Clinical Practice Guideline	Hypertension in Pregnancy (Pre-Eclampsia & Eclampsia)
Department	Women's Health

Target Audience
Medical and Nursing Staff

Purpose
Severe hypertensive disorders of pregnancy are associated with high rates of maternal and fetal morbidity and mortality.
Pre-eclampsia is a multi-system disorder with unpredictable presentation and progression. Although the clinical progression is usually slow, occurring over days and sometimes weeks, rapid deterioration may occur and occasionally result in multisystem failure within a few hours. There is no curative treatment apart from birth, and the best management is by the involvement of a multidisciplinary team.
Pre-eclampsia is a common medical complication of pregnancy affecting 2-8% of pregnancies. Eclampsia complicates 1 in 200-300 cases of pre-eclampsia in Australia.
To manage hypertension, pre-eclampsia and eclampsia through prompt detection and treatment.

Guideline
Risk Factors
There is no single test to predict the occurrence of pre-eclampsia; however, it has been shown that women may benefit from a risk stratification model to identify those at greatest risk of developing the disease.

At the antenatal booking visit, women should be assessed for the following risk factors for preeclampsia and appropriate specialist referrals should be made, preferably before 20 weeks gestation.

High Risk Factors

- Pre-eclampsia in a previous pregnancy
- Multiple pregnancy
- Pre-existing medical conditions such as
    - Hypertension
    - Diabetes
    - Antiphospholipid antibody syndrome
    - Renal disease.

Additional Risk Factors
- Obesity, BMI > 35
- Maternal age <18 or >35 null parity
- Family history of pre-eclampsia
- Vascular & connective tissue disorders
- New partner

In women with a moderate to high risk of developing Pre – eclampsia, prophylaxis with low dose Aspirin (150mg nocte) is recommended, ideally commencing early in pregnancy (e.g.

at booking) and continued until 36 weeks. Calcium supplementation (1.5g/day) is useful in women whose diet is deficient in Calcium.

HYPERTENSION – Definition and Classification in pregnancy
Defined as systolic blood pressure greater than or equal to 140 mm Hg and/or diastolic blood pressure greater than or equal to 90 mm Hg arising after 20 weeks gestation and under 7 days postpartum

Taking blood pressures
A manual sphygmomanometer should be used in preference to an automated devise as the latter can underestimate systolic pressures.
To accurately assess blood pressure, an appropriately sized cuff for the arm should be selected. A large cuff with an inflatable bladder covering 80% of the arm circumference should be used, if the upper arm circumference is greater than 33 cm.
The woman should be sitting comfortably with her feet on a hard surface.
The systolic blood pressure is accepted as the first sound heard (Korotkoff 1) and the diastolic blood pressure is the disappearance of sounds completely (Korotkoff 5). Where Korotkoff 5 does not occur, Korotkoff 4 (muffling) is accepted. Hypertension is confirmed by serial readings over several hours or at least on two readings a minimum of 4 hours apart.

Pre-existing Chronic Hypertension

Essential hypertension: Systolic blood pressure ≥ 140mmHg and/or diastolic pressure ≥ 90mmHg confirmed before pregnancy or before 20 weeks gestation, of unknown cause, which is a diagnosis of exclusion.

Secondary hypertension: Raised blood pressure as above caused by known pre-existing medical conditions. Important causes of secondary hypertension in pregnancy include:

- Chronic kidney disease e.g. glomerulonephritis, reflux nephropathy, adult polycystic kidney disease
- Renal artery stenosis
- Systemic disease with renal involvement e.g. diabetes mellitus, systemic lupus erythematosus
- Endocrine disorders e.g. Pheochromocytoma, Cushing's syndrome, primary hyperaldosteronism

White coat hypertension: Defined as hypertension in the clinical setting in the presence of a medical attendant. When assessed away from this setting by 24 hour ambulatory blood pressure monitoring or home blood pressure monitoring using an appropriately validated device blood pressure is normal. Women with this condition often present early in pregnancy with apparent chronic hypertension, but their outcomes are better than those with true chronic hypertension. They may generally be managed without medication by using repeated ambulatory or home blood pressure monitoring. It is important to note that a small proportion of these will go on to develop pre-eclampsia.

