Guideline

Pre-Eclampsia: Management

1. Purpose

This document outlines the guideline details for managing women with pre-eclampsia at the Women's.

Hypertensive disorders of pregnancy affect approximately (5-8%) of women. They are a leading direct cause of maternal death and have a significant association with maternal morbidity, stillbirths, neonatal morbidity and mortality[1].

The aim of this document is to provide a standardised approach to the management of pre-eclampsia and eclampsia in the antenatal, intrapartum and postnatal period. This guideline can be used in conjunction with the guideline Hypertension - Management of Acute.

2. Definitions

Pre-eclampsia: a multi-system disorder, unique to pregnancy, which is usually associated with raised blood pressure after 20 weeks gestation (definitions below) and accompanied by one or more of the following signs of organ involvement. Proteinuria is the most commonly recognised additional feature after hypertension but should not be considered mandatory to make a clinical diagnosis.

- Renal involvement
    - Significant proteinuria (spot urine protein/creatinine ratio greater than or equal to 30mg/mmol
    - Serum or plasma creatinine greater than 90 micromol/L
    - Oliguria: less than 80mL over 4 hours
- Haematological involvement
    - Thrombocytopaenia less than 100 x 10^9/L
    - Haemolysis: schistocytes or red cell fragments on blood film, raised bilirubin, raised LDH greater than 600mIU/L, decreased haptoglobin
    - Disseminated intravascular coagulation
- Liver involvement
    - Raised serum transaminases (AST and ALT > 70 IU/L)
    - Severe epigastric or right upper quadrant pain
- Neurological involvement
    - Convulsions (eclampsia)
    - Hyper-reflexia with sustained clonus (greater than 2 beats)
    - Persistent , new headache
    - Persistent visual disturbances (photopsia, scotomata, cortical blindness, posterior reversible encephalopathy syndrome retinal vasospasm)
    - Stroke.
- Pulmonary oedema
- Fetal growth restriction.

Raised blood pressure as defined in the table below: measured on at least two occasions at least 6 hours apart

Classification	Blood Pressure Range	
Mild	140-149 mmHg systolic	90-99 mmHg diastolic
Moderate	150-169 mmHg systolic	100-109 mmHg diastolic
Severe	>170 mmHg systolic	>110 diastolic

Severe pre-eclampsia: As above, usually accompanied by other haematological, neurological, hepatic or renal derangement. Classification of hypertensive disorders of pregnancy reflects the pathophysiology of the conditions as well as the risk to maternal and fetal wellbeing.

Eclampsia: one or more generalised seizures in association with the syndrome of pre-eclampsia.

Gestational hypertension: a new onset of raised blood pressure without maternal or fetal signs of pre-eclampsia, after 20 weeks gestation.

Existing (essential) hypertension: known hypertension before pregnancy or raised blood pressure before 20 weeks gestation. Pre-eclampsia can be superimposed on chronic hypertension.

HELLP syndrome: the following must all be present-

Haemolysis: schistocytes or red cell fragments on blood film, raised bilirubin, raised LDH greater than 600mIU/L, decreased haptoglobin

Elevated liver enzymes: AST and ALT greater than 70 IU/L

Low **p**latelets: less than 100 x 10^9/L

Clonus- ankle clonus/foot clonus: a series of abnormal reflex movements of the foot, induced by sudden dorsiflexion, causing alternate contraction and relaxation of the triceps surae muscle.

- Determining the degree of clonus is a simple procedure and part of the whole clinical assessment for preeclampsia
- Clonus at the ankle is tested by rapidly flexing the foot into dorsiflexion (upward), inducing a stretch to the gastrocnemius muscle. Subsequent beating of the foot will result, however only a sustained clonus (greater than 2 beats) is considered abnormal. This may indicate nervous system excitability sufficient to indicate possible risk of seizure (eclampsia). Its presence along with others symptoms indicates a need for seizure prophylaxis.

3. Responsibilities

Obstetric medical staff and midwives are responsible for caring for women with pre-eclampsia, in collaboration with other clinical staff as required.

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4.1 Complications associated with pre-eclampsia

Maternal complications

- placental abruption
- disseminated intravascular coagulation (DIC)
- HELLP Syndrome (Haemolysis, Elevated Liver enzymes, Low Platelets)
- ascites
- pulmonary oedema
- acute renal failure
- liver rupture
- intracerebral haemorrhage
- eclampsia (incidence 1:200-300 women with pre-eclampsia in Australia[1].

