MATERNITY UNIT
GUIDELINE:

MANAGEMENT OF HYPERTENSIVE DISORDERS ON THE MATERNITY UNIT

SCOPE:
All Midwives, LMC's and Obstetricians working in Maternity unit

AUTHOR:
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PURPOSE:
To provide midwives, LMC's and obstetricians with guidance on the care for women with hypertension, pre-eclampsia and eclampsia.

BACKGROUND:
Chronic hypertension, gestational hypertension, pre-eclampsia and eclampsia are all part of the spectrum of hypertensive disorders of pregnancy affecting about 10% of all pregnant women. Pre-eclampsia complicates 2-3% of all pregnancies and the incidence is 1½-2x higher in nulliparous women. Pre-eclampsia is a multisystem disorder that is usually associated with raised blood pressure and proteinuria. A priority of antenatal care in the second half of pregnancy is to detect the development of pre-eclampsia. When pre-eclampsia develops, delivery is the only known cure. Management is aimed at timing of delivery and providing therapy to prevent maternal complications whilst minimising fetal morbidity and mortality.

DEFINITIONS:

SBP = Systolic BP

DBP = Diastolic BP

PCR = Protein creatinine ratio

Hypertension is a SBP ≥ 140 and/or DBP ≥ 90mmHg on two or more consecutive occasions at least 4 hours apart or one measurement SBP ≥ 170 and/or DPB ≥ 110 mmHg.

Severe hypertension requiring treatment is defined as a SBP ≥ 160 and/or DBP ≥ 110. Treatment targets should be individualized but in general the recommendation is for a target SBP of 130-150 and a target DBP of 80-100.

Moderate hypertension is SBP 150-159 mmHG and/or DBP 100-109 mmHG.

Chronic hypertension is hypertension diagnosed before 20 weeks of gestation.

Gestational hypertension is hypertension diagnosed after 20 weeks of gestation without proteinuria or any other maternal or Fetal features of preeclampsia that normalizes within three months of delivery.

Proteinuria for definition of pre-eclampsia is a 24 hour urine collection with a protein level of ≥ 0.3g in 24hours. Proteinuria can also be defined by a PCR≥ 30 on a random urine sample or suspected with ≥ 1+ on two separate dipstick samples. This should be confirmed with a PCR.

The gold standard is a 24 hour urine collection to confirm the diagnosis of pre-eclampsia. However, a random urine PCR has been shown to closely approximate a 24 hour urine collection and is commonly used.

It is not clear that repeated quantitative estimations of proteinuria are of value in assessing disease progression as neither the rate of increase nor the amount of proteinuria affects maternal or perinatal outcome.

Pre-eclampsia is when hypertension arises after 20 weeks gestation in a woman who also develops proteinuria or any of the features of severe preeclampsia.

Severe Pre-eclampsia is when pre-eclampsia is accompanied by any of the following:

- Persistent severe hypertension (SBP≥ 160 and or DBP≥ 110)

- Serum creatinine > 97.3 micromol/L

- Signs of neurologic involvement

    - Convulsions (eclampsia)
    - Severe headache
    - Persistent visual disturbances
    - Hyperreflexia with sustained clonus
    - Stroke

-Signs of liver dysfunction

    - Elevated transaminases (2 x upper limits of normal)
    - Severe epigastric or right upper quadrant pain, nausea and vomiting

- Signs of haematological involvement

    - Thrombocytopenia – Platelets < 100K or rapidly falling platelets
    - Haemolysis – Abnormalities on peripheral blood smear, increased bilirubin levels and dramatically increased LDH (eg twice normal levels)
    - Disseminated intravascular coagulation

- Intrauterine growth restriction with oligohydramnios and abnormal uterine artery Doppler flows

- Pulmonary oedema

HELLP syndrome is characterised by evidence of haemolysis, elevated liver enzymes and low platelets. Generally it is considered a subset of severe pre-eclampsia. Often only 2 of the 3 components are recognisable.

Superimposed pre-eclampsia is when a woman with chronic hypertension develops one or more of the systemic features of PET at or beyond 20 weeks gestation.

