Government of the Republic of Trinidad and Tobago

Ministry of Health

Women's Health

Hypertension in Pregnancy

Clinical Guideline

Directorate of Women's Health
Ministry of Health

Trinidad and Tobago

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Accountability of this Document

This Clinical Guideline was developed by the Directorate of Women's Health, Ministry of Health, Trinidad and Tobago. The Directorate is a unit under the office of the Chief Medical Officer. This guideline seeks to standardize the delivery of Obstetric services at both public and private health care facilities. It was developed based on the Ministry's principles of accessibility, equity, affordability, efficiency, effectiveness and safety. This Guideline provides updated information which complements or replaces the advice provided under the heading *3. Hypertensive Disorders of pregnancy: Pregnancy Induced Hypertension (PIH), Pre-Eclampsia and Eclampsia in the MOH's Maternal and Child Health Manual (2015), Pages 13- 16 and 10.1 Management of the Client with Pre-eclampsia* in the MOH's SOP Obstetric and Midwifery Services (2011), Pages 35-37.

Control

The senior management including the Chief Executive Officers of the RHAs, Executive Medical Directors, Medical Directors, County Medical Officers of Health, Medical Chiefs of Staff, General Managers of Nursing, Primary Care Managers, and Heads of Departments have the overall responsibility for the dissemination, staff education, implementation of and compliance with this guideline.

Distribution

The guideline is to be distributed to all relevant health facilities where obstetric and midwifery services are provided.

Review Cycle

The Guideline will be reviewed on a three-year cycle and updated where necessary, including at earlier intervals if warranted. Unless recalled by the Ministry of Health, the Guideline will remain in force however.

Earlier versions

Any earlier version of this document should be archived for use by the health facility as a reference document.

Clinical disclaimer

The recommendations in this guideline were arrived at after consideration of the existing evidence available. When exercising their clinical judgement, professionals are expected to take this guideline fully into account, along with the individual needs, preferences and values of their patients or service users. The application of the recommendations in this guideline do not dictate an exclusive course of action as we recognize that individual clinical circumstances may require an individualized approach at times. Major deviations from these recommendations however, are to be documented in the patient's case records including the reason(s) for doing so.

Approval date 27TH JUNE 2018

Adesh Sirjusingh

Director, Women's Health

Chief Medical Officer

Permanent Secretary

Hon. Minister of Health

Message from the Directorate

The Directorate of Women's Health has been charged with providing a co-ordinated national health team response to issues related to women's health. Standardized clinical management strategies that are locally-based, is one area that needs further development. This document aims to capture present international recommendations for the management of hypertensive disorders in pregnancy.

Ongoing research into this disorder means the contents of this document are liable to change following the publication of these studies. The reader is expected to consider this when making clinical decisions.

Non-communicable diseases statement

Hypertension and Diabetes Mellitus account for two of the most common complications that affect perinatal and mortal morbidity and mortality in Trinidad and Tobago. Eclampsia remains an important contributor to maternal morbidity and mortality. In addressing these two disorders starting from pre-conception and in utero, we hope to make an additional impact.

All routine antenatal care management guidelines apply including the Maternal and Child Health Manual (MOH, 2015) and the SOP Obstetric and Midwifery Services (MOH, 2011) unless specifically updated in this guideline. These areas are not repeated in this guideline.

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List of Abbreviations

ABPM	Ambulatory Blood Pressure Monitoring
AFV	Amniotic Fluid Volume
ALT	Alanine Transaminase
APTT	Activated Partial Thromboplastin Time
ASA	Aspirin
AST	Aspartate Transaminase
BW	Birth weight
ECG	Electrocardiogram
CBC	Complete Blood Count
FGR	Fetal Growth Restriction
HELLP	Haemolysis, elevated liver enzymes and low platelet-syndrome
INR	International Normalised Ratio
ISSHP	International Society for the Study of Hypertension in Pregnancy
IU	International Units
IV	Intravenous
K1	Korotkoff sound 1
K2	Korotkoff sound 2
Kg	kilogram
LDH	Lactate dehydrogenase
LFT	Liver Function Tests
mcg	microgram(s)
mg	milligram (s)
min	minute
mL	millilitre(s)
NICU	Neonatal Intensive Care Unit
PCR	Protein/creatinine ratio
RDS	Respiratory Distress Syndrome
SGA	Small for Gestational Age
USS	Ultrasound scan

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1.0 Definitions

- Normal pregnancy is characterized by a fall in blood pressure, detectable in the first trimester and usually reaching a nadir in the second trimester.
- Blood pressure rises towards pre-conception levels by term.

Hypertension in pregnancy is defined as:

- **Systolic blood pressure greater than or equal to 140 mmHg and/or**
- **Diastolic blood pressure greater than or equal to 90 mmHg (Korotkoff 5)**

These measurements should be confirmed by repeated readings over several hours.

Elevations of both systolic and diastolic blood pressures have been associated with adverse maternal and fetal outcome and therefore both are important.