Fetal complications

- fetal growth restriction
- fetal death in utero.

Neonatal complications

Neonatal complications are those associated with preterm birth plus:

- hypoxic and neurological injury

- perinatal death.

4.2 Diagnosis of pre-eclampsia

Preeclampsia classification

- **Mild to moderate**: Defined as systolic blood pressure of 140mmHg and/or diastolic blood pressure of 90mmHg or higher measured on at least two occasions over several hours, combined with proteinuria >300 mg total protein in a 24-h urine collection, or ratio of protein to creatinine >30 mg/mmol)
- **Severe preeclampsia**: Defined as systolic blood pressure greater than 170 and/or diastolic blood pressure of 110mmHg or higher measured on at least two occasions over several hours, combined with proteinuria >300 mg total protein in a 24-h urine collection, or ratio of protein to creatinine >30 mg/mmol. All usually accompanied by other haematological, neurological, hepatic or renal derangement.[1]

NOTE: A systolic blood pressure of 160 mmHg or greater on two consecutive occasions, although not diagnostic of pre-eclampsia is significant and requires treatment.

Additional symptoms of pre-eclampsia:

- onset of oedema of face, hands or feet
- headache, or visual disturbance, or both
- epigastric pain or vomiting, or both
- reduced fetal movements.

Signs of severe pre-eclampsia:

- increased signs of clonus
- pitting oedema
- papilloedema
- liver tenderness.

Associations

- intrauterine growth restricted fetus (IUGR)
- placental abruption
- fetal death in utero.

4.3 Biochemical changes

- serum creatinine greater than 90 micromols/L and/or oliguria (less than 20 mL per hour over 4 hours)
- LDH greater than 600 IU
- raised transaminases (ALT and AST rising to above 70 IU/L)
- platelets <$100x10^9$/L (DIC, haemolysis)

4.4 Categorisation of care

1. Inpatient care should be provided for women with severe hypertension and pre-eclampsia. Women presenting with neurological symptoms should be initially assessed in the Birth Centre
2. Women with moderate pre-eclampsia should be admitted to the antenatal ward
3. For women with mild pre-eclampsia, pre-existing or pregnancy induced (gestational) hypertension, monitoring may be undertaken on an outpatient basis.

4.5 Acute management of pre-eclampsia

The management of pre-eclampsia in Birth Centre is multi-disciplinary and may involve the obstetrician, midwife, anaesthetist, physician, haematologist and paediatrician (as required).

Full physical examination with respect to potential complications of pre-eclampsia must be undertaken on admission and thereafter at regular intervals.

Investigations

Firstly, check FBE, and U and E's.

Only if the platelets are less than 100 x 10^9/L, proceed to AST, ALT and LDH and coagulation profile (APTT, PT, fibrinogen).

When the woman is admitted to the Birth Centre, consider group and hold.

Blood pressure control

A target blood pressure should be determined and documented. The target should be tailored to the woman's controlled blood pressure (systolic 140-160, diastolic 90-100).

Care should be taken to avoid lowering the blood pressure too much as this will negatively affect placental perfusion with subsequent fetal compromise.

Note: BP ≥170/110 mmHg requires prompt treatment.

Use of magnesium sulphate

Prophylaxis with magnesium sulphate should be implemented where there are premonitory signs of eclampsia (increased reflexes associated with clonus and/or severe headache, visual changes) or following diagnosis of severe pre-eclampsia (diastolic B/P >110 mmHg, proteinuria >300mg/24 hours, abnormal AST and ALT and LDH), thrombocytopenia <100x10^9/L).

- Refer to guideline: Magnesium Sulphate – Management of Hypertensive Disorders of Pregnancy:
  - magnesium sulphate commenced (as per procedure) and continued as a maintenance infusion
  - serum magnesium concentrations should be checked every 6 hours in the antepartum & intrapartum phase (therapeutic level of magnesium sulphate: 1.7- 3.5 mmol/L)
    - this is to ensure that the woman is receiving a therapeutic concentration.
  - wait for blood pressure to stabilise following administration of magnesium sulphate before considering other anti-hypertensive agents
  - maintain diastolic B/P ≈ 90-100mmHg.
- Also refer to guideline: Eclampsia: Management.

Acute control of severe hypertension

Intravenous labetalol is considered to be the primary drug of choice for the urgent control of severe hypertension in pregnancy. Its associated lower incidence of adverse side effects and supplants the use of Hydralazine. Usage will depend on availability and the clinicians experience and familiarity with the drug.