Gestational Hypertension
Characterised by a new onset raised blood pressure after 20 weeks gestation, without

maternal or fetal signs or symptoms of pre-eclampsia, followed by a return to normal within 3 months post-partum.

Mild to moderate hypertension: Blood pressure systolic ≥ 140mmHg and/or diastolic ≥90mmHg

Severe hypertension: Blood pressure systolic ≥ 160 mmHg and/or diastolic ≥ 110mmHg

PRE-ECLAMPSIA
A clinical diagnosis of pre-eclampsia can be made when the following criteria are fulfilled: Hypertension and the onset after 20 weeks gestation of any one or more of the following

Renal:
- Proteinuria: ≥ 1+ on dipstick confirmed by the following
- Proteinuria confirmed by laboratory testing of a spot urine protein/creatinine ratio of ≥ 30mg/mmol or 24 hour urine collection ≥ 300mg. In view of close correlation between spot urine protein / creatinine ratio and 24 hour urine protein excretion, the latter is rarely required
- Oliguria i.e. <500ml/24 hours or <20ml/hour
- Serum or plasma creatinine > 0.09mmol/L or 90µmol/L

Haematological:
- Thrombocytopenia. platelet count < $100x10^9$
- Coagulation profile derangement **(only taken if platelet count is low)**
- Disseminated intravascular coagulation (DIC)

Hepatic:
- Nausea and/or vomiting
- Upper abdominal pain, often at the right upper quadrant
- Raised serum transaminase >70iu/L.

Neurological:
- Severe Headache
- Persistent visual disturbances such as photopsia, scotomata, cortical blindness, retinal vasospasm
- Hyperreflexia with clonus
- Convulsions (eclampsia)
- Stroke

Pulmonary Oedema

Fetal:
- Fetal growth restriction / evidence of placental compromise
- Placental abruption

Notes:

- Oedema is not included in the diagnostic features of pre-eclampsia, occurring as commonly in normal pregnant women and those with pre-eclampsia and severe pre-eclampsia may be present in the absence of any oedema. Nevertheless, rapid development of generalised oedema may be a marker of clinical deterioration in women with pre-eclampsia.
- Other rare disorders may present with some of the features of pre-eclampsia. Disorders such as acute fatty liver of pregnancy, haemolytic uraemic syndrome, thrombotic thrombocytopenic purpura, exacerbation of SLE or cholecystitis may need to be excluded.
- Rarely pre-eclampsia presents before 20 weeks gestation, usually in the presence of a predisposing factor such as hydatidiform mole, multiple pregnancy, fetal triploidy, severe renal disease or antiphospholipid antibody syndrome.
- Dipstick testing for proteinuria is a screening test with very high false positive and negative rates. Ideally, all women with hypertension should have a urine protein/creatinine ratio performed; in practice, dipstick readings of 'nil' or 'trace' are unlikely to be significant.
- Hyperuricemia is a common but not diagnostic feature of pre-eclampsia. Degree of hyperuricemia may correlate with fetal risk. A rapidly rising plasma uric acid in the setting of hypertension usually indicates worsening pre-eclampsia often in the presence of other markers of deterioration.
- Serum transaminases are reduced in normal pregnancy (by approximately 20%) and the upper limit of normal should be based on local reference ranges.
- HELLP syndrome (Haemolysis, Elevated Liver enzymes and Low Platelet count) represents a particular presentation of severe pre-eclampsia and separating it as a distinct disorder is not helpful.
- Microangiopathic haemolysis although rare may cause a sudden fall in haemoglobin and the appearance of fragmented red blood cells on the blood film. It is accompanied by a rise in bilirubin and lactate dehydrogenase, thrombocytopenia and elevated liver enzymes, sometimes with appearance of red or black urine. This diagnosis should be considered after a fall in haemoglobin when there has been insufficient revealed bleeding to account for anaemia.
- Pre-eclampsia is a frequent cause of migraine symptoms in pregnancy, the commonest cause in pregnancy of cerebral haemorrhage, and the only cause of eclampsia. Other neurological complications include cerebral oedema, cortical and sinus vein thrombosis, retinal detachment and central serous retinopathy.