There are several reasons to support the blood pressure readings above as diagnostic of hypertension in pregnancy:

- Perinatal mortality rises with diastolic blood pressures above 90 mmHg
- The chosen levels are consistent with International guidelines and correspond with the current diagnosis of hypertension outside of pregnancy

Detecting a rise in blood pressure from 'booking' or preconception blood pressure (> 30/15 mmHg), rather than relying on an absolute value has in the past been considered useful in diagnosing preeclampsia in women who do not reach blood pressures of 140 or 90 mmHg. **Available evidence does not support** the notion that these women have an increased risk of adverse outcomes except in the presence of hyperuricaemia, proteinuria or small for gestational age (SGA) fetus.

Severe hypertension in pregnancy:

- Antihypertensive treatment is recommended for all pregnant women with blood pressure greater than or equal to **160 mm Hg systolic or 110 mm Hg diastolic.**
- Severe hypertension requiring urgent treatment is defined as a systolic blood pressure greater than or equal to **170 mmHg with or without diastolic blood pressure greater than or equal to 110 mmHg.**

This represents a level of blood pressure above which the risk of maternal morbidity and mortality is increased. This degree of hypertension requires urgent assessment and management. Increasing evidence exists that cerebral perfusion pressure is altered in pregnant women making them more susceptible to cerebral haemorrhage, posterior reversible encephalopathy syndrome and hypertensive encephalopathy. It is universally agreed that severe hypertension should be lowered promptly, albeit carefully, to prevent such complications.

2.0 Blood pressure measurement

Accurate blood pressure measurement is important as the level of blood pressure may result in changes in clinical management

- The woman should be seated comfortably with her legs resting on a flat surface and her arm resting at the level of her heart
- In labour, the blood pressure may be measured in a lateral recumbent position
- Supine posture should be avoided because of the supine hypotension syndrome
- The systolic blood pressure is accepted as the first sound heard (K1) and the diastolic blood pressure the disappearance of sounds completely (K5)
- Where K5 is absent, K4 (muffling) should be accepted
- Correct cuff size is important for accurate blood pressure recording.
- 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 but less than 44 cm and a thigh cuff used if the upper arm circumference is greater than 44 cm. This helps to minimize over-diagnosis of hypertension during pregnancy.
- The cuff-pressure should be slowly decreased to avoid underestimating systolic blood pressure
- Mercury sphygmomanometers remain the gold standard for measurement of blood pressure in pregnancy, however, occupational health concerns are limiting their availability.
- Self-initiated home blood pressure monitors have provided major advantages for treatment and diagnosis of hypertension in the general community and are now widely used by both pregnant women and their clinicians but there is wide intra individual error and their accuracy may be further compromised in preeclamptic women
- Only a few automated blood pressure monitors have been validated for use in normotensive or mildly hypertensive pregnant women
- Non-mercury auditory sphygmomanometers present an option with appropriately trained observers. Aneroid sphygmomanometers may be used but are also prone to error.
- Healthcare providers must ensure that devices for measuring blood pressure are properly validated, maintained and regularly recalibrated according to manufacturers' instructions

3.0 Classification of hypertensive disorders in pregnancy

This classification of the hypertensive disorders in pregnancy reflects the pathophysiology of the constituent conditions as well as the risks and potential outcomes for both mother and baby.

- Preeclampsia – eclampsia
- Gestational hypertension
- Chronic hypertension
- Preeclampsia superimposed on chronic hypertension

3.1 Preeclampsia

A diagnosis of preeclampsia can be made when hypertension arises after 20 weeks of gestation (except if due to hydatidiform mole) and is accompanied by one or more of the following signs of organ involvement:

- Renal involvement
  - ✓ Significant proteinuria –a spot urine protein/creatinine ratio ≥ 30 mg/mmol (PCR)
  - ✓ In practice, dipstick testing is simple, cheap and an appropriate screening test but spot urine PCR is recommended for confirmation or exclusion of proteinuria when preeclampsia is suspected
  - ✓ Serum or plasma creatinine > 90 µmol/L
  - ✓ Oliguria: <80 mL/4 hr

Hyperuricemia is a common but not diagnostic feature of preeclampsia (urate is not included as a diagnostic feature).

It is important to use gestational corrected normal ranges which may correlate better with adverse events.

Table 1. Upper limits for uric acid (based on mean+2SD) at different gestational ages

GESTATION (WEEKS)	24	32	36	38
URIC ACID (mmol/L)	0.28	0.32	0.34	0.38

- Haematological involvement
  - ✓ Thrombocytopenia <100,000 /µL
  - ✓ Haemolysis: schistocytes or red cell fragments on blood film, raised bilirubin, raised lactate dehydrogenase >600mIU/L, decreased haptoglobin
  - ✓ Disseminated intravascular coagulation
  - ✓ Coagulation studies are not indicated if the platelet count is normal

- Liver involvement
  - ✓ Raised serum transaminases
  - ✓ Severe epigastric and/or right upper quadrant pain.

