The Mid Yorkshire Hospitals NHS
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Bringing together community and hospital services

Clinical Practice Care Pathway

Maternity Services

Eclampsia and Severe Pre-eclampsia Yorkshire Protocol

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Guideline Review and Amendment Log

Version Number	Reason for Change	Date	Description of Change
4	Routine review by Mr A Mumdzjans/Dr Dhingra	Feb-April 2014	New additions: Background, clinical presentation and symptoms, definitions. Additional information included: magnesium sulphate protocol, antenatal fluid management, postpartum management and audit recommendations. Flow chart developed
4a	Review in relation to reconfiguration of services	August 2016	Minor word changes only – not circulated.
4b	Reword	January 2017	Rewording/clarification of flow chart (page 4) – not circulated: Dexamethasone/Betamethasone not to be used for the **treatment** of HELLP (not contraindicated)
5	Routine review & update	April 2017	Addition: Any women presenting at the Dewsbury or Pontefract hospitals with severe or moderate hypertension should be transferred immediately via ambulance to the Labour ward at PGH. Dexamethasone or Betamethasone should not be used for the treatment of HELLP syndrome.
5a	Minor update	June 2019	Serum magnesium levels should be monitored if oliguric (<25ml/hour averaged over 4 hours) or recurrent fitting. Bloods should be repeated once daily if patient stable, to be repeated more frequently if abnormal or patient unstable.
5b	Minor updates	Nov 2019	Changes made in lines with updated- 'Hypertension in pregnancy NICE Guideline NG 133 - Indication for Magnesium sulphate - Doses for recurrent fits

CONTENTS

1.0 Flow chart for management of Severe Pre- eclampsia and Eclampsia

Moderate hypertension: Systolic 150-159mmhg, Diastolic 100-109 mmhg
or
Mild hypertension: Systolic 140-149 mmhg, Diastolic 90-99 mmhg

+ proteinura
With 1 or more of;
Headache, Visual disturbance, epigatric pain with vomiting, liver tenderness, clonus, papilloedema, abnormal blood picture or HELLP.

Severe hypertension:
Systolic >160mmhg
Diastolic >110mmhg
MAP >125 mmhg
+ proteinuria

Eclampsia:
Emergency buzzer – call for help
Call 2222 – Obstetric emergency (Stating hospital site)
Protect the airway and administer O2
Commence magnesium sulphate bolus regime
If bolus dose previously administered increase infusion to 7.5mls/hr or 2g bolus.

Admit to labour ward - 1:1 care
Good communication and regular reviews with co-ordinator, obstetric, anaesthetic and neonatal teams.

Magnesium sulphate
Consider commencing infusion if: BP >160/100 or severe symptoms.
Loading dose: 4g over 10 minutes.
(20mls of 20% solution at 120mls/hr).
Maintenance dose: 1g/hour over 24 hours.

Documentation: Yorkshire protocol.
Intapartum- Birth record - partogram and record significant events i.e Lscs, suturing, labour summary.

Labetolol (1st line agent)
200mg orally (should get response in 30 mins)
If responsive 2nd dose of 200mg can be given after 1 hour
No response or oral therapy not tolerated = IV labetolol.
IV labetolol – (BP monitoring every 10 mins)
Bolus dose: 50mg given over 1 minute
Repeat every 10 minutes to Max 200mg.
(Consider oral Nifedipine 10mg after 4th dose.)
Maintenance dose: 5mg/ml at 4mls /hr
Doubled every 30 minutes. Max 32mls/hr.

Monitoring:
Pre-treatment and pre-syringe:
Reflexes, repiratory rate >12 and urine output >80mls 4 hourly.
Bloods: serum levels 6 hourly if oliguric (<25ml/hr) or recurrent fitting.
Levels 2-4mmols/l

Urine output:
If <10 mls/hr stop infusion.
10-20mls/hr halve rate to 2.5mls/hr

Thromboprophylaxis:
TED Stockings
Low Molecular Weight Heparin postnatal (Unless PPH or regional analgesia)

Nifedipine (2nd line agent)
Orally 10mg (not slow release)
BP every 10 mins for 30 mins.
Repeat after 30 minutes.
When BP stable 6 hourly
Postnatally consider 12 hourly slow release.

Monitoring (Aim for BP 150/80-100)
IV hypertensives:
BP 10 minutely until stable
30 minutely for 1 hour,
Hourly thereafter.
Oral hypertensives:
BP 10 minutely until stable,
Hourly thereafter.

Postnatal fluid management:
See page 5

Antenatal fluid management:
80-85mls/hr or 1ml/kg
Hourly urine output = 80mls in 4 hours
If oliguria consider CVP line
Conservative management:
1ml/kg bodyweight/hr or 24mls/kg bodyweight/day
Record on 24 hourly urine chart.

Postnatal care:
*Consultant must be involved in decision to discharge.
*A Comprehensive letter written to GP on discharge.
*Plan of care following discharge documented in notes, specifying frequency of monitoring and when to reduce treatment.
*Women to be informed of how to self monitor.
-Medical review at 2 weeks if remains medicated.
* 6-8 week follow up by Obstetric consultant or GP.