ASSESSMENT & INVESTIGATIONS

Assessment and investigations in women with pre-eclampsia will depend on the severity of the condition. Thorough maternal assessment should be aimed at detection and management of likely complications as listed above.

Maternal assessment

- Antenatal history
- Physical examination: general examination (e.g. facial oedema)
- Vital signs: blood pressure (frequency of recording dependent upon severity: from continuous in severe disease to 4 hourly in mild disease)
- Neurological (assess headache, visual disturbances, reflexes, clonus)

- Abdominal examination for the -presence or absence of associated complications (e.g. Fetal Growth Restrictions (FGR) or hepatic pain).

Maternal investigations

Urine check:

- Urinalysis
- Mid-stream urine (MSU) to exclude infection
- Quantification of proteinuria - spot urine protein/creatinine ratio or 24 hour urine collection

In severe pre-eclampsia strict fluid balance chart (FBC) is required including:

- Hourly urine measurements
- Early morning weighing may be useful

Full blood examination (FBE) and blood film
Liver function tests (LFT)
Renal function tests **-** serum uric acid
Clotting studies if platelets $<100\times10^9$

Fetal Assessment

Ongoing fetal surveillance may include:

- Gestational age
- General assessment fetal size, lie, presentation, movements
- Electronic fetal surveillance (CTG)
- Ultrasound scan for fetal growth, liquor volume, umbilical and middle cerebral artery dopplers.

Ongoing fetal surveillance includes:

- Growth scans.
- Biophysical profile
- Amniotic Fluid Index (AFI)
- Fetal placental Doppler studies (e.g. umbilical arterial, middle cerebral artery etc.)

Notes:

- Blood test abnormalities should be interpreted using the pregnancy specific ranges, some of which are gestation dependent
- Women with severe early onset pre-eclampsia warrant investigations for associated conditions e.g. SLE, antiphospholipid syndrome or thrombophilias

MANAGEMENT OF PRE-ECLAMPSIA

Management includes:

- Control of hypertension
- Seizure prophylaxis
- Fetal maturation and surveillance
- Fluid balance
- Delivery of the baby

- Ongoing post-natal surveillance

Control of HYPERTENSION

Antihypertensive drugs are **advisable** where:

- Blood pressure ≥ 160/110 mmHg (with aim to maintain BP in range of 130-140/80-90mmHg).
- Blood pressure < 160/110 associated with other organ markers of severe disease i.e. proteinuria or abnormal LFT or haematological changes, when delivery of the baby may also be indicated

Antihypertensive drugs are **mandatory** where:

- Systolic pressure ≥170 mmHg or diastolic pressure ≥110 mmHg

Pressures of these levels may lead to direct vascular damage associated with life threatening sequelae

Table 1. Medications for controlling MODERATE Hypertension

Drug	Dose/Route	Action	Comments
1. Labetalol	**200 mg** oral stat Repeat 200 mg oral hourly until control is achieved. Maximum 3 doses. Maintenance dose 100-400 mg. 6-12 hourly (max 1600mg/day)	Peripheral acting sympatholytic alpha and beta blocker induces vascular relaxation, lower peripheral resistance and cardiac output with exercise.	<u>First agent of choice</u> **Maternal side effects:** bradycardia, postural hypotension, cold extremities, rebound hypertension, sleep or gastrointestinal disturbance. Caution with asthmatics. **Caution:** May exacerbate asthma and mask hypoglycaemia. **Fetal side effects:** respiratory depression and bradycardia.
2. Nifedipine	**10 mg** oral stat Repeat 10 mg orally every 30 mins. Maximum 3 doses. Maintenance dose 10-20 mg 3-6 hourly to maximum 80-120 mg/day.	Lowers blood pressure by relaxing vascular muscle, blood vessels dilate with lowered peripheral resistance.	<u>Alternative</u> **Maternal side effects:** postural hypotension, flushing, tachycardia, nausea, headaches, sleep or gastrointestinal disturbance. **Caution:** *Not to be confused with a slow release formulation of Nifedipine also available.*
3. Methyldopa	**250 mg** oral stat Maintenance 250-500 mg TDS.	Centrally acting Onset of action very slow	<u>Alternative</u> **Maternal side effects:** drowsiness and depression, postural hypotension.