Eclampsia is defined as new onset of one or more convulsions (fits) in association with pre-eclampsia. Eclampsia occurs in 2-3% of women with severe pre-eclampsia, about 1:10,000 deliveries. Eclampsia presents as tonic clonic seizures with jerking limbs and head movements. The mother may become cyanotic. Tongue biting and urinary incontinence may or may not occur. Eclamptic seizures occur in approximately 0.1% of all births.

Most seizures are self-limiting and usually resolve within 90 seconds. Most woman recover full responsiveness in 10-20 minutes. Fetal bradycardia for 3-5 minutes is a common finding during and immediately after the seizure. Fetal tachycardia often follows the seizure frequently with loss of variability and transient decelerations. A CTG suggestive of foetal hypoxia >10-15 minutes after maternal resuscitation suggests possible occult abruption.

Fifty-nine percent of eclamptic seizures occur antepartum, 20% intrapartum, and 21% postpartum. The recurrence rate of seizures is 10% with expectant management. Magnesium sulphate treatment reduces recurrence risk by ½ to $^{1}/_{3}$.

Signs of impending eclampsia may include:

- Sharp rise in blood pressure, >160/110 (75%)
- Persistent headaches – frontal, occipital or thunderclap (66%)
- Epigastric pain/nausea (25%)
- Ankle clonus
- Visual disturbance (27%)
- Asymptomatic (25%)

Maternal complications are common in eclampsia occurring in approximately 70% of cases. These include:

- Inhalation of vomit and asphyxia (2-3%)
- Cerebral haemorrhage (1.2%)
- Renal, cardiac, or hepatic failure (5-9%)
- Disseminated intravascular coagulation (DIC) (7-11%)
- Pulmonary oedema (3-5%)
- HELLP syndrome (10-15%)

- Placental abruption (7-10%)

Fetal complications include:

- Placental insufficiency
- Acute asphyxia
- Premature delivery
- Increased perinatal mortality
- Abruption

It is important to remember that eclampsia can occasionally occur in the absence of hypertension or proteinuria. Regarding postpartum seizures, the further from delivery the seizure occurs the more carefully should other diagnoses be considered.

DIAGNOSIS:

The evaluation of hypertensive disorders in pregnancy should include at least the following:

Evaluation of blood pressure
Evaluation for symptoms of severe pre-eclampsia (ie. headache,
visual changes, epigastric/right upper quadrant pain, nausea and vomiting.
Evaluation for urinary protein
Complete blood count
Serum creatinine
Serum liver transaminases
Fetal assessment – CTG and amniotic fluid assessment

Other tests that may be considered depending on the presentation are an obstetrical ultrasound for weight, amniotic fluid and Dopplers, serum lactate dehydrogenase and coagulation studies.

Overall Management:

It is important to emphasize that treatment will not change the underlying progression of hypertensive disorders in pregnancy but it may reduce the risk of complications such as stroke and abruption.

- Treatment options such as antihypertensives and seizure prophylaxis are described in the guidelines following.
- Fetal monitoring should be continuous, especially if acutely administering antihypertensives
- Attention should be paid to DVT prophylaxis as PET increases the DVT risk.
- Fluid management must be strict. Woman with preeclampsia should have an IV sited. If IV fluids are given, maintain IVF at 85 ml/hour with total of 1000 mls/12hours.

  -strict fluid balance with all ins and outs recorded

  -fluid challenges only as necessary and limited to 200-300cc – use caution regarding repeat fluid challenges.

-Consider anaesthesia involvement dependent on the woman's condition.

- Ergometrine and Syntometrine are contraindicated in the presence of hypertension. Prostaglandins and Syntocin are indicated as needed. NSAIDs should not be used postpartum for woman with persistent hypertension.

