

1. INTRODUCTION:

Definition:

Pre-eclampsia is defined as **gestational hypertension of >140/90 mmHg** on two separate occasions ≥4 hours apart accompanied by significant **proteinuria of >300 mg** in a 24-hour collection of urine, arising after the **20th week** of gestation in a previously normotensive woman and resolving completely by the **6th postpartum week**' 1.

Eclampsia is part of the clinical spectrum of pre-eclampsia. It's defined as one or more convulsions in association with PET.'

Facts:

- PET affects 2-8% of pregnancies with 5/1000 maternities in UK suffering severe preeclampsia
- Eclampsia affects 2.7/10,000 maternities
- The death rate from PET/ Eclampsia is at its lowest rate of 0.25 per 100,000 due to good standards of care.

2. AIM:

To improve the detection and treatment of women with eclampsia or pre-eclampsia on labour ward, the ante natal and post natal wards.

3.GUIDELINES:

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Management of Eclampsia

IMMEDIATE RESUSCITATION

Call for Help	Dial 2222 State "Obstetric Emergency" and location		
Airway	Flatten bed and place in left lateral position Assess airway – Clear and maintain		
Breathing	High flow oxygen		
Circulation	Intravenous access x 2 (16 gauge)		
Circulation	Bloods -Brown tube -U&Es, LFTs, Urate		
	-Red tube -FBC		
	-Green tube -Coagulation		
	-Blue tube -Group and Save		
	-Yellow tube -Serum glucose		
	Fluid restriction to 80 ml/hr (RCOG 2006)		

IMMEDIATE MANAGEMENT OF SEIZURE

Magnesium Sulphate	See <i>Magnesium Sulphate protocol</i> Obtain Eclampsia box from labour ward or antenatal ward or Obstetric triage
Recurrent seizure	2 gram bolus of MgSO₄ over 5 minutes or 4gram bolus over 5 minutes if >70Kg at booking
Third or more seizure	Consultant Anaesthetist and Obstetrician must attend and consider intubation, ICU management ±CT Brain. Maternal stabilisation and blood pressure control is vital <i>prior</i> to intubation in order to minimise maternal risk. Neuroimaging should be performed urgently if any focal neurology present or persistent seizures. Consider use of diazepam or thiopentone/propofol.

Once initially stabilised trans MEWS Chart	sfer to Labour Ward Pulse, respiratory rate, oxygen saturations measured every 10 minutes for two hours then half hourly.
Blood pressure	Appropriate size/ level of heart. Korotkoff 5 (silence) Correlate manual with automated BP cuff Every 15 minutes until stable, then half hourly. Keep BP<150/100.

MATERNAL MONITORING

FETAL ASSESSMENT

Continuous CTG in acute setting (RCOG 2006) Plan for delivery after mother stabilized, discuss with consultant regarding Induction of Labour Vs Caesarean section USS - growth, liquor volumes, umbilical artery Doppler if conservative management.

See Managing Hypertension in Severe Pre-eclampsia TREAT HYPERTENSION

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Only Syntocinon(Oxytocin) should be used for 3rd stage.

Management of Severe Pre-Eclampsia

The following signs and symptoms in isolation or any combination may indicate fulminating pre eclampsia. Transfer to labour ward and consider delivery. Management plan should be discussed at obstetric and anaesthetic consultant level.

DEFINITION

Severe hypertension (BP \geq 160/110mmHg) and proteinuria (PCR >30 mg/mmol or 24 urine collection >300 mg protein).

Or

Mild or moderate hypertension (BP 140/90-159/109 mmHg) and proteinuria with at least one of the following:

- Severe headache
- Visual disturbances
- Severe RUQ pain or vomiting
- > Papilloedema
- Signs of clonus (> 3 beats)
- Liver tenderness
- HELLP syndrome
- Platelets falling <100</p>
- Abnormal liver enzymes (ALT > 70)

MANAGEMENT



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Managing Hypertension in Severe Pre-eclampsia

Beware synergistic effects of different drug classes including magnesium sulphate. Cases of severe hypotension have been reported. An interaction between nifedipine and magnesium sulphate leading to profound muscle weakness has been reported. Anaesthetic staff should be informed of patients, as invasive monitoring may be required. Target blood pressure should be clearly documented in patient's notes, usually 140-150 systolic and 90-100 diastolic.