Hydralazine IV (3rd agent)
20mg hydralazine in 20mls Normal saline
Bolus: Give 2.5-10mg slowly over 1 minute
Consider stopping labetolol infusion.
Consider 500mls crystalloid before of during administration
Repeat after 20-30 mins. Max total dose 30 mg.
Maintenance: continuous infusion of 50-150mcg/mis= 3-9mg/hr
Continuous CTG monitoring
Stop if diastolic <90mmhg

- Continuous O2 saturations,
- 4 hourly temperature,
- Foleys catheter – Hourly urine output,
- PCR/ 24 hour urine collection.
- Nil by mouth

Daily Bloods (if stable): UE, Urates, LFT, FBC and clotting screen.
GSS weekly

Fetal monitoring:
CTG performed initially for fetal assessment.

Intrapartum	**Conservative management**
Continuous monitoring	4-6 hourly USS (Growth) fortnightly. Doppler and Liquor volume alternate days.

Delivery plan:
Stabilise
Well planned
>34 weeks consider delivery if <32 weeks LSCS preferred option.
2 doses = Betamethasone 12mg IM 24 hours apart between 24-34 weeks.
Consider between 35-36 weeks (Do not use dexamethasone or betamethasone for the treatment of HELLP syndrome)
Short 2nd stage of labour consider elective operative delivery.
10iu Syntocinon intramuscular for 3rd stage (Ergometrine or Syntometrine are contraindicated).

1.1Flowchart: POSTPARTUM FLUID MANAGEMENT

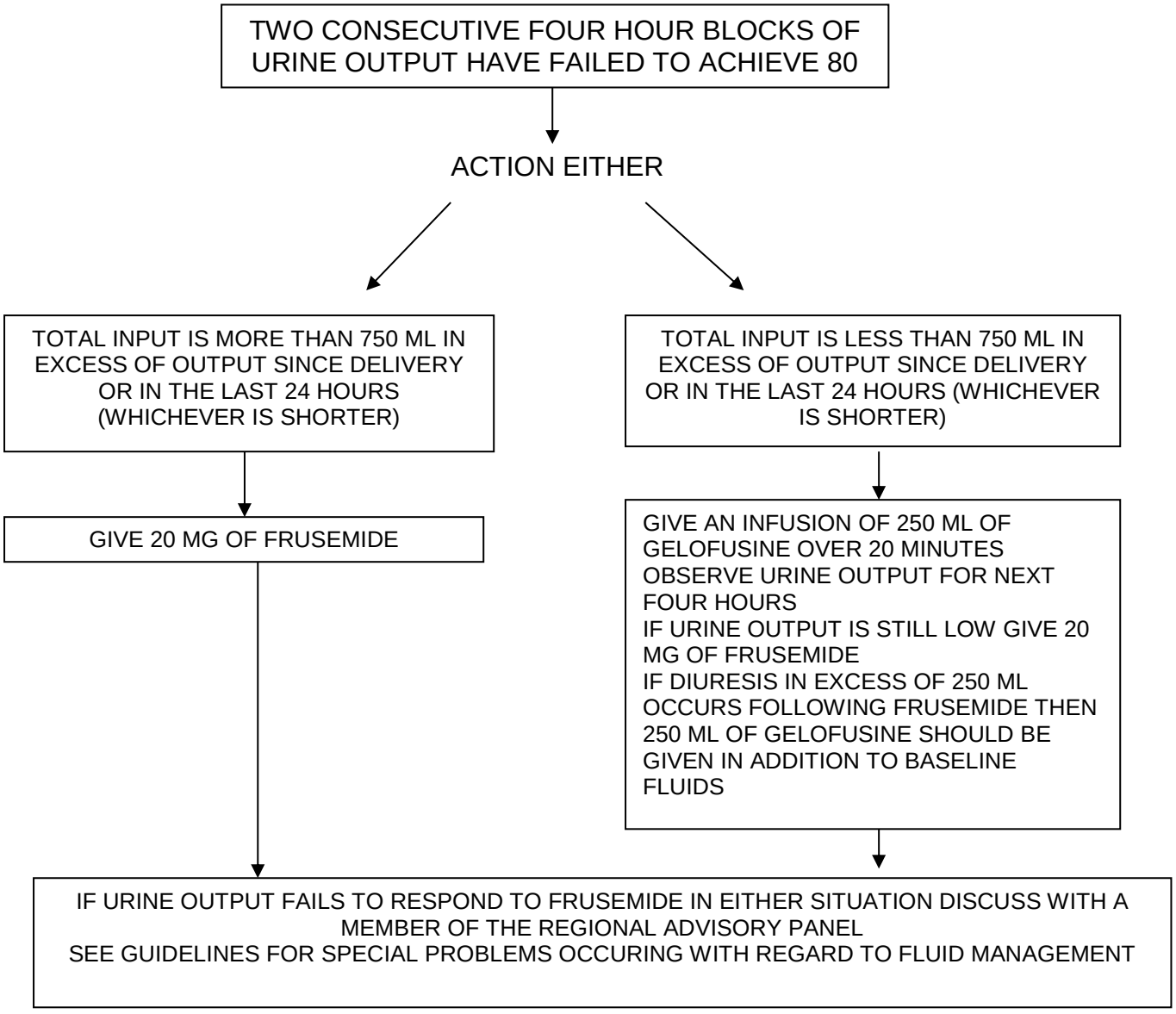
FOLLOWING DELIVERY THE URINE OUTPUT SHOULD BE TOTALLED AND FLUID BALANCE RESTARTED

ACCOUNT SHOULD BE TAKEN OF BLOOD LOSS AT DELIVERY AND IV INPUT IN THEATRE, THIS SHOULD BE RECORDED ON THE 24 HOUR CHART

URINE OUTPUT SHOULD BE MEASURED HOURLY AND AFTER FOUR HOURS THE TOTAL AMOUNT NOTED ON THE 24 HOUR CHART

EACH FOUR HOUR BLOCK SHOULD TOTAL 80 ML OR MORE

IF TWO CONSECUTIVE BLOCKS FAIL TO TOTAL 80 ML THEN TAKE FURTHER ACTION AS OUTLINED BELOW



2.0 Background

Eclampsia and severe pre-eclampsia are relatively rare but serious complications of pregnancy with approximately 5/10,000 maternities in the UK suffering eclampsia and 5/1000 maternities with severe pre-eclampsia. They remain the second highest cause of maternal deaths and it is therefore essential that early warning signs are detected and that referral to specialist care takes place.