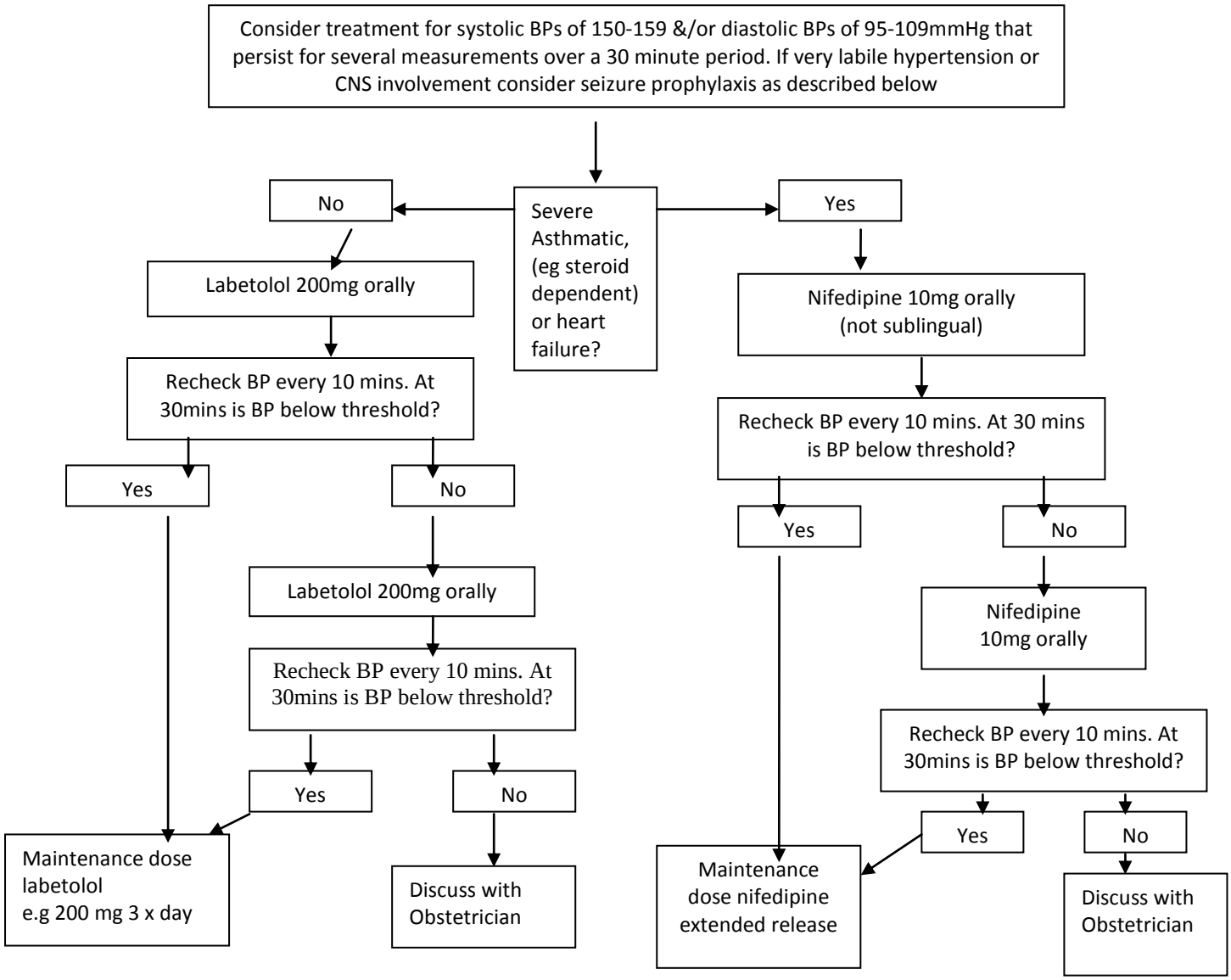
Criteria for transfer to critical care unit:

-Persisting convulsions
-SBP > 180 and DBP > 120 despite treatment
-Pulmonary oedema
-Unresponsive oliguria
-Compromised myocardial function
-Neurologic impairment
-Massive blood loss
-Inadequate staffing levels or experience
-Other complicating comorbidities

Criteria for transfer to tertiary care facility:

Woman under 32 weeks of gestation
Critically ill woman once stable for transfer.