First line Labetalol orally.

• 200mg stat. Repeat oral dose once after 30 mins if no response.

Cautions

Contraindicated in patients with AV block or bradycardia (<60bpm). Caution in patients with asthma

Second Line Nifedipine capsule – (if labetolol contraindicated).

- 10mg orally. NOT sublingual.
- Wait 30 min; repeat dose ONCE if necessary

Third Line Labetalol bolus and infusion- (when oral therapy inadequate.)

- Bolus- 50 mg over 5 mins. Rpt to a maximum of 200 mg in 10 min intervals.
- Ampoules are 100mg Labetalol HCl in 20mls (i.e. 5mg/ml) draw up 50ml
- See Infusion protocol for the control of hypertension in pregnancy

Fourth Line Hydralazine bolus and Infusion (Consider when Labetolol contraindicated)

- Bolus- 10–20 mg over 10–20 minutes, while measuring blood pressure every 5 minutes.
- Ampules contain 20mg Hydralazine
- See Infusion protocol for the control of hypertension in pregnancy
- Cautions

AN EPIDURAL IS USEFUL IN CONTROLLING BLOOD PRESSURE

Managing Pulmonary Oedema

Consider if $SaO_2 < 95\%$, tachypnoea, dyspnoea or cough.

Management: -

- Sit patient up
- High flow Oxygen via face mask with reservoir bag
- Exclude sedation from opiates
- CXR
- Arterial Blood Gases
- Inform senior anaesthetist and Obstetrician
- Very careful fluid balance with fluid restriction
- Furosemide 10-20mg slowly IV

Consider ICU referral

Infusion protocol for the control of hypertension in pregnancy

Target blood pressure should be clearly documented in patient's notes

LABETALOL HCL INFUSION

Preparation of infusion for 50 ml syringe

Draw up 50mls of labetalol 5mg/ml(21/2 Ampoules)

Rate

- Infusion rate is started at 4ml/hr
- Double every 30 min to a maximum of 32 ml/hr OR
- Until target blood pressure is achieved (usually 150/95 mmHg) •

Administration	Rate (ml/hr)	Dose (mg/hr)
	4ml/hr	20mg/hr
	8ml/hr	40mg/hr
	16ml/hr	80mg/hr
	32ml/hr	160mg/hr

Weaning Off

Reduce infusion by 2ml/hr every 30 minutes ٠

Cautions

- Labetalol should be used with caution in patients with asthma/liver damage
- Contraindicated in patients with AV block or bradycardia (<60bpm)
- Monitor blood pressure closely during administration, check manually before major treatment decisions made

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BEWARE OF PULMONARY OEDEMA .

Side Effects

- Headache, dizziness
- Sweating
- Tremor
- Urinary retention
- Ankle oedema
- Masks symptoms of hypoglycaemia
- GI upset
- Sleep disorder
- Hallucinations and rarely psychoses

HYDRALAZINE INFUSION

To be considered where Labetalol either unsuitable or unsuccessful

Equipment

Assumes syringe driver available Preparation of infusion for 50 ml syringe

Preparation

Hydralazine 40 mg (2 ampoules) made up to 40ml in Sodium Chloride 0.9% (i.e. 1mg/ml)

Administration

- 5mg (5ml) i.v. bolus may be given *slowly*
- Run at 2.5mg/hr (2.5ml/hr)
- Double every 30 min until target blood pressure achieved then maintain.
- Do not exceed 10ml/hr
- Consider alternatives if tachycardia, flushing or nausea are problems
- Do not infuse with glucose