Note: Hydralazine remains the drug of choice for women with asthma or congestive heart failure.

For details of administration and monitoring of IV labetalol and IV hydralazine, refer to guideline: Hypertension - Management of Acute.

Fluid balance

Accurate assessment of fluid input/output is essential: iatrogenic fluid overload is a main cause of maternal death in the pre-eclampsia/eclampsia sequelae.

Maintain a strict fluid balance chart: record on electronic fluid balance chart.

On admission to the Birth Centre it is recommended that a main line of sodium chloride 0.9% (Normal Saline) x 1L be commenced via a multiflow adapter into the IV site. Intravenous fluids should be administered via a controlled infusion pump at no greater than 84mL/hr.

NOTE: if using oxytocin for augmentation/induction, use the syringe driver protocol (refer to procedure Oxytocin Administration (Intravenous).

Renal function

- protein excretion should be monitored by a full ward test of urine four hourly

- a random urinary protein/creatinine ratio (UPRCR) may be considered.
- indwelling urinary catheter (+ urometer)
- urine output measured hourly.

Urine output <20mL/hour is considered inadequate with magnesium sulphate administration.

Management of oliguria (with a magnesium sulphate administration) should be multidisciplinary. A fluid assessment should be conducted by medical staff prior to administering any extra fluids. BEWARE OF PULMONARY OEDEMA

- consider giving Hartmann's 250mL stat.
- continuing oliguria requires obstetric and anaesthetic consultation. The insertion of a CVC may be considered
- persistent oliguria may be an indication for diuretic use following obstetric/ anaesthetic consultation
- persisting oliguria may require transfer to a high dependency unit.

Ongoing monitoring/ observations

- ½ hourly blood pressure, pulse
- 1 hourly respiratory rate
- 1 hourly patellar reflexes
- 1 hourly urine output measurement
    - Regular testing for proteinuria is not necessary once the diagnosis has been made.
- 2 hourly temperature
- Continuous electronic fetal monitoring (antepartum and intrapartum) of fetus from 26 weeks gestation until clinical review/discussion by medical staff. Between 24- 26 weeks gestation individualised management in regard to fetal monitoring will be considered.

Pain Management

An epidural may be considered for pain management as it has the additional benefit of lowering the women's blood pressure, in the absence of contra-indications and platelets must be >80 x 10^9/L.

Fetal monitoring

- continuous electronic fetal monitoring in labour (Birth Centre)
- remember the IUGR fetus will have less tolerance of labour than a well-grown healthy fetuscontinuous electronic fetal monitoring during administration of magnesium sulphate (Birth Centre).

Birth

Expedite the birth if any of the following:

- eclampsia (once stable)
- BP uncontrolled despite optimal treatment (defined as : maximum dose of 3 anti-hypertensive medicines plus 2 or more BPs 170/110 in 24 hours)
- diagnosis of HELLP syndrome Abnormal renal function (creatinine >90 and urea >10)neurological symptoms (visual disturbances and/or persistent frontal headache) / eclampsia
- abruption
- concerns regarding fetal wellbeing.

Expedited birth is generally indicated in severe pre-eclampsia or in a fetus of greater than 37 weeks gestation.

An attempt may be made to defer birth at very early gestations around the limits of viability.

Mode of birth/delivery:

- will depend on maternal and fetal factors (gestation, presentation)

- will require multidisciplinary consultation
- If the fetus is <34 weeks gestation, and maternal condition stable, consider deferring delivery to allow time for steroids to be administered
- If induction of labour is undertaken with oxytocin / ARM, an oxytocin infusion must be delivered in a concentrated dose via a syringe driver pump.

Second stage management:

- Operative birth is not routinely required for the second stage but may be necessary if the BP is poorly controlled, woman has symptoms of severe cerebral irritability, or progress is inadequate.

Third stage management:

- should be actively managed: oxytocin 10 IU (ten international units) bolus IV for third stage
- refer to guideline: Third Stage Labour - Management.

Note: Do not give ERGOMETRINE or SYNTOMETRINE as routine oxytocic management at birth.

Postpartum

Immediate management

Most women will show signs of recovery within the first 24 hours of delivery; however a minority will remain unstable or deteriorate after delivery. As the majority of eclamptic seizures occur after the birth, close monitoring should therefore continue until:

- BP is stable
- diuresis has occurred and urine output has normalized
- blood investigations (FBE, LFT's, U and Es) are stable/improving.