Table 2. Medications for controlling SEVERE Hypertensive crisis

Drug	Dose/Route	Action
Labetalol	**Bolus dose of 20 mg undiluted IV over 2 minutes** - to be administered by medical staff • Labetalol comes as 100 mg in 20 ml (5mg/ml). • Draw up labetalol 100 mg (20ml) undiluted in 5 doses of 4mls (20mg) per syringe and label syringes clearly. • Inject 20 mg (4mls) over 2 minutes. • Repeat every 10 minutes until control is achieved. Maximum 300mg in 24 hours. **Maintenance dose** • Remove 50mL of fluid from 250mL infusion bag sodium chloride 0.9% and discard. • Add 50mL (250mg labetalol) to remaining 200mL sodium chloride 0.9**%. Final concentration 250mg in 250mL = 1mg/mL.** • Ongoing labetalol infusion 20-160mg/hour(20-160mL/hr) titrated to achieve an optimum blood pressure.	<u>First line drug management</u> Peripheral acting sympatholytic alpha and beta blocker with vascular relaxation, lower peripheral resistance and cardiac output evident with exercise. **Observations:** Continuous electronic fetal surveillance (CTG) is required with labetalol IV administration. **During bolus** record blood pressure and pulse every 5 minutes. **During labetalol infusion** record blood pressure and pulse every 15 - 30 minutes until stabilized, then record every hour as required. Must avoid precipitous fall in BP to maintain uteroplacental perfusion. Halve the infusion rate or cease (depending on severity). Blood pressure should not be lowered below 140 / 85 mm Hg. **Caution. If higher doses required aim to keep total fluid infusion to 1mL/kg/hour if possible.**

Drug	Dose/Route	Action
Hydralazine	Reconstitute 20mg amp with 1ml water for injection and dilute to 20mls with sodium chloride 0.9% =1mg/mL **5mg (5ml) slow (IV) Bolus** to be administered by Medical staff **.**Repeat 5 mg slow IV bolus every 10 - 20 minutes as necessary (up to a total bolus 15 mg).Consider need for continuous intravenous infusion: **40mg Hydralazine made up to 40mL with sodium chloride 0.9%** =1mg/mL Infusion rate 5-10mg/hr (5-10mls/hr)	<u>Alternative drug management</u> Smooth muscle relaxer, arterial dilator. **Maternal side effects:** headache, Tachycardia, palpitations, gastrointestinal disturbance, flushing, hypotension. **Observations:** As above.
Sodium chloride 0.9%	80mls per hour IV	<u>Fluid maintenance</u>

When controlling acute severe hypertension:

- IV access (18 g) Jelco (to allow acute volume expansion)
- Continuous CTG
- Second IV line required if considering Magnesium Sulphate infusion
- Titrate antihypertensive medication to maternal response
- Monitor and reassess for signs of deterioration
- Urinary catheter - with hourly urine measurements

SEIZURE PROPHYLAXIS

Prophylaxis with Magnesium Sulphate should be considered when:

- Warning signs of eclampsia e.g. neurological irritability
- All women with severe pre-eclampsia during labour, birth and immediate postpartum period

Drug	Dose/Route	Action	Comments
Magnesium Sulphate	**Loading dose 4 gm IV undiluted given over 10 minutes.** **Maintenance dose 1gm/hr.** for at least 24 hours post birth **or** post last seizure	Prevents maternal cerebral vasospasm Neuroprotection of the preterm fetus	<u>Eclamptic seizure prophylaxis</u> Administer slowly via a **syringe driver** using a Peripheral intravenous line (not CVP line). **Therapeutic range:** 2-4 mmol/L. **Maternal side effects:** Local burning and pain at injection site; nausea. **Caution:** Excreted by kidneys therefore toxicity likely if urine output poor. **Contraindications:** Heart block or myocardial damage.