Side Effects

- Profound hypotension (rapid dose increase)
- Flushing
- Nasal congestion
- Palpitations
- Tachycardia
- GI upset

• Magnesium Sulphate Protocol

DISCUSS WITH CONSULTANT PRIOR TO COMMENCEMENT An interaction between nifedipine and magnesium sulphate leading to profound muscle weakness has been reported

Loading Dose	Magnesium Sulphate - 4 grams over 15 minutes	
	Draw 8 ml of 50 % MgSO₄ from 10ml vial Add to 100ml bag of NaCl IVI via Braun pump at 400ml/hr	
Maintenance	Magnesium Sulphate 1 gram per hour Maintenance for 24 hrs post last seizure or post delivery	
	10ml of 50% MgSO₄ (5 grams) Add to 40 ml NaCl (Total volume = 50ml) IVI at 10 ml / hour	
2nd Seizure	2 grams (4 ml of 50% MgSO ₄) over 5 minutes or 4grams over 5 minutes if booking weight >70kg Make up to 10 ml with NaCl	

MONITIORING ON MAGNESIUM INFUSION

Respiratory rate, reflexes and oxygen saturations should be measured every 10 minutes for two hours then half hourly. Urine volumes hourly.

Pulse oximetry	If <95%, stop infusion and inform senior duty doctor
Patella/Arm reflexes	If absent, stop infusion and inform senior duty doctor
Respiratory rate	If < 12 , stop infusion and inform doctor
Urine volumes	If < 20 ml/hr, half infusion. If < 10 ml/hr, stop infusion.

If any of the above adverse signs occur then check Mg levels (Mg toxicity level >5mmol/I). Therapeutic range is 2-4 mmol/I.

CardioRespiratory Arrest	Dial 2222 State "Respiratory Arrest and location") Airway, Breathing, Circulation Stop and remove MgS0₄ infusion Administer Calcium gluconate 10% (1g in 10 ml)
Respiratory Depression	Airway, Breathing, Circulation Stop MgS0₄ infusion Consider Calcium gluconate

ANTIDOTE: CALCIUM GLUCONATE 10% (1G IN 10ML) GIVEN OVER 10 MINUTES.

Side Effects of magnesium sulphate

- Nausea, vomiting, diarrhoea
- Dizziness, confusion. Itching/tingling, thirst
- Muscle weakness, reduced or absent tendon reflexes
- Hypotension, palpitations, tachycardia
- Respiratory depression and arrest
- Cardiac arrest

Management of Oliguria in treatment of Pre-Eclampsia

Oliguria = Urine output < 120ml in 6 hrs

- · Consult senior obstetric and anaesthetic staff
- Assess patient including auscultation of chest, measurement of RR and SaO₂.
- Check urinary catheter not blocked
- Check PET bloods if not performed in last 4 hours
- Consider overall fluid balance: calculate and replace fluid deficits
- Fluid Challenge -250 ml Plasmalyte over 15 min and assess at 1 hour

At one hour	- $UO > 20ml$ then return to $80ml/hr$ fluid regime
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- UO < 20ml then discuss Central Venous Line (CVP)

Central Venous Pressure

CVP	<0	Repeat Fluid Challenge 250ml Plasmalyte over 15 min Check CVP after fluid bolus.
	0-5 MmHg	Continue with 80mls/hr (1 ml/kg/hr) Monitor CVP hourly
	>5	Furosemide 10- 20 mg IV Check CVP after 30 mins If oliguria persists check U+Es If UO < 20ml/hr consult with renal physician

Anaesthetic considerations in treatment of Pre-Eclampsia

1) Regional analgesia and anaesthesia

- 1. <u>Epidural analgesia</u> is recommended. It will help to prevent surges in BP and may improve perfusion through the feto-placental unit. An epidural can be topped up for surgical intervention as usual. NB. An epidural is not a substitute for intravenous antihypertensive therapy and these drugs should be continued throughout anaesthesia.
- 2. <u>Spinal anaesthesia</u> is not contraindicated in severe pre-eclampsia. BP is better maintained than in non pre-eclamptics, and vasopressor use is reduced.