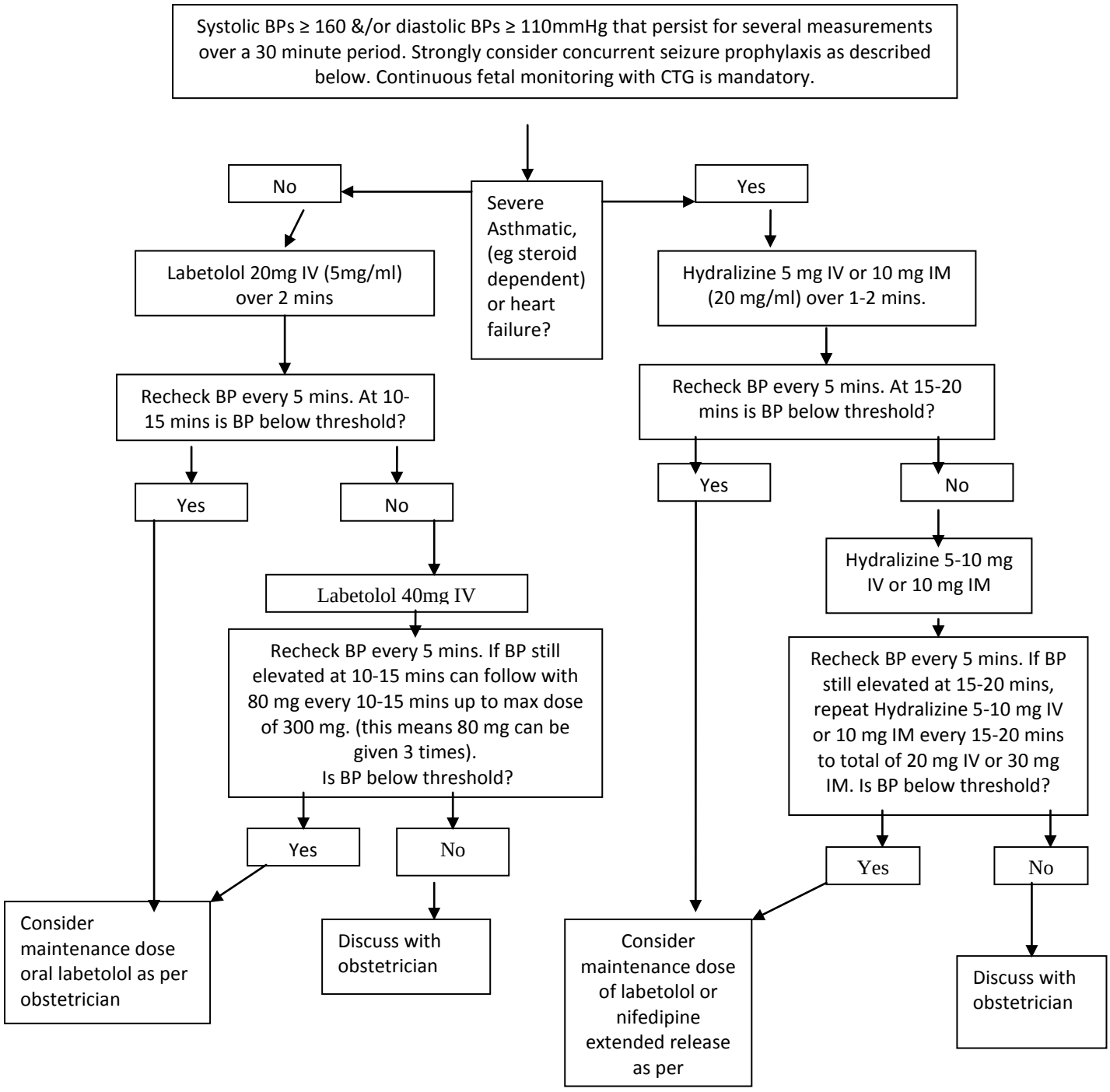
Treatment Guidelines for Moderate Hypertension



In general, aim to keep systolic BP 130-150 & diastolic BP 80-100 but discuss target range for BP with obstetrician.

Caution as Nifedipine may interact with magnesium sulfate to increase the risk of muscular blockade. According to Up to Date this has been described in case reports but appears to be of minimal risk.

Treatment guidelines for Severe Hypertension:



In general, aim to keep systolic BP 130-150 & diastolic BP 85-100 but discuss target range for BP with obstetrician.