Pre-eclampsia is a dynamic process. Diagnosing a woman's condition as "mild pre-eclampsia" is not helpful because it is a progressive disease, progressing at different rates in different women. Appropriate care requires frequent re-evaluation for severe features of the disease and appropriate actions as outlined in the new guidelines.

CMACE have consistently reported that substandard care has attributed to poor outcomes in these women and that standardised local and regional guidelines for management would help improve outcomes.

2.1 Definitions

- **Eclampsia:** Convulsive condition associated with pre-eclampsia.
- **Severe Pre-eclampsia:** Pre-eclampsia with severe hypertension and/ or with symptoms, and /or altered blood picture.
- **Pre-eclampsia:** New hypertension presenting after 20 weeks gestation with significant proteinuria.
- **Significant proteinuria:** Diagnosed if:
  urinary protein: creatinine ratio above 30 mg/mmol **OR**
  24-hour urine collection above 300mg protein (approximately equivalent to 1+ proteinuria on urine dipstick.)
  NB: The poor predictive value of urine dipstick has to be acknowledged. NICE hence advises use of automated reagent-strip device or a spot urinary protein:creatine ratio in a secondary care setting.

There is evidence, that the diagnosis of pre-eclampsia no longer requires the detection of high levels of protein in the urine (proteinuria). Evidence shows organ problems with the kidneys and liver can occur without signs of protein, and that the amount of protein in the urine does not predict how severely the disease will progress.

3.0 Aims and Objectives

This guideline is aimed at all health care professionals involved in the management of women diagnosed with eclampsia and/ or severe pre-eclampsia. The guideline reflects evidence based recommendations from the Yorkshire Regional Pre-eclampsia guideline, NICE Clinical Guidance for Hypertension in pregnancy (CG107; August 2010) and current NHS National Litigation Authority Clinical Negligence Scheme for trusts maternity clinical risk standards 2013-2014 standard 3, criteria 1 & 2.

4.0 Target Population

Women admitted into the maternity service who have pre-eclampsia and eclampsia requiring management according to recognised guidelines.

5.0 Audience

- Consultant Obstetrician
- SpR Obstetrician
- SHO Obstetrician
- Senior Labour Ward Midwife/Coordinator
- Consultant Anaesthetist and Registrars
- Midwife

6.0 Practice Recommendations

6.1 Clinical Presentation and Symptoms

- Onset after 20 weeks gestation in a previously normotensive and non-proteinuric woman.

- Features include hypertension, significant proteinuria with specific clinical and/or biochemical abnormalities.

- Clinical feature of severe pre-eclampsia are hyperreflexia, frontal headaches, blurred vision and epigastric tenderness.

- Biochemical features of severe pre-eclampsia include elevated liver enzymes, low platelets and elevated creatinine. Severe pre-eclampsia is a multisystem disease. Cerebral odema, vasospasm and microinfarcts can lead to eclamptic fits. Severe hypertension can lead to intracranial haemorrhage and stroke.

- Haemolysis with Elevated Liver enzymes and Low platelets Syndrome (HELLP) and disseminated intravascular coagulation may develop.

- Renal effects vary from mildly raised serum creatinine to oliguria and anuria which can result in fluid retention, renal failure and pulmonary odema.

6.2 Assessment and Diagnosis

Any woman with one of the following criteria should be considered as having severe pre-eclampsia:

1. Severe hypertension (systolic BP ≥160 or diastolic BP ≥ 110 or MAP ≥ 125 on two occasions) and proteinuria

2. Moderate hypertension (systolic BP 150-159 or diastolic BP 100-109) or Mild hypertension (140-149 mm Hg systolic or 90- 99mm Hg diastolic and proteinuria (≥ +1 or ≥ 0.3g/l) **with one or more abnormal clinical/biochemical features:**
   i) Abnormal clinical features: severe headache, visual disturbance, epigastric pain with vomiting, liver tenderness, clonus and papilloedema

ii) Abnormal biochemical features: Platelet count less than 100 x 10^9, ALT (alanine amniotransferase) > 70 iu/l, creatinine greater than 100 or creatinine clearance less than 80.
iii) Clinical discretion should be used to include women who present with atypical signs and symptoms.
iv) HELLP syndrome**. (NB It is possible to have HELLP syndrome with a normal BP)**

Any women presenting at the Dewsbury or Pontefract hospitals with severe or moderate hypertension should be transferred immediately via ambulance to the Labour ward at PGH.

6.3 Differential Diagnoses

These include renal disease, phaeochromocytoma, drug usage such as cocaine and amphetamines and cardiovascular diseases such as coarctation, subclavian stenosis, aortic dissection and vasculitis.