Preparing Magnesium Sulphate

<u>Initially give 4 gm loading dose:</u>

- Draw up 2 amp of magnesium sulphate (2.5 gm in 5 ml), prime the extension tubing leaving 8mls = 4gms in a 10 ml syringe.
- Do not dilute
- Set rate at 48 mls /hr to infuse over 10 minutes
- Pump will alarm and stop after 8 mls infused

<u>Follow with 1gm/hr. maintenance dose</u>

- Once the loading dose is complete replace syringe with the magnesium sulphate maintenance dose 24.7g (100mmol) in 50mls (49.3%) pre-loaded syringe
- Run infusion at 2 mls / hour

Consideration should be given to cardiac monitoring and oxygen saturation monitoring with the commencement of magnesium sulphate

Assessment during magnesium sulphate infusion

Monitor vital signs (BP, pulse, respiratory rate, oxygen saturation) 5 minutely during loading dose

Thereafter:

- Half hourly vital signs (BP, pulse, respiratory rate, oxygen saturation)
- Hourly urine output
- Hourly patellar reflexes
- Continuous electronic fetal surveillance (CTG)
- Check pump and IV site hourly to ensure dose correct
- Consider monitoring serum levels of magnesium in women with oliguria (< 100 ml in 4 hrs). Therapeutic range 1.7- 3.5 mmol/L.

Signs of Magnesium Sulphate Toxicity

- Loss of patellar reflexes
- Respiratory rate < 12 breaths/minute
- Nausea, vomiting
- Slurred speech, weakness, extreme sleepiness
- Double vision
- Muscle paralysis
- Respiratory/cardiac arrest

Maternity staff should have access to and be familiar with:

- Adult resuscitation equipment
- Maternity eclampsia trolley – **IV labetalol, hydralazine, magnesium sulphate and Calcium gluconate can be found here together with drug administration instructions for use in an emergency.**

To reverse Magnesium Sulphate Toxicity

Drug	Dose/Route	Action	Comments
Calcium Gluconate	**1 gm IV** slow injection over 10 minutes.	Antidote for Magnesium Sulphate toxicity.	Administer slowly

Fetal Maturation and Surveillance

- Corticosteroids: Betamethasone (Celestone Chronodose®) 11.4 mg IM x 2 doses 24 hours apart) for promotion of fetal lung maturation should be administered if gestation is 36 weeks or below, or under 39 weeks if caesarean is required.
- With management of acute hypertension, continuous CTG surveillance is required

Fluid Balance

Careful maternal fluid balance is required in all women with pre-eclampsia
In severe pre-eclampsia maternal fluid retention can lead to severe acute pulmonary oedema

- Total fluid input should be restricted to 80ml/hr. or 1ml/kg/hr

- Monitor output: hourly urine measurements with indwelling urinary catheter (IDC)

Where urine output is less than 20mls per hour for 3 consecutive hours immediate management includes:

- Review by medical staff
- Assessment of renal function
- In presence of sustained oliguria and renal impairment consider transfer to an Intensive Care Unit (ICU) for more intensive haemodynamic monitoring
- As oliguria is usually due to central vascular depletion, diuretics should not be used routinely unless there is evidence of fluid overload.

Birth and postnatal

Pre-eclampsia is a progressive disorder and will inevitably worsen if pregnancy continues. Current therapy does not improve placental pathology nor alter the pathophysiology or natural history or progression of pre-eclampsia. Delivery of the baby is the definitive management and is followed by resolution, generally over a few days but sometimes much longer. At mature gestational age delivery should not be delayed. Even so, it is important to stabilize maternal condition before subjecting her to the stresses of delivery.

Prolonging the pregnancy in the presence of pre-eclampsia carries no benefit for the mother but is desirable at earlier gestations to improve fetal prognosis. 25-30% of women managed expectantly with pre-eclampsia will develop severe morbidity and mean duration of prolonging the pregnancy has been shown to be less than 12 days. Continuation also carries fetal risks and some still births will occur despite careful monitoring.