Contraindications to regional blockade

The usual contraindications apply. In addition note that: -

<u>Platelet counts may fall rapidly</u>. A platelet count should be taken within **4-6 hours** of regional blockade

- If Platelets \geq 100,000: proceed with indicated block
- If Platelets < 100,000: take coagulation sample and ROTEM if available
- Platelets 80 100,000, coagulation screen/ROTEM normal and no other factors which may indicate haemostatic problem e.g. history of excessive bruising: proceed with indicated block
- Platelets < 80,000 OR coagulation screen/ROTEM abnormal: block contraindicated

Other considerations

1. An increased dose of intrathecal drug may be required if patient is preterm with a small uterus.

- 2. Vasopressors should be used with caution. Patients with severe pre-eclampsia are very sensitive to vasopressors and large surges in BP may result.
- 3. May require long spinal or Tuohy needles due to oedema.
- 4. Avoid adding epinephrine to solutions.
- 5. Caution with IV fluid administration (easy to precipitate pulmonary oedema because of increased vascular permeability).
- 6. Epidural catheter removal should not occur until thrombocytopenia and coagulation have corrected.
- 7. Withhold LMWH until coagulation status verified post op.

2) Anaesthesia for caesarean section in severe pre-eclampsia

Patients should not be delivered until medically stable i.e. BP and fitting controlled

Continue intravenous antihypertensives throughout duration of anaesthesia

1. <u>Regional anaesthesia</u> – see above. Preferable to general anaesthesia if possible.

2. General anaesthesia considerations

- Call Senior Anaesthetic help
- Assess airway. Beware facial oedema and hoarseness of voice or voice change. May predict difficult intubation

- Prepare drugs and equipment for difficult and failed intubation, especially availability of videolaryngoscopy and small COETTs
- Consider arterial line if BP unstable, on ≥ 2 intravenous antihypertensives, or on MgSO4.
- Modify RSI to attenuate haemodynamic response to laryngoscopy: consider using: -
 - I. MgSO₄ 4g IV over 15 mins if not already given
 - II. Alfentanil 1-2mg
 - III. Remifentanil infusion during preoxygenation at 0.2-0.5mcg/kg/min. At clinician's discretion give a bolus of 0.5-1 mcg/kg at induction
 - IV. Labetalol if not already on intravenous infusion
- Tracheal intubation if trauma occurs, perform laryngoscopy prior to considering extubation, and assess for leak around ETT whilst maintaining cricoid pressure
- Non-depolarising neuromuscular blockade will be prolonged by MgSO₄ therefore blockade should be guided by neuromuscular monitoring
- Cautious infusion of IV fluids. Replace deficits including blood loss

3) Prevention and treatment of PPH

Use syntocinon instead of syntometrine for management of PPH. Ergometrine is contraindicated in hypertensive patients as it causes a further rise in BP which may precipitate a stroke.

4) Analgesia

NSAIDS should be avoided until severe pre-eclampsia resolving

Summary of end organ changes in severe pre-eclampsia

cvs	Hypertension and ↑SVR ↑response to vasopressors Normal or ↓Cardiac Index ↑cap. Permeability	↓plasma volume ↓COP Disparity between CVP and PAWP	
Resp	Risk of pulmonary oedema (low COP +/- <pre></pre>		
CNS	Vasospasm Ischaemia Cerebral oedema	Haemorrhage Hypertensive encephalopathy	
Renal	Glomerular swelling Fibrin deposition	Oliguria ↓GFR	Proteinuria
Hepatic	Periportal necrosis Subcapsular haemorrhage	Spontaneous liver rupture	
Haematology	Low grade DIC	Haemolysis (HELLP)	

Management of Post Partum Hypertension

Blood pressure in normal pregnancy falls immediately after delivery and then rises again, often reaching a peak 3 or 4 days post partum. Women with hypertension during pregnancy may become hypertensive again within the first week post partum, even though they are normotensive immediately following delivery.