SEIZURE PREVENTION:

As noted above, seizures can occur antepartum, intrapartum and postpartum. The highest risk time extends until 24-48 hours postpartum. Magnesium sulfate has also been shown to reduce the risk of eclamptic convulsions in women with severe pre-eclampsia, more than halving the risk of seizure.

Prophylactic therapy during and after birth should be considered in women with severe pre-eclampsia especially if neurological signs or symptoms are present. However, any recommendation to give magnesium for women with severe pre-eclampsia should be made on an individual basis and will involve the obstetrician and the woman.

CONTRAINDICATIONS AND INCOMPATIBILITIES

- Magnesium sulfate should be used with caution with:
  - -severe renal impairment (urine output < 25 ml/hour and/or creatinine > 0.90 micromol/L.
  - -hypocalcaemia
  - -current treatment with Lithium or Gentamicin, Aminophylline, Sodium Bicarbonate, any calcium preparations, NSAIDS and Chlorpromazine.
  - -nifedipine must be used with caution due to possible neuromuscular blockade and severe hypotension
  - - paralyzing anesthetic agents.
  - -heart conditions including arrhythmia, cardiomyopathy or any degree of heart block.

- Magnesium sulfate is contraindicated in women with myasthenia gravis as it can precipitate a severe myasthenic crisis.

When toxicity is a major risk, the obstetrician should be consulted before magnesium sulfate is used.

Protocol for the administration of intravenous magnesium sulfate

Loading Dose: 5 g magnesium sulfate IV over 20 minutes

- Make up 5 g (2 x 5 ml amps) in 100 ml N-saline (withdraw 10 ml from 100 ml bag first)
- Set up infusion pump
- Run over 20 mins (300 ml per hour)

Remember to reduce the infusion rate when changing from the loading dose to the maintenance dose

Maintenance dose: 1.5 g IV per hour

- 10 g (4 x 5 ml amps) into 80 ml of N-saline (withdraw 20 ml from 100 ml bag first)
- Concentration will be 0.1 g per ml

- Run at 15 ml per hour

For severe pre-eclampsia/eclampsia continue for at least 24-48 hours after delivery - stopping maintenance infusion should be discussed with on call obstetrician).

Protocol for the administration of intramuscular magnesium sulfate

If intravenous access is not available, treatment may be started with an intramuscular injection

Loading dose
-A total of 10g magnesium sulfate IM is given
-Give 5g (10mls) of magnesium sulfate 49.3% containing 2.47g in 5mLs to each buttock.

Maintenance dose
-Give 5g IM every 4 hours until IV administration is possible (give as 10mls of magnesium sulfate 49.3% containing 2.47g/5ml). Alternate gluteal muscles every 4 hours.

Observation and management whilst on magnesium sulfate

Magnesium sulfate is excreted by the kidneys and is a smooth muscle relaxant. With normal renal function the recommended loading and maintenance doses will not cause toxicity and so routine serum magnesium levels are not required. However, close maternal observation is necessary.

Observations and management required

- Continuous CTG monitoring
- BP, RR, PaO2 every 15 minutes until stable, then every 30 minutes
- Pulmonary auscultation and deep tendon reflexes should be checked and documented hourly (see Appendix One)
- Fluid balance chart hourly including urine output
- Bloods to lab as indicated
- Woman should be nil by mouth. Consider Ranitidine (50 mg IVI every 8 hours) if this is to be for a prolonged period of time.

Infusions can be continued at standard rate provided that:

- The knee jerk or biceps reflex are present
- Urine output remains > 25 ml/hour.
- Respiratory rate does not fall below 12 per minute
- The emergency trolley is stationed outside the womans room

If acute loss of deep tendon reflexes and/or respiratory depression (<12 breaths/min) is observed:

1. STOP magnesium infusion.
2. Call Obstetrician urgently. If woman severely compromised call crash team and anaesthesia (as the anaesthetists are not on the crash team).
3. Send blood for urgent magnesium levels.
4. Administer 3g of calcium gluconate intravenously (30 ml of Calcium Gluconate 10% solution) over 5-10 minutes. Repeat every 10-20 minutes up to 4 times, depending on response.
5. **Alternatively**, withdraw 10mls from 100ml bag of Normal saline, add 1 gram (1x10ml ampoule) of calcium gluconate to the bag. Set IVAC to run at 300mls per hour. This will deliver 1 gram calcium gluconate over 20mins.
6. Repeat observations and reflexes