In cases of preterm pre-eclampsia between 32 - 36 weeks, if maternal and fetal status permit delivery should be delayed for at least 24-48 hours to allow fetal benefit from antenatal corticosteroid administered for fetal lung maturation.

The management of women with preeclampsia between gestational ages of 24-32 weeks should be restricted to those centres with appropriate experience and facilities (tertiary level). Care should be individualised and clear end-points should be defined for each woman based on agreed criteria. Timing of delivery is often based on a number of factors, fetal and or maternal rather than a single absolute indication.

Induction of labour is associated with improved maternal outcome and should be advised for women with mild hypertensive disease beyond 37 weeks' gestation. (HYPITAT trial)

For women with non-severe hypertensive disorders at 34-37 weeks of gestation immediate delivery might reduce the already small risk of adverse maternal outcomes. However, it significantly increases the risk of neonatal respiratory distress syndrome, therefore routine immediate delivery does not seem justified and a strategy of expectant monitoring until the clinical situation deteriorates can be considered (HYPITAT-11 trial)

In summary:

Expediting birth is indicated if:

- Woman is at term i.e. gestational age of ≥37 weeks with any degree of gestational hypertension or pre-eclampsia

Should be considered at any gestational age in the presence of one or more of the following:

- Inability to control BP despite maximum anti-hypertensive therapy, or rapidly escalating hypertension
- Deteriorating liver function
- Persistent epigastric pain, with nausea or vomiting with abnormal liver function tests
- Deteriorating renal function
- Progressive thrombocytopenia
- Persistent neurological symptoms
- Eclampsia
- Neurological complications
- Placental abruption
- Pulmonary oedema
- Concern for fetal wellbeing

Stabilisation of maternal condition is indicated prior to expediting the birth

Mode of birth

Mode of birth depends on:

- Fetal presentation
- Well-being and degree of urgency
- Bishops score
- If caesarean section is required, epidural or spinal anaesthesia is preferred over general anaesthetic (GA) providing clotting profile and platelet count are satisfactory
- If vaginal birth, epidural analgesia is appropriate provided the clotting profile and platelet count are satisfactory

There should be a multidisciplinary consultation between the woman, obstetric, midwifery, paediatric, and anaesthetic staff.

Active management of third stage is recommended

- 10 units IM oxytocin (Syntocinon®) or 5 units IV given slowly
- Avoid ergometrine or Syntometrine® for third stage

Post Partum Management

Almost half of all eclampsia occurs postnatally, possibly due to inadequate management. While it is expected that the woman's condition will steadily improve management includes:
Mild – moderate pre-eclampsia:

- Maintain anti-hypertensive therapy until BP is adequately controlled. Then wean off gradually
- Close monitoring of mother for at least 24 hours post-partum
- Consider MgSO4 for prevention of eclampsia

Severe Pre-eclampsia:

- Maintain BP with anti-hypertensive therapy to maintain diastolic BP at 90 mm Hg
- Magnesium sulphate for prevention of eclampsia is indicated and should be commenced
- If commenced magnesium sulphate, maintain for a further 24 hours post birth

- While magnesium sulphate infusion is maintained an obstetric review is required 4 hourly by a registrar or consultant
- Continue strict fluid balance chart (with hourly urine measurements)
- Monitor biochemistry markers until stable/improving

Discharge and follow up
- Decision and timing of discharge to be made in consultation with senior obstetric staff
- Consideration should be given to the risk of late seizures
- Offer appropriate postnatal review

ECLAMPSIA
The occurrence of one or more convulsions after 20 weeks gestation in association with pre-eclampsia. Seizures can occur antepartum, intrapartum or postpartum. About half of all eclamptic seizures occur postpartum.

Signs of Impending Eclampsia
Impending eclampsia may be asymptomatic. Initial features may be non-specific and mild. Signs and symptoms may include:
- Persistent, severe frontal or occipital headache
- Visual disturbances (blurred vision/photophobia) papilloedema
- Right upper quadrant or epigastric pain, nausea and/or vomiting
- Sudden rise in blood pressure (BP). In about 20% of women with eclampsia BP may be normal
- Diminished urine output. Oliguria (<500mls /24 hours or <20mls/hr)
- Increasing proteinuria
- Hyper-reflexes and clonus
- Altered level of consciousness
- Mental state/restlessness

Eclampsia management
- Immediate management
- Seizure control
- Control of hypertension
- Monitoring and investigations
- Timing and mode of birth
- Postnatal care and follow up
- Consider differential diagnoses

Immediate management
The management of eclampsia involves basic life support measures as well as management of seizures.

