Initially check BP manually and compare to automated readings, as there can be a difference between the two. Then when using an automated machine take the difference into account – remember you are observing for trends.

**Thromboprophylaxis**

Antenatally, in labour and postnatally all patients should have anti-embolic stockings and/or heparin whilst immobile. Following delivery or after insertion of an epidural either heparin 5000 i.u. s/c bd or a low molecular weight heparin daily should be given until the patient is fully mobile. Many units do not see heparin as a contraindication to the insertion of an epidural. Low molecular weight heparin should not be given until 2 hours after spinal anaesthesia. An epidural catheter should be left in place until 10 hours after low molecular weight heparin.
Antepartum/ Intrapartum management

Control of blood pressure
As a guide stabilisation of blood pressure is to reduce diastolic blood pressure by 10mmHg and to below 105mmHg in the first instance and maintain the blood pressure at or below that level.
The most recent Confidential Enquiry suggests that there should be concern about systolic hypertension and that treatment should be instituted if the systolic blood pressure is over 160mmHg.

First choice agent: Labetalol
If the woman can tolerate oral therapy an initial 200mg oral dose can be given. This can be done immediately before venous access and so can achieve as quick a result as an initial intravenous dose. This should lead to a reduction in blood pressure in about half an hour. A second oral dose can be given if needed in one hour.
If there is no initial response to oral therapy or if it cannot be tolerated control should be by repeated bolus of labetalol followed by a labetalol infusion.

Bolus infusion is 50mg (= 10ml of labetalol 5mg/ml) given over at least 1 minute. This should have an effect by 5 minutes and should be repeated if diastolic blood pressure has not been reduced. This can be repeated to a maximum dose of 200mg. The pulse rate should remain over 60 beats per minute.

Following this or as initial treatment in moderate hypertension a labetalol infusion should be commenced. An infusion of (neat) labetalol 5mg/ml at a rate of 4ml/hour via a syringe pump should be started. The infusion rate should be doubled every half-hour to a maximum of 32ml (160mg)/ hour until the blood pressure has dropped and then stabilized at an acceptable level. This level will vary between women. Oral antihypertensive treatment should be commenced when Iv treatment has been discontinued.

Second choice agent: Nifedipine
If labetalol is contraindicated or fails to control the blood pressure then Nifedipine is an alternative agent.

This is given as a 10mg oral tablet (not a slow release tablet). If it controls blood pressure it should be repeated 6 hourly initially though may be changed postnataally to a slow release preparation which lasts 12 hours. Blood pressure should be measured every 10 minutes in the first half-hour after treatment as often there can be a very marked drop in pressure.

Footnote: some concern over interaction between Magnesium Sulphate and Nifedipine exists, though clinically this has not been seen to be a problem.
Antenatal Fluid Management

Careful fluid balance is aimed at avoiding fluid overload. Total intravenous input should be limited to 80ml/hour (approximately 1ml/kg/hr). If syntocinon is used it should be at high concentration and the volume of fluid included in the total input. Oliguria at this point should not precipitate any specific intervention except to encourage early delivery. As these women are at high risk of caesarean section oral fluids should also be limited.

Delivery Guidelines

“Planned delivery on the best day in the best way”

The delivery should be well planned, done on the best day, performed in the best place, by the best route and with the best support team. Timing affects the outcome for both mother and baby. If the mother is unstable then delivery is inappropriate and increases risk. Once stabilized with antihypertensive drugs and Magnesium Sulphate then a decision should be made. In the absence of convulsions prolonging the pregnancy may be possible to improve the outcome of a premature fetus but only if the mother remains stable. Continued close monitoring of mother and baby is needed. It seems ideal to achieve delivery, particularly of premature infants, during normal working hours. Even a few hours may be helpful if it allows the neonatal unit to be more organized or to transfer a mother to a place where a cot is available, assuming the mother is stable before transfer. (See stabilization section).

If the pregnancy can be prolonged in excess of 48 hours steroids help mature the fetal lungs. There is probably benefit of steroid therapy even if delivery is less than 48 hours from them being given. Since the benefits to the fetus peak between 48 hours and 6 days then after 48 hours further consideration should be given to delivery as further delay may not be advantageous to the baby or mother. In all situations a planned elective delivery suiting all professionals is appropriate.

Delivery is not necessarily by Caesarean section but if gestation is under 32 weeks it is preferable. After 34 weeks vaginal delivery should be considered in a cephalic presentation. The mode of delivery should be discussed with the Consultant Obstetrician. Vaginal prostaglandins will increase the chance of success. Anti hypertensive treatment should be continued throughout assessment and labour.

If vaginal delivery is planned then the second stage should be short with consideration given to elective operative vaginal delivery. An epidural will normally be used. The third stage should be managed with 5 units of i.v. SYNTOCINON. Ergometrine or syntometrine should not be given in any form.

Anaesthesia and Fluids

Genuine pre-eclampsia tend to maintain their blood pressure, despite regional blockade. When this happens, fluid load is unnecessary and may complicate fluid balance. For this reason, fluid loading in pre-eclampsia should never be done prophylactically or routinely, and should always be considered and controlled. Hypotension, when it occurs, can be easily controlled with very small doses of ephedrine. General Anaesthesia can add to the risks of delivery since intubation and extubation can lead to increases in systolic and diastolic blood pressure, as well as heart rate, so should be avoided where possible. In women with pre-eclampsia fluid requirements at caesarean section should be carefully considered and use of more than 500mls of fluid, unless to replace blood loss, should be exceptional.
**Indications for Central Venous Pressure Monitoring**
A CVP may be indicated:

i) at caesarean section particularly if blood loss is excessive.

ii) if blood loss is excessive or delivery is complicated by other factors such as abruptio placentae.