6.4 Multidisciplinary Team

Management should be multidisciplinary and involve:

- Consultant Obstetrician on-call
- SpR Obstetrician on-call
- SHO Obstetrician on-call
- Senior Labour Ward Midwife/Coordinator
- Consultant Anaesthetist and Duty Anaesthetist on-call
- The Consultant Haematologist on-call may also need to be informed depending on the situation.
- Consultant Paediatrician and Registrar on-call

6.5 Communication and Team Working

- The midwife caring for the woman must inform the Consultant Obstetrician, Consultant Anaesthetist and Labour Ward Coordinator as appropriate to allow involvement at an early stage
- Effective communications are of the utmost importance. The on-call Obstetric Consultant, Anaesthetist and Paediatrician should be routinely involved in the management of these patients.
- The involvement of all senior staff should be documented in the hospital records detailing the time called and time of arrival.
- Optimal channels of communication between staff, women and their families must be maintained and any discussions documented in the hospital records.
- The Labour Ward Coordinator should ensure that she is kept abreast of the clinical and biochemical progress of any woman admitted with a diagnosis of pre-eclampsia.
- The Labour Ward may be the most appropriate place to care for pregnant women. However some mothers will develop medical complications requiring

transfer to HDU/ITU in cases of DIC, HELLP, coagulation support, haemorrhage, hyperkalaemia, severe oliguria,cerebrovascular accident, uncontrolled eclampsia, renal failure, pulmonary oedema.

- Communication with HDU/ITU personnel, haematologist and physicians in such cases is essential. Non pregnancy related problems such as cerebral vascular accident and pulmonary oedema need to be considered.
- Porters and laboratory staff should be closely involved.

6.6 Basic Investigations

Blood should be sent for:
1. Serum electrolytes (Na, K, Urea, Creatinine, Urate)
2. Liver function tests (Albumin, ALT)
3. Full blood count (Hb, WCC, Plts)
4. Clotting (PT, APTT + fibrinogen, FDP's)
5. Group and save serum
6. Urine sent for Protein-Creatinine ratio sent in a sterile universal container. A protein-creatinine ratio >30mg/mmol indicates significant proteinuria (RCOG/NICE).

Tests 1-4 should be checked daily if the woman is stable or more frequently if abnormal.

PGH – For urgent samples Monday – Friday 9am – 5pm contact the lab direct. For out of hours samples ring ext 51086.

7.0 General Management Principles

7.1 Maternal Assessment and Monitoring

- Admit to Labour Ward.
- One to one midwifery care
- An accurate record of care should commence within the Yorkshire protocol booklet, using the birth record to document any relevant delivery events.
- All maternal observations should be recorded on an observation chart within the Yorkshire protocol booklet.
- In women who receive I.V. antihypertensive drug treatment, pulse and blood pressure recordings including MAP should be made every 10 minutes till BP is stabilised, then every 30 minutes for the next hour and then every hour if the woman is in labour or 4 hourly if conservative management is planned. In women who receive oral antihypertensive therapy, BP should be monitored every 10 minutes until stabilised.
- An appropriate sized cuff should be used ensure accurate readings. If electronic recordings are made - check manually every hour. Consider an arterial line for accurate BP measurement.

- Oxygen saturation should be measured continuously and respiratory rate should be monitored and charted hourly.
- Maternal temperature should be recorded four hourly.
- A Foley catheter should be *in situ* and hourly urinary output measured. Fluid balance should be monitored on the Yorkshire protocol observation chart.

- Routine blood samples should be taken every 12-24 hours, including full blood count, urea and electrolytes, creatinine, uric acid, liver function tests and coagulation screen. Results should be recorded within the Yorkshire protocol booklet.
- 24 hour urine collection to assess proteinuria if conservative management is planned. Alternatively, 20 mls urine in a universal container can be sent to the lab for protein-creatinine ratio.

7.2 Fetal Assessment and Monitoring

Electronic fetal monitoring should be performed at the initial assessment and repeated 4-6 hourly if conservative management is planned. Women in labour should have continuous electronic fetal monitoring and observations recorded within the birth record as per intrapartum care guidelines.

If conservative management is planned, fetal assessment with ultrasound and Doppler's should also be arranged. Growth scans should be done every 2 weeks, amniotic fluid index (AFI) and Doppler's should be done every 2 days depending on results. All results need to be seen by the Obstetric Consultant in-charge of the patient's care.

7.3 Antihypertensives

Aim for a target BP of 150/80-100 (NICE).

7.3.1 First line agent: Labetalol

(Contraindicated in known severe asthmatics and congestive heart failure.)

- If the woman can tolerate oral therapy an initial 200mg oral dose can be given. This can be done before venous access is secured and 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 200mg oral dose can be given if needed after one hour.
- If there is no initial response to oral therapy or oral therapy cannot be tolerated, BP control should be by boluses of IV Labetalol followed by a Labetalol infusion (Refer to the flow chart below for a guide to IV Labetalol bolus administration.)
- Each bolus is 50mg (=10ml of Labetalol 5mg/ml) given over at least 1 minute.
- This should have an effect within 5 minutes and can be repeated after 10 minutes until target systolic blood pressure has been reached.
- Boluses of IV Labetalol can be repeated to a maximum dose of 200mg.
- The pulse rate should remain over 60 beats per minute.
- A record of IV boluses and serial BP measurements can be recorded in the comments section of the Yorkshire protocol chart.
- Following this or as an 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 stabilised at an acceptable level. This level will vary between women.

- Oral antihypertensive treatment should be commenced when IV treatment has been discontinued.