Call for HELP
Ring the emergency buzzer to summon help. This includes a senior midwife, the most experienced obstetrician, an anaesthetist and additional midwives. Contact the consultant obstetrician and consultant anaesthetist.

- Call a MET call. Call respond blue if the woman remains un-rousable, or if evidence of cardiorespiratory arrest.
- Note the time the seizure occurred and its duration
- Note the time of the emergency call and the time of arrival of the staff

Support: Airway, breathing, Circulation

- Remember most seizures are self-limiting and usually resolve within 90 seconds
- Remain calm
- Monitor and maintain airway breathing and circulation
- Move mother into left lateral and protect her from injury
- Give high flow facial oxygen
- Do not attempt to restrain her during seizure

Immediately following the eclamptic seizure ensure the woman is maintained in the left lateral position with an open airway

Seizure Control

Magnesium Sulphate is the anticonvulsant of choice for the prevention and treatment of eclamptic seizures.

- **Loading dose** (intravenous bolus of 4g Magnesium Sulphate undiluted over 10 minutes if not already given as treatment for pre-eclampsia
- **Maintenance dose** (IV infusion Magnesium Sulphate of 1g /hour for 24 hours) MgS04 should be administered for 24 hours following birth or after the last seizure, whichever is the later, unless there is a clinical reason to continue.
- Cardiac monitoring and oxygen saturation monitoring to be considered with the commencement of Magnesium Sulphate

Recurrent seizures:

- Give a further intravenous bolus of 2g Magnesium Sulphate undiluted over 10 minutes.

And:

- Consider increasing the infusion rate to 2-3 gm /hour = 4-6mls/hr.
- Check serum magnesium levels.

Preparing Magnesium Sulphate

Use undiluted 49.3% (treat as 50% solution). Initially give 4 gm loading dose:

- Draw up1amp of Magnesium Sulphate (2.5 gm in 5 ml), prime the extension tubing leaving 4mls=2 gms in a 10 ml syringe.
- Do not dilute
- Set rate at 24mls /hr to infuse over 10 minutes
- Pump will alarm and stop after 4mls infused.
- Once the loading dose is complete replace syringe with the Magnesium Sulphate maintenance dose 24.7g (100mmol) in 50mls (49.3%) pre-loaded syringe
- Run infusion at new rate of 4 mls / hour or 6mls/hr. as required

Maternal observations

- During Magnesium Sulphate loading dose or where condition remains unstable
- Continuous pulse oximeter
- 5 minutely blood pressure (using a non-automated device)

- 5 minutely pulse and respiratory rate
- Signs of Magnesium Sulphate toxicity include: loss of patellar reflexes, respiratory rate < 12 minute, nausea, vomiting, slurred speech, weakness, extreme sleepiness, double vision, muscle paralysis, respiratory or cardiac arrest

Maternal observations thereafter or when stable:

- Hourly vital signs (BP, pulse, respiratory rate)
- Hourly check of pump, syringe and IV site to ensure dosage correct
- Hourly temperature (a rise may indicate CNS haemorrhage /anoxic damage)
- Uterine activity as clinically indicated
- Strict fluid balance including:
    - Fluid input restricted to 80mLs hour
    - Urinary output hourly

  Neurological:
    - Hourly patella reflexes
    - A=Absent N=Normal B=Brisk
    - Restlessness or twitching may indicate seizure
- Consider monitoring serum levels of magnesium in women with oliguria (< 100 ml in 4 hrs). Therapeutic range 1.7- 3.5 mmol/L.

Observe for signs of Haemolysis, Elevated Liver Enzymes, low platelets (HELLP) syndrome, Disseminated Intravascular Coagulation (DIC) antepartum haemorrhage (occurs in 10% of eclamptic women).