The most recent Confidential Enquiry has 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.

**Anti Convulsant Therapy**

**Prophylaxis**
Following the MAGPIE study (3) women felt to require care according to the guidelines should also be started on Magnesium Sulphate. If a woman needs Magnesium Sulphate she needs care according to the guidelines.

**Management of Eclampsia**
Call appropriate personnel - including the resident Anaesthetist.
Commence Magnesium Sulphate according to the protocol (2).
If fitting has not ceased give Diazepam 5-10 mg intravenously.
Once stabilised the woman should be delivered.
Oximetry should be instituted if not already in place.

**Management of recurrent fits**
Increase rate of infusion of Magnesium to 1.5g / hour. Continue observations and consider the need for ventilation.
**Magnesium Sulphate Protocol**

Magnesium sulphate is given as a loading dose followed by a continuous infusion for 24 hours or until 24 hours after delivery - whichever is the later.

**Loading dose:** 25ml Magnesium sulphate 20% i.v. over 25 minutes. Draw up 25mls from the pre-diluted vial. Administer via a syringe pump over 25 minutes at an infusion rate of 60ml/hr.

**Maintenance dose:** Magnesium sulphate 20% i.v. over 24 hours. Draw up 50 mls from the prediluted vial. Administer via a syringe pump at an infusion rate of 5ml/hr. Each syringe should last 10 hours.

**Important Observations.**
The medical staff are responsible for the assessment of the patient and the decision to start the next dose.

The following observations should be performed:-

- i) Continuous pulse oximetry
- ii) Hourly urine output
- iii) Hourly respiratory rate
- iv) Deep tendon reflexes

Every 5 hours the following observations should take place.

- i) The biceps reflex is present.
- ii) The respiratory rate is > 12/min.
- iii) The urine output is greater than 100ml in the previous 4 hours.

**The antidote is 10ml 10% calcium gluconate given slowly intravenously.**
97% of magnesium is excreted in the urine and therefore the presence of oliguria can lead to toxic levels. If the above criteria are not met then further administration of magnesium sulphate should be withheld. If magnesium is not being excreted then the levels should not fall and no other anticonvulsant is needed. Magnesium should be re-introduced if urine output improves.

**Side effects**
Motor paralysis, Absent tendon reflexes, Respiratory depression and Cardiac arrhythmia (increased conduction time) can all occur but will be at a minimum if Magnesium is administered slowly and the patient observed as above.

**THERE IS NO NEED TO MEASURE MAGNESIUM LEVELS WITH THE ABOVE PROTOCOL**
**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 80 ml/hr: Hartmanns solution or equivalent plus other infusions of drugs.

Urine output should be recorded hourly and each 4-hour block should be totaled and recorded on the chart. Each 4-hour block should total in excess of 80 ml. If two consecutive blocks fail to achieve 80 ml 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 gelofusine 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 gelofusine in addition to baseline fluids.

If the urine output fails to respond to frusemide in either situation then a discussion with a member of the Regional advisory panel would be appropriate.

**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 member of the regional panel.

If the woman has dropping oxygen saturation it is most likely to be due to fluid overload. 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. The regional panel is available to give advice as needed.
Stabilization before Transfer

When the woman is ill and requires delivery transfer for fetal reasons is often considered. However if the woman requires transfer for delivery it is even more important that her condition is stabilized. We therefore recommend the following as a minimum requirement before transfer.

i) Blood pressure should be stabilized at an acceptable level according to the above protocol. Also when the woman is ventilated it is important to ensure ventilatory requirements are stable and oxygen saturations’ are being maintained.

ii) All basic investigations should have been performed and the results clearly recorded in the accompanying notes or telephoned through as soon as available.

iii) Fetal well-being has been assessed to be certain that transfer is in the fetal interest before delivery. Steroids should be given if the woman is pre-term.

iv) Appropriate personnel are available to transfer the woman. This will normally mean at least a senior midwife often with an anaesthetist.

v) Transfer has been discussed with appropriate Consultant medical staff and all the relevant people at the receiving unit e.g. the neonatal unit and neonatal medical staff, the resident obstetrician, the midwife in charge of delivery suite, intensive care and the intensive care anaesthetist (where appropriate).

Appendix

Minimum equipment requirements for monitoring

In order to adequately assess and monitor a woman in a critical care situation a certain minimum of equipment is required. We would suggest the following:

1. Oximeter (e.g. OHMEDA)
2. Non Invasive Blood Pressure (e.g. DINAMAP)
3. Volumetric Pumps (2 minimum) (e.g. IMED)
4. Syringe Drivers (2 minimum) (e.g. Graseby)
5. Pressure channels for CVP (usually with above)
6. ECG Monitor
7. Temperature (usually on dinamap) - may be useful
8. Cardiotocograph
Regional Advisory Panel

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2. Collaborative Eclampsia trial  Lancet. 1995; 345 1455-63