7.3.2 Guide to Using IV Labetalol as a Bolus:

Time 0min: 1st dose **labetalol 50mg IV** over 1 minute
– check BP at 10 minutes- if effective → commence infusion
↓
If no effect
↓
Time 10min: 2nd dose **labetalol 50mg IV** over 1 minute
– check BP at 20 minutes- if effective → commence infusion
↓
If no effect
↓
Time 20min: 3rd dose **labetalol 50mg IV** over 1 minute
– check BP at 30 minutes- if effective → commence infusion
↓
If no effect
↓
Time 30min: 4th dose **labetalol 50mg IV** over 1 minute
– check BP at 40 minutes - if effective → commence infusion
↓
If BP still not under control use 2nd line agent Nifedipine
↓
Time 40min: **Oral nifedipine 10mg**and start labetalol infusion at 4ml/hr
- Check BP at 50 minutes and 60 minutes
↓
If no effect
↓
Time 70min: Further **Oral nifedipine 10mg**
Increase labetalol infusion to **8ml/hr**
- Check BP at 80 minutes and 90 minutes
↓
Time 100min: If BP still not at or below 150mmHg Consider IV hydralazine (as described below).

7.3.3 Second Line Agent: Nifedipine

- If labetolol 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).
- 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 BP.
- If a first dose fails to control the systolic blood pressure, a second 10mg oral dose can be given after 30 minutes.
- Once blood pressure control is achieved, nifedipine can be administered six hourly initially, though may be changed postnatally to a slow release preparation which lasts 12 hours.

7.3.4 Third Line Agent: IV Hydralazine

- Use IV hydralazine only if the woman cannot tolerate or does not respond to 1st or 2nd line agents. If using this agent because the woman has reduced conscious level, you must get senior help from Anaesthetic Consultant.
- Reconstitute 20mg hydralazine ampoule into 20ml syringe with 20mls of normal saline (to a 1mg/ml concentration). The dose is 2.5-10mg.Give small doses initially and over 1 minute.
- Onset of action is within 5-20 minutes. A further dose can be repeated every 20-30 minutes until BP stabilises at or below 150mmHg, to a maximum total dose of 30mg.
- Consider suspending the labetolol infusion whilst administering hydralazine boluses.
- Consider up to 500ml crystalloid bolus before or at the same time as the hydralazine bolus as the BP can drop suddenly.
- Hydralazine can be given as a continuous infusion to maintain BP control at a dose of 50-150mcg/minute = 3-9mg/hour = 3-9ml/hour of the above dilution.
- Care must be taken to avoid the tachycardia associated with IV hydralazine infusion.
- The hydralazine infusion must be suspended if Diastolic BP drops below 90mmHg.
- Continuous CTG monitoring must be in place with IV hydralazine administration.

All IV drugs should be prescribed in the Yorkshire protocol booklet.

7.4 Magnesium Sulphate Anti-Convulsant Protocol

Introduction

The MAGPIE study demonstrated that the administration magnesium sulphate to women with pre-eclampsia reduces the risk of an eclamptic seizure. Magnesium sulphate is given in severe pre-eclampsia once a delivery decision has been made and in the immediate postpartum period.

To **prevent eclampsia** (seizures), magnesium sulphate should be given if blood pressure is 160/110 or higher. However, if blood pressure is less than 160/110 and there are other severe symptoms that usually precede seizures - magnesium sulphate should be administered. Severe hypertension can be confirmed within a short interval (minutes) to facilitate timely antihypertensive therapy.

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. Ready made up vials containing 50ml of a 20% magnesium sulphate solution are available from pharmacy and must always be available on the Labour Ward.

7.4.1 Indications

If a woman in a critical care setting who has severe hypertension or severe preeclampsia has or previously had an eclamptic fit, give intravenous magnesium sulphate if birth is planned within 24 hours after discussion with a Consultant.

Consider the need for magnesium sulphate treatment, if 1 or more of the following features of severe pre-eclampsia is present:

- **ongoing or recurring severe headaches**
- **visual scotomata**
- **nausea or vomiting**
- **epigastric pain**
- **oliguria and severe hypertension**
- **Progressive deterioration in laboratory blood tests (such as rising creatinine or liver transaminases, or falling platelet count).**

Early diagnosis and prompt management of severe pre-eclampsia is **ESSENTIAL**.

Contraindications to Magnesium Sulphate

- Known hypersensitivity to magnesium sulphate
- Myasthenia gravis
- Hepatic coma with risk of renal failure

7.4.2 Pre- treatment monitoring (record on the Yorkshire protocol Chart)

- Knee reflexes present or forearm reflex if patient has an epidural
- Respiratory rate (> 12 breaths/min).
- Urine output (>80mLs over 4 hours)

7.4.3 Dosage and Administration

- Loading dose - 4g of Magnesium Sulphate - Use a 50ml syringe to infuse 20ml of 20% magnesium sulphate solution over 10 minutes via a syringe pump at 120ml/hour.

- Maintenance dose - infusion of 1g/hour maintained for 24 hours. (Use a 50ml syringe to infuse 50mls of 20% magnesium sulphate solution at a rate of 5mls/hour).

The prescription should be recorded within the Yorkshire protocol booklet.

7.4.4 Side Effects

These include (of most concern): respiratory depression, respiratory arrest, pneumonia, cardiac arrest and cerebral haemorrhage.

Common side effects (25%) include nausea, vomiting, diarrhoea, dizziness, drowsiness, confusion, muscle weakness, absent or reduced tendon reflex, thirst, headache, itching/tingling, hypotension, palpitation, tachycardia and site problems range from phlebitis, abscess, pain and burning.