Magnesium levels **are not** required to be measured routinely. Indications for measuring magnesium levels include:

- Altered renal function (urine output < 25mls/hour, creatinine > 90)
- Signs suggesting toxicity such as significant drowsiness, loss of deep tendon reflexes, respiratory depression RR < 12 breaths/min
- Unexplained clinical symptoms or signs
- Further seizures
-

If measured important levels are (Lu, 2000):

Therapeutic levels	1.8 – 3.0 mmol/l
Loss of tendon reflexes	3.5 – 5.0 mmol/l
Respiratory paralysis	5.0 – 6.5 mmol/l
Cardiac arrest	>12.5 mmol/l

FETAL EFFECTS OF MAGNESIUM INFUSION

- Magnesium sulfate crosses the placenta and therefore can reduce the fetal heart variability on the CTG

- Fetal tachycardia may be seen

- At birth the neonate may be hypotensive, hypotonic, hyporeflexic with accompanying respiratory depression (especially in the case of prolonged infusion, or infusion with increased doses). **THEREFORE a Paediatrician must be present at birth**

- Breastfeeding should still be encouraged.

MANAGEMENT OF ECLAMPTIC SEIZURES

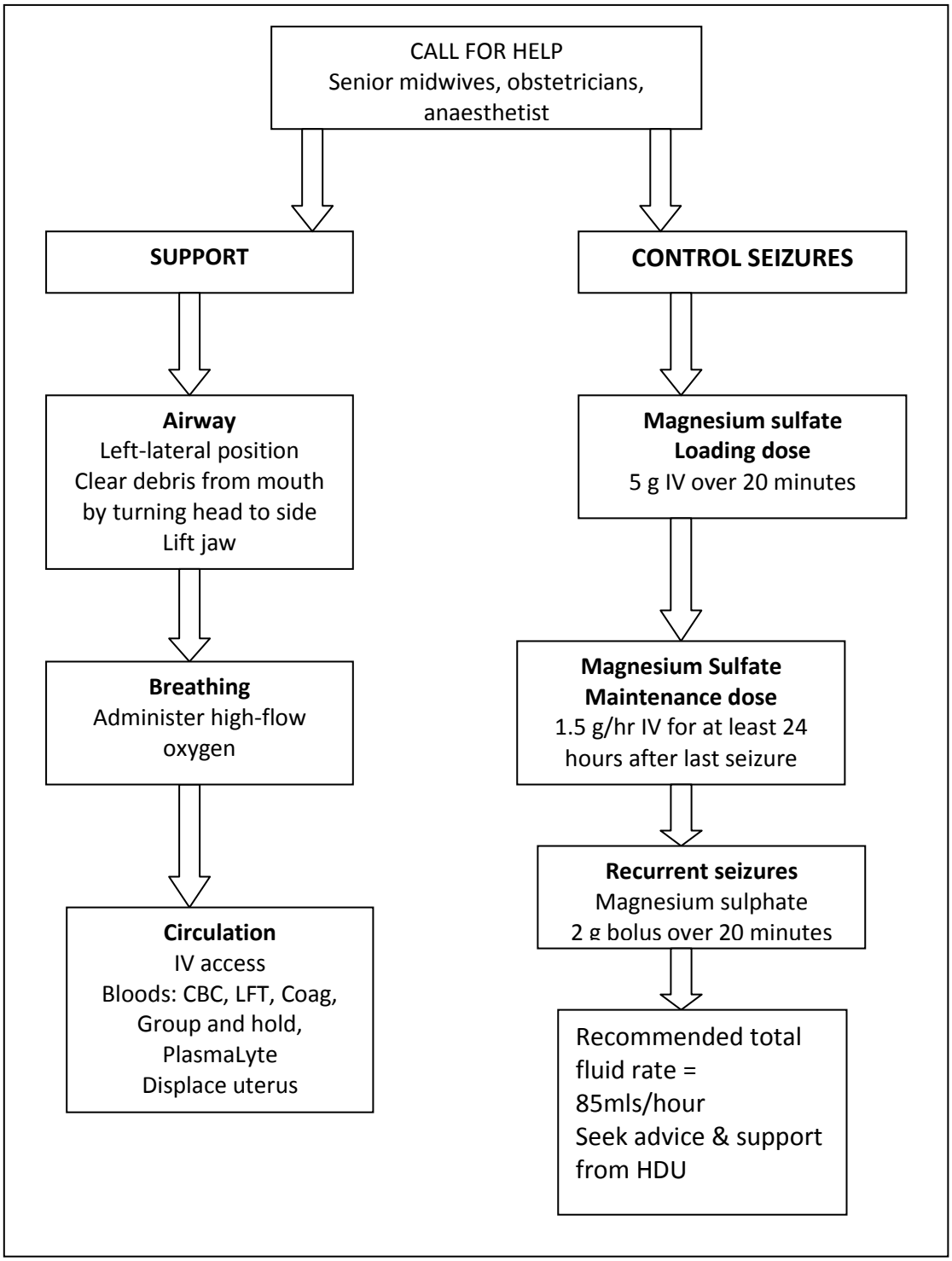
The management of eclampsia involves basic life supportive measures, as well as management of seizures.