Control of Hypertension
See Table 2 – Medications for controlling severe hypertensive crisis

Fetal assessment

- Apply CTG once eclamptic seizure is controlled. Not during a seizure.

Maternal investigations

- Blood group and hold
- Full blood examination (FBE) consider blood film if evidence of haemolysis
- Clotting studies if platelets < 100 x 10^9/L
- Liver function tests (LFT)
- Renal function tests
- Serum uric acid
- Urine check: assessment of proteinuria

Timing and mode of birth

Refer to pre-eclampsia for factors to consider in the decision on timing and mode of birth
Key points:
All cases of Eclampsia would need delivery

- Stabilise the mother before expediting birth
- Consider fetal condition and maturation
- Consider corticosteroids (Celestone Chronodose® 11.4 mg IM x 2 doses 24 hours apart) if gestation below 37 weeks

Mode of birth and analgesia depends upon:
- Fetal presentation
- Well-being and degree of urgency
- Bishops score
- Consultation between the woman, obstetric, midwifery, paediatric, and anaesthetic staff.

Active management of third stage is recommended.
- 10 units IM oxytocin (Syntocinon®) or 5 units IV given slowly.
- **Avoid** ergometrine or Syntometrine® for third stage.

Postnatal
- High dependency care for at least 24 hours.
- Maintain magnesium sulphate therapy and labetolol infusion
- While magnesium sulphate infusion is maintained an obstetric review is required 4 hourly by registrar of consultant.
- Frequent observations in line with clinical condition

Discharge and follow up
- Decision and timing of discharge to be made in consultation with senior obstetric staff
- Consideration should be given to the risk of late seizures
- Offer appropriate postnatal review

Differential Diagnosis
- Epilepsy
- Intracerebral or subarachnoid haemorrhage
- Meningitis
- Drug or alcohol related
- Head trauma
- Metabolic disorders
- Persistent seizures/neurological symptoms merit a CT brain scan and referral to an appropriate medical specialty team

INDICATIONS

The basis of management is stabilization, assessment, observation and if appropriate, delivery. The frequency and place of surveillance is based upon the gestation, the severity and rate at which the condition advances. Maternal surveillance can be as frequent as daily to weekly as a hospital in- patient or an outpatient. Similarly, fetal surveillance varies from between daily to second weekly dependent upon test performed, results, gestation and severity of disease.

CLINICAL CONSIDERATIONS

Pre-eclampsia superimposed on chronic hypertension

Women with pre-existing hypertension with or without proteinuria before 20 weeks gestation, who later develop symptoms or signs of pre-eclampsia

Pre-existing hypertension is a strong risk factor for the development of pre-eclampsia. Superimposed pre-eclampsia is diagnosed when one or more of the features of pre-eclampsia develop after 20 weeks gestation in a woman with chronic hypertension.

REQUIREMENTS

- Pre-eclampsia / Eclampsia trolley
- Adult Resuscitation equipment

COMPLICATIONS

Potential fetal consequences of hypertension and pre-eclampsia:

Complications arising from pre-eclampsia include placental insufficiency, which can lead to high levels of fetal morbidity and mortality. While there is a focus on maternal manifestations, the following fetal characteristics should not be overlooked, as they may aid the diagnosis and are part of the assessment.

- Reduced fetal movements
- Abnormal fetal heart rate on cardiotocograph (CTG)
- Reduced amniotic fluid index (AFI)
- Asymmetrical growth restriction
- Increased resistance, absent or reversed end diastolic flow on umbilical artery Doppler
- Low biophysical profile score

Key Aligned Documents

- Hand Hygiene & Aseptic Technique
- Resuscitation of the Newborn
- Intrauterine Resuscitation
- Instrumental Vaginal Birth
- Classification of Urgency for Caesarean Section
- Blood and Body Substance Exposure Prevention and Management of Exposure
- Induction of Labour- Indications and Booking Process

Evaluation

- VHIMS will be followed up as per Peninsula Health Policy.
- Ongoing evaluation of care is reported on at monthly Maternal Mortality and Morbidity meetings

References

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