7.4.5 Interactions

Avoid NSAIDs only during management, whilst platelet/renal functions are impaired (risk of renal failure and bleeds). Enhanced and prolonged neuromuscular blockade can occur with neuromuscular blocking agents, Nifedipine and Gentamicin. Avoid the use or consider a reduced dose if the woman has received magnesium sulphate. Or, the use of Rocuronium could be considered with Sugammadex as the reversal agent. Enhanced CNS effects with CNS depressants and addictive hypotensive effects with nifedipine and other calcium channel blockers can also occur.

7.4.6 During Treatment

- Monitor urine output hourly
- Hourly respiratory rate
- Continuous pulse oximetry
- Keep woman nil by mouth
- Bp measured every 10 minutes if BP not controlled, every 30 minutes if BP controlled.
- Review deep tendon reflexes before commencing each new syringe.

  The next syringe should only be administered if: -
  * The patellar reflexes are present.
  * The respiratory rate is > 12/min.
  * The urine output is greater than 80mls in the previous 4 hours.
- Serum levels to be monitored 6 hourly if oliguric (<25mLs/hr – averaged over 4 hours) or recurrent fitting. The therapeutic range of serum magnesium is 2 to 4mmol/L.

7.4.7 Stop Treatment If:

Reflexes are absent (usually above levels of 5mmol/L), or respiratory rate is less than 12 per minute, or SaO_2 less than 95%.

7.4.8 Inform Anaesthetist If:

- Respiratory rate <12/min
- O_2 Saturation <92%
- Bradycardia below 60 beats/min
- In the event of the above, discontinue the infusion. If no recovery in spite of this, then give the antidote: 1g in 10mLs of Calcium Gluconate injection 10% given by slow IV bolus over 10minutes.

If fits continue or if they are focal in nature, it is important to exclude other causes and a CT scan should be considered.

7.4.9 MANAGEMENT OF MAGNESIUM SULPHATE TOXICITIES

Magnesium sulphate infusion can be associated with some serious side effects that are dose (serum Mg level) related. Clearance of magnesium is impaired in renal failure. It is essential to monitor **serum magnesium** level when patients exhibit **clinical symptoms** of toxicities. The dose can be altered based on urine output and levels if available as follows:

Urine output (monitor hourly)

1. If less than 10mls/hr: Stop infusion. Check serum Mg level.

2. If 10 to 20mls/hr: Halve rate to 0.5g (2.5mls)/hr

3. If greater than 20mls/hr: Continue at 1g (5mls)/hr

Serum Mg concentration (therapeutic range 2 to 4mmol/L)

Action to be taken once serum Mg levels are available:

1. Serum Mg level 3.5 to 5mmol/L: STOP infusion for 15 minutes and restart at half the dose. Adjust dose on both clinical signs of toxicity and serum Mg level.

2. Serum Mg level > 5mmol/L: STOP infusion and depending on clinical symptoms the antidote Calcium Gluconate (see below) should be administered.

7.5 Management of Eclampsia

Eclampsia may be defined as a tonic clonic (grand mal) convulsion occurring in association with features of pre-eclampsia (although the diagnosis may only be made in retrospect).More than a third of women experience their first convulsion before the development of hypertension or proteinuria. Convulsions may occur antepartum (38%), intrapartum (18%) or postpartum (44%).Teenagers are three times more likely to suffer eclampsia then older women.

7.5.1 Assessment and Diagnosis

Any fit in a pregnant or newly delivered woman (up to 96 hours postpartum), other than in someone with known epilepsy, should be treated as eclampsia until proven otherwise.

Eclampsia has been reported up to 4 weeks postnatally, but the incidence of eclampsia falls after the fourth postnatal day.

7.5.2 Immediate Actions:

- ***GET HELP - Pull emergency call bell***
- ***Alert Labour Ward Coordinator***
- Call 2222 and specify Obstetrics emergency, clearly indicate the site.
- Position the patient to protect the patient's airway and to avoid injury.
- Administer oxygen. Pulse oximetry should be commenced if not already in place.
- Commence magnesium sulphate according to the protocol. If the patient has not yet received her 4g $MgSO_4$ loading dose, this should be given.
- Use a 50ml syringe to infuse 20ml of 20% magnesium sulphate solution (=4g) over 10 minutes via a syringe pump at 120ml/hour.
- If the patient has already received her loading dose, follow *Management of Recurrent Fits* as below.
- Most eclamptic fits are short lived, stop spontaneously and do not require immediate intubation.
- Once stabilised the woman should be delivered.
- Do not use diazepam, phenytoin or other anticonvulsants as an alternative to magnesium sulphate in women with eclampsia

7.5.3 Management of Recurrent Fits

- Increase rate of infusion of Magnesium to 1.5g/hour (to 7.5ml/hr) or give a further 2-4g bolus given intravenously over 5-10 (10-20ml of 20% Magnesium sulphate over 5-10 minutes at 120ml/hour).
- Continue full observations including conscious level.
- Further fits should be managed by controlled induction of anaesthesia with continuous BP control, potent dose of opiate and thiopentone with consideration being made to other causes of recurrent seizures.

7.6 Antenatal Fluid Management

- Fluid intake should be restricted to a total of 80- 85ml/hour or 1ml/kg body weight/hr
- Urinary output should be measured hourly. The woman should pass 80mls in 4 hours.
- If oliguria is present and there are concerns over fluid balance then a CVP line should be considered. Insertion of a CVP line would usually necessitate delivery and/or transfer of the woman to ITU for monitoring. If the CVP line is to be used for a very short period and it is decided that the woman can remain on the labour ward, all CVP measurements should be undertaken by the anaesthetist.