General Points Regarding Anti Hypertensives

- Methlydopa, although the anti hypertensive of choice in early pregnancy, has side effects including depression, sedation and postural hypotension and should be discontinued after delivery
- Well established beta blockers (eg. Labetalol and atenolol), angiotensin converting enzyme (ACE) inhibitors (enalapril), calcium channel blockers and diuretics are considered moderately safe to use in women who are breast feeding. Information on newer drugs is sparse.
- Although diuretics are safe, they may be less well tolerated and cause excessive thirst if the mother is breastfeeding.

Pre-existing /Chronic Hypertension

- Stop methyldopa after delivery.
- Recommence the anti hypertensive treatment regime the woman was receiving prior to pregnancy. If this was a diuretic, consider using a beta-blocker or calcium channel blocker instead. Ask about known adverse reactions to antihypertensives.
- For medical review prior to discharge to GP/community midwife. If suspected preexisting hypertension is diagnosed for the first time in pregnancy (ie BP raised <20 weeks of pregnancy) this must be clearly communicated to the GP and initial treatment is as for PIH/PET (see below)

Pregnancy Induced Hypertension/ Pre-eclampsia

- Stop methyldopa after delivery.
- Continue monitoring fluid balance, U&E's, platelets and LFT's following delivery until normalising. Urate does not require monitoring.
- If not on medication, a BP>150/100 requires regular treatment.
- Medication can be reduced in increments if BP consistently <140/90. NB most women will require to go home still on treatment.
- Discharge to GP/community midwife. If the BP is <140/90 by 2 weeks post partum, therapy should be decreased/stopped. Antihypertensives can usually be discontinued within 2-6 weeks.

Suggested Antihypertensive Regimes for Post Partum Hypertension

First Line

Labetalol may have been used orally antenatally or peripartum. This can be continued postpartum with dose adjustment according to BP. Consider changing labetalol to atenolol if long term antihypertensive treatment anticipated. Atenolol 50 – 100mg OD (ensure there is no history of asthma) If this is inadequate, add in:

Second Line

Nifedipine Modified Release- Prescribe Adalat LA 20mg or 30mg once daily unless currently has a supply of Adalat Retard which is prescribed as 10mg or 20mg twice daily.

If beta blocker and a calcium channel blocker together fail to control the blood pressure then renal function should be checked and a Consultant Obstetrician should be involved prior to considering commencing an ACE inhibitor (enalapril is preferable if breast feeding).

If third line treatment fails to adequately control the blood pressure consider referral to the Hypertension clinic.

Contents of Eclampisa Box

- **AIRWAY BAG**
 - o Laerdal pocket mask
 - o Hudson mask with tubing
 - o Guedel airway

IV BAG

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- Tourniquet 0
- Venflons x2 0
- Tegaderm 0
- o Connector
- o Tubes-FBC, Coag, U&E, Glucose, Group & Save
- o Forms-Combined Labs (RIE), Haematology, Biochemistry, BTS
- o Blood bags
- o IV chart
- o Drug Kardex

MAGNESIUM BAG

- o 6 ampoules magnesium sulphate (5g/10mls)
- INSTRUCTION SHEET FOR MAKING UP MAGNESIUM SULPHATE
- o Needles x2
- o 10 & 60 ml syringes
- o 5% Dextrose 100ml bag
- o Label
- o Giving set
- SIGNS OF MAGNESIUM TOXICITY INFORMATION о

CALCIUM GLUCONATE

- o 1 ampoule of calcium gluconate (1g/10mls)
- o 10ml syringe
- о Drawing up needle
- o Instructions for administration of calcium gluconate

. **CATHETER BAG**

- Sterile pack 0
- o Gloves
- o Catheter
- o Water
- o Syringe

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4. ASSOCIATED DOCUMENTS:

5. **REFERENCES**:

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