Management of magnesium sulphate

- magnesium sulphate should be stopped at a minimum of 24 hours postpartum but may be prolonged if clinically indicated
- postpartum magnesium levels may be adequately assessed clinically (reflexes, respiratory rate) **unless** there is renal impairment/oliguria when serum levels should be performed 6 hourly
- continue to check hourly patellar reflexes until infusion is ceased.

4.6 Antenatal ward management

Indication for in-patient admission:

- BP ≥ 150/100 mmHg on 2 occasions
- maternal symptoms
- concern for fetal well-being.

Antenatal ward admission

- admission
- 4/24 BP
- daily ward urinalysis (if protein not previously confirmed as present)
- FBE, U&Es, ALT and AST (alternate days)
- 24 hour urine (creatinine clearance and protein) is only necessary if spot protein test is inconclusive/borderline
- fetal assessment:
  - growth - 2nd weekly
  - AFI, doppler, (initially on admission and repeat as indicated by fetal condition)
  - CTG: 2 to 3 times per week

- biophysical profile as required weekly.

- **antihypertensive therapy** if BP >160/100 mmHg (maintain BP at 140-160/90-100 mmHg). Usually the first line drug of choice is oral labetalol (caution with use in asthmatics).

The use of antihypertensive therapy in cases of mild pre-eclampsia is equivocal and its use may compromise placental perfusion. It should only be used in the presence of other disease markers or existing co-morbidities, such as diabetes, chronic hypertension, renal or vascular disease. When blood pressures begin to exceed 140/90mmHg, closer surveillance is required and consultation with senior colleagues is recommended before commencing antihypertensive therapy.

First line medication of choice for oral maintenance therapy is methyldopa. Labetalol or nifedipine should only be considered after the maximum dose of methyldopa has been reached.

Medication	Dose	Maximum dose in 24 hours
Methyldopa	250mg-500mg 6-12 hourly	2g
Labetalol (avoid in women with asthma)	100mg to 400mg 6-12 hourly	1600mg
Nifedipine SR	30mg-120mg daily	120mg
Prazosin	1-7mg eight hourly	21mg

- steroids if <34 weeks: 11.4mg IM Betamethasone (Celestone Chronodose®), daily for two (2) days.

If patient's condition deteriorates (i.e. BP becomes uncontrollable, or she shows signs of increased reflexes) seek a medical review of the woman PRIOR to transfer to Birth Centre.

For a patient with moderate pre-eclampsia induction of labour should be planned from 37 weeks gestation.

4.7 Postnatal follow-up

Early onset (≤32 weeks) severe PE, particularly if associated with IUGR, requires further investigation (inherited or acquired thrombophilia, antiphospholipid syndrome, autoantibody screen, renal disease) prior to discharge. These women should be offered an obstetric review appointment as well as a review by a physician.

Women who have experienced pre-eclampsia may require discharge on antihypertensive medication and arrangements should be made for ongoing outpatient monitoring of blood pressure.

Women with severe or early onset pre-eclampsia should have physician and obstetric review routinely at six weeks; although in some cases earlier and/or later follow up may be required. This process applies to women discharged on antihypertensive medication. Hypertension that has not resolved after three months requires further review by a physician and investigation [consider renal disease, systemic disease (SLE, diabetes) endocrine disease (phaeochromocytoma, primary aldosteronism)] coarctation of the aorta, renal artery stenosis, essential hypertension.

Timely communication with the woman's primary health care provider at discharge is important.

The woman's medical and obstetric history, current status and plan for ongoing care should be communicated to the women's community health care providers (e.g. GP and Maternal and Child Health Nurse).

4.8 Consumer information

Consumer fact sheet: Explaining Pre-eclampsia.

5. Evaluation, monitoring and reporting of compliance to this guideline

Compliance to this guideline will be monitored, evaluated and reported throughVHIMS clinical incident reporting.

6. References

1. Lowe SA, Bowyer L, Lust K, McMahon LP, Morton MR, North RA, Paech M, Said JM (2014) SOMANZ Guideline for the Management of Hypertensive Disorders of Pregnancy available at:

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5. Royal Women's Hospital policies, guidelines and procedures:

- Eclampsia: Management
- Magnesium Sulphate – Management of Hypertensive Disorders of Pregnancy.

7. Legislation/Regulations related to this guideline

Not applicable.

8. Appendices

Not applicable.