- For women who are not in labour and conservatively managed, oral fluid intake should also be restricted to 1ml/kg bodyweight/hr or 24ml/kg bodyweight/day. A 24 hour input-output chart should be completed for these women.

➢ All IV fluids should be prescribed in the Yorkshire protocol booklet.

7.7 Thromboprophylaxis

All patients should have anti-embolic stockings and Low Molecular Weight Heparin (LMWH) whilst immobile. The first thrombo-prophylactic dose of LMWH should be given as soon as possible after delivery provided that there is no postpartum haemorrhage or there has been regional analgesia. In such cases LMWH should be given by 4 hours after delivery or 4 hours after removal of the epidural catheter, if it is removed immediately or shortly after delivery. If the epidural catheter is left in place after delivery for the purpose of postpartum analgesia, it should be removed at least 12 hours after a dose and at least 4 hours before the next dose of LMWH (RCOG37a). Maintain adequate hydration and encourage early mobilisation.

7.8 Delivery Planning

"Planned delivery on the best day in the best way"

- Decision to deliver should be considered once the mother is stabilised. If the mother is unstable then delivery is inappropriate and increases risk.
- 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.
- Women more than 34 weeks gestation should be delivered, however some studies suggest that the best time of delivery is at 37 weeks of gestation– if stable. Mode of delivery should be decided by the Consultant Obstetrician. If vaginal delivery is planned follow induction of labour guidelines.
- 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. Vaginal prostaglandins will increase the chance of success.
- Antihypertensive treatment should be continued throughout assessment and labour.
- In the absence of convulsion, prolonging the pregnancy may be possible to improve the outcome of a premature fetus but only if the mother remains stable. Women less than 34 weeks gestation may be managed conservatively. This decision should be made on an individual basis by a Consultant Obstetrician.
- 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.
- 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. Two doses of Betamethasone 12mg intramuscularly 24 hours apart should be administered to women between 24

and 34 weeks gestation. Steroids should also be considered for women between 35-36 weeks. Since the benefits to the fetus peak between 48 hours and 6 days, after 48 hours further consideration should be given to delivery as further delay may not be advantageous to the baby or mother.

- **Dexamethasone or Betamethasone should not be used for the treatment of HELLP syndrome.**

- 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 advocated.
- The third stage should be managed with 10 units of **IM SYNTOCINON**.
- **Ergometrine** or **Syntometrine** should **not be given** in any form.
- Intrapartum care records should be recorded in the Yorkshire protocol booklet, using the birth record to document labour partogram and other relevant delivery events.

7.9 Anaesthesia and Fluids

Genuine pre-eclamptic patients tend to maintain their blood pressure, despite regional blockade. Fluid loading in pre-eclampsia should not be done prophylactically or routinely but should be considered and controlled.

Hypotension, when it occurs, can be easily controlled with very small doses of ephedrine or phenylephrine. 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. CVP monitoring may be considered to aid fluid resuscitation.

General anaesthesia carries added risks since intubation and extubation can lead to surges in systolic and diastolic blood pressure, as well as heart rate, so should be avoided where possible (risk of intracerebral bleed).If general anaesthesia is necessary, a controlled induction of anaesthesia with continuous and careful BP control, and with a potent dose of opiate and thiopentoneto obtund a dangerous BP surge is vital. The peripheral and facial oedema seen in pre-eclampsia increases the risk of upper airway oedema and difficult intubation.

A senior anaesthetist should be present for induction of general anaesthesia in these patients.

7.10 Postpartum Management

- The highest risk of eclampsia is in the first 24 to 48 hours postpartum therefore these women require continuing intensive monitoring for the first 24 to 48 hours.

- A Consultant Obstetrician will be nominated to provide continuity and consistency of care and will be the one person through whom all treatment decisions are channelled.

- Treatment of women with pre-eclampsia should continue throughout the postpartum period. Pulmonary oedema may occur in 2.9% of women, with more than two thirds of cases occurring after delivery. Treatment of acute pulmonary oedema is similar to that in non-obstetric patients.

- Postpartum fluid management is managed different to antenatal fluid management (see flow chart 1.1).

- Oliguria in the immediate postpartum period may be a problem. However if renal and respiratory functions are normal, this condition usually requires no treatment.

- Some women will continue to need oral anti-hypertensive medication for control of hypertension.

- Discharge home only following obstetric team review. The Consultant should be involved in the decision to discharge. A comprehensive discharge letter for the GP should be written by the SHO summarizing the woman's care.

- A comprehensive discharge plan must be documented in the maternal record stating:
  - Follow up care
  - Frequency of monitoring
  - When to reduce or stop medications
  - When referral to hospital is required.

- Women should be educated on the signs and symptoms of pre-eclampsia and when to report symptoms.

- Assessment of blood pressure, proteinuria and maternal condition should be continued by the community midwifery team /GP following discharge from hospital during the puerperium. Every 1-2 days for the first 14 days until medication stopped or no hypertension.

- A medical review should be offered if still remains medicated at 2 weeks postnatal.

- A postnatal follow-up appointment will be arranged for 6-8 weeks with the Consultant Obstetrician/GP. This is to review blood pressure control, bloods and presence of proteinuria, and to arrange appropriate referral if required for the management of these problems.

- Counselling for subsequent pregnancies should also take place at this visit.
- Women should be informed that their risk of developing gestational hypertension in future pregnancies ranges from 1 in 8 (13%) to about 1 in 2 (53%) pregnancies.
- Pre-eclampsia in future pregnancies is around 1 in 6 (16%) pregnancies.