MAGNESIUM SULFATE IS THE DRUG OF CHOICE FOR TREATING ECLAMPSIA

Use the same protocol as for seizure prophylaxis

The maternal condition should always take precedence over the fetal condition. The mother should be stabilised before delivery.

Flow chart for the Management of Eclamptic Seizures



Protocol for the administration of magnesium sulfate for recurrent seizures

- Seek immediate help.
- Draw up 4 ml of 49.3% magnesium sulfate solution (2 g) followed by 6 ml of 0.9% saline into a 10 ml syringe.
- This will give a total volume of 10 ml.
- Give as an IV bolus over 20 minutes.
- If possible, take blood for magnesium level prior to giving the bolus dose.

The maternal condition should always take precedence over the fetal condition.

The mother should be stabilised before delivery.

ASSOCIATED DOCUMENTS:

Magnesium Sulphate for Pre-eclampsia, Eclampsia and Neonatal Neuroprotection in Pre-term Births < 30weeks

REFERENCES:

AUCKLANDS DHB Hypertension – Antenatal, Intrapartum and Postpartum Guideline (March 2012)
UPTODATE-PREECLAMPSIA: MANAGEMENT & PROGNOSIS (2017) HTTP://WWW.UPTODATE.COM/CONTENTS/PREECLAMPSIA-MANAGEMENT-AND-PROGNOSIS
UPTODATE-PRE-ECLAMPSIA: CLINICAL FEATURES AND DIAGNOSIS (2017) HTTP://WWW.UPTODATE.COM/CONTENTS/MANAGEMENT-OF-HYPERTENSION-IN-PREGNANT-AND-POSTPARTUM-WOMEN
UP TO DATE-ECLAMPSIA (2017) HTTP://WWW.UPTODATE.COM/CONTENTS/ECLAMPSIA
SOMANZ GUIDELINES-GUIDELINE FOR THE MANAGEMENT OF HYPERTENSIVE DISORDERS OF PREGTNANCY (2014) http://www.nice.org.uk/nicemedia/live/13098/50475/50475.pdf
Lu JF, Nightingale CH. Magnesium sulphate in eclampsia and pre-eclampsia: pharmacokinetic principles. Clin Pharmacokinet. 2000 Apr:38(4): 305-14. Review
NICE – Hypertension in pregnancy (UpToDate 2016) WWW.NICE.0126.UK/pathways/hypertension-in-pregnancy.
PROMPT – PRACTICAL **O**BSTETRIC **M**ULTI-**P**ROFESSIONAL **T**RAINING COURSE MANUAL – AUSTRALIAN & NEW ZEALAND EDITION (2013)

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APPENDIX ONE

Checking for Reflexes when treating Magnesium Sulphate

To check this reflex tap the patella tendon which is located just below the patella once. This should cause a sudden extension of the leg, which is known as the knee-jerk. The obstetrician is to be informed of the absence or significant decrease in the patella reflex as the Magnesium Sulphate dose may need to be reduced.