- Pre-eclampsia in a future pregnancy is about 1 in 4 (25%) pregnancies if their eclampsia was complicated by severe pre-eclampsia, HELLP syndrome or eclampsia and led to birth before 34 weeks, and about 1 in 2 (55%) pregnancies if it led to birth before 28 weeks.

- Evidence firmly tells us that pre-eclampsia is associated with later life cardiovascular disease (CVD).
- Positive point is **to educate all pregnant and postpartum patients** about the signs and symptoms of pre-eclampsia.

7.11 Breastfeeding

Drugs that are safe to use during breastfeeding include; labetalol, Nifedipine, enalapril, captopril, atenolol, metroprolol. There is insufficient evidence on the safety of ARB's, amlodipine and ACE inhibitors other than enalapril and captopril.

8.0 Audit/Monitoring Compliance

This guideline will be monitored by health records of women who have delivered with a diagnosis of severe pre-eclampsia using an agreed audit proforma which ensures that as a minimum the audit will include assessment of compliance in relation to:

- Blood pressure control and fluid balance
- Prevention of seizures
- Fetal assessment and delivery planning.

The lead for monitoring the guideline will be Labour Ward Lead Consultant in conjunction with the Labour Ward Forum.

The results of the audits will be presented at the departmental audit or clinical governance meeting where any identified deficiencies and recommendations will be action planned. The action plan will be monitored at the divisional Clinical Governance meeting using the divisional risk register as the monitoring document.

Actions developed at the audit/clinical governance meeting will be monitored quarterly at the Women's Services Clinical Governance meeting using the Women's Services risk register to demonstrate progress.

Any required changes to practice will be actioned within a specific time frame. A lead member of the team will be identified to take the change forward where appropriate. Lessons will be shared with all relevant stakeholders.

The audit may also consider the RCOG Auditable Standards

- Rate of documented involvement of Consultant Obstetrician and Anaesthetist in acute management.
- Proportion of women with full complement of appropriate investigations.
- Proportion of women in whom fluid has been restricted appropriately to 80 ml/hour.
- Proportion of women receiving appropriate magnesium sulphate prophylaxis.

- Proportion of women with eclampsia treated with magnesium sulphate.
- Proportion of women attending for postnatal review and/or preconception counselling.
- Appropriate anti-hypertensives to reduce blood pressure to recommended levels.

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10.0 Appendices

Appendix 1

List of all staff consulted as part of care pathway development

First Consultation – version 5 April 2017

All Wards and Department managers
Consultants
Women's Governance group
Anaesthetists
Paediatricians

Second consultation – Version June 2019

Obstetric consultants
Anaesthetic consultants
Maternity Managers

Version 5B – November 2019

Maternity managers
Obstetric consultants
Anaesthetic consultants
Maternity governance group

Appendix 2 Equality Impact Assessment – Initial Assessment

Directorate: Women's Health	**Area: Maternity**
Policy/Project Summary: Guidelines for the Management of Eclampsia and Severe Pre-eclampsia	

What are you seeking to achieve with this work? *What has prompted this change?* *What are the intended outcomes of this work?*	**This guideline seeks to promote and maintain best clinical practice in the MYHT Maternity Services regarding the management of women with eclampsia & severe pre-eclampsia**
Who will be affected by it and why? *(e.g. Public, patients, service users, staff, etc.)*	**Obstetric medical staff and midwives. Anaesthetic staff. Paediatric staff.**

Information

What information is available about the current situation to assist decision making?
(e.g. data, intelligence, research or national guidelines; staff and patient experience)

Impact Analysis

Based on the information available, an assessment of the current situation and the changes being proposed is there the possibility of a differential impact (positive or negative) on the groups listed below?
(Enter Y/N against each characteristic and a rationale with evidence)

	Y/N		Y/N
Disability	N	**Gender Reassignment & Transgender**	N
Gender/Sex	N	**Religion or Belief**	N
Race	N	**Pregnancy and Maternity**	N
Age	N	**Marriage & Civil Partnerships:**	N
Sexual Orientation	N	**Carers**	N

Rationale for Answers Above:
(Explain for each characteristic, why it is considered that there may or may not be an impact)

Summary of Actions Planned as a Result of the Assessment
(Indicate timescales and lead officers for each action)

Date: November 2019
Name: Tove Crookes
Role: Deputy Governance and Risk Midwife

APPENDIX 3

Document Control Summary	
Document Title	Guidelines for the Management of Eclampsia and Severe Pre-eclampsia
Author (s) and Grade (s)	Ms Chitra Rajagopalan – Consultant Obstetrician Dr Sarah Radbourne – Consultant Anaesthetist Ms Simi Dhingra – Consultant Obstetrician
Department	Maternity Services
Date of Production	June 2019
Planned implementation date:	June 2019
Purpose/Aim of Document	To provide, safe, consistent, evidence-based care.
Circulated to	All Wards and Departments All Consultants Paediatricians Anaesthetists
Status	Live
Update Frequency	3 yearly
Next Review Date	April 2020
Approved By	Maternity Governance Group 25.11.2019 Chair – Y Rowlan (Head of Midwifery)

Document Checklist to be filled in by Ratifying Committee	
Is the Document using the correct Template?	Yes
Is the Circulation List Representative?	Yes
Is there an Evidence Base (where required)?	Yes
Is it signed off at the appropriate level?	Yes
Does it have an Equalities Impact Assessment that is satisfactory?	Yes
Does it need to go to other committees for ratification?	No