- Neurological involvement
  - ✓ Convulsions (eclampsia)
  - ✓ Hyperreflexia with sustained clonus
  - ✓ Persistent, new headache
  - ✓ Persistent visual disturbances (photophobia, scotomata, cortical blindness, posterior reversible encephalopathy syndrome, retinal vasospasm)
  - ✓ Stroke

- Pulmonary oedema
- Fetal growth restriction (FGR)

3.2 Gestational Hypertension

- New onset of hypertension after 20 weeks' gestation without any maternal or fetal features of preeclampsia, followed by return of blood pressure to normal within 3 months post-partum.
- At first presentation this diagnosis will include some women (up to 25%) who are in the process of developing preeclampsia but have not yet developed proteinuria or other manifestations.
- Some women initially diagnosed in this category will manifest persistent blood pressure elevation beyond 12 weeks post-partum and eventually be classified as having chronic hypertension.
- The earlier the gestation at presentation and the more severe the hypertension, the higher is the likelihood that the woman with gestational hypertension will progress to develop preeclampsia or an adverse pregnancy outcome
    - Gestational hypertension near term is associated with little increase in the risk of adverse pregnancy outcomes
    - Severe hypertension (≥170/110 mmHg) is associated with increased risk of adverse outcomes in pregnancy

3.3 Chronic Hypertension

This category includes:

- Essential hypertension, as well as
- Hypertension secondary to a range of conditions.
- Essential hypertension is defined by a blood pressure greater than or equal to 140 mmHg systolic and/or 90 mmHg diastolic confirmed before pregnancy or before 20 completed weeks gestation without a known cause.

Some women with apparent essential hypertension may have white coat hypertension (raised blood pressure in the presence of a clinical attendant but normal blood pressure otherwise as assessed by ambulatory or home blood pressure monitoring). These women appear to have a lower risk of superimposed preeclampsia than women with true essential hypertension but are still at an increased risk compared with normotensive women.

Important secondary causes of chronic hypertension in pregnancy include:

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

In the absence of any of the above conditions it is likely that a woman with high blood pressure in the first half of pregnancy has essential hypertension.

It is not possible to investigate these disorders fully during pregnancy, and complete appraisal may need to be deferred until after delivery.

3.4 Preeclampsia superimposed on chronic hypertension

- Pre-existing hypertension is a strong risk factor for the development of preeclampsia
- Superimposed preeclampsia is diagnosed when a woman with chronic hypertension develops one or more of the systemic features of preeclampsia after 20 weeks gestation
- Worsening or accelerated hypertension should increase surveillance for preeclampsia but is not diagnostic

- SGA occurs more frequently in women with chronic hypertension and evidence of fetal effects other than SGA e.g. oligohydramnios or abnormal uterine artery Doppler flows is required to diagnose superimposed preeclampsia

- In women with pre-existing proteinuria, the diagnosis of superimposed preeclampsia is often difficult as pre existing proteinuria normally increases during pregnancy. In such women substantial increases in proteinuria and hypertension should raise suspicion of preeclampsia and therefore justifies closer surveillance but the diagnosis is not secure without the development of other maternal systemic features or fetal effects with or without SGA i.e. the presence of oligohydramnios or abnormal uterine artery Doppler flows.

4.0 Prevention

For the following patients especially those with multiple risk factors, low dose aspirin should be commenced from 12 weeks e.g. 81 mg daily, unless contraindicated (bleeding in pregnancy, aspirin allergy)

- T1DM, T2DM, Pre-pregnancy hypertension, previous pregnancy in, or family history of preeclampsia/eclampsia, Connective Tissue Disorder, Anti-phospholipid Syndrome, Obesity, Advanced maternal age, Nulliparity

- The ASA can safely be continued to term but in most cases, can be stopped at 37 weeks

The use of 1200 mg/day calcium supplementation has also been demonstrated to significantly reduce the risk of preeclampsia, particularly in high-risk women and those with low dietary calcium intake.

5.0 New onset hypertension after 20 weeks

Any woman presenting with new hypertension after 20 weeks gestation should be assessed for signs and symptoms of preeclampsia. Initially, assessment and management in a day assessment unit may be appropriate. If features of preeclampsia are detected, admission to hospital is indicated.

The presence of severe hypertension, headache, epigastric pain, oliguria or nausea and vomiting are ominous signs which should lead to urgent admission and management, as should any concern about fetal wellbeing

Initial assessment

- Spot urine PCR if available

- Full blood count

- Creatinine, electrolytes, urate

- Liver function tests

- Ultrasound assessment of fetal growth, amniotic fluid volume and umbilical artery Doppler assessment

- Blood test abnormalities should be interpreted using pregnancy-specific ranges, some of which are gestation dependent

- If features of preeclampsia are present, additional investigations should include: Urinalysis for protein and urine microscopy on a carefully collected mid-stream urine sample

- If there is thrombocytopenia or a falling hemoglobin, investigations for disseminated intravascular coagulation and/or haemolysis (coagulation studies, blood film, LDH, fibrinogen) are indicated

- Patients with severe, early onset preeclampsia warrant investigation for associated conditions e.g. systemic lupus erythematosus, underlying renal disease or antiphospholipid syndrome. The timing of these investigations will be guided by the clinical features

- Although a very rare disorder, undiagnosed phaeochromocytoma in pregnancy is potentially fatal and may present as preeclampsia. In the presence of very labile or severe hypertension, measurement of fasting plasma free metanephrines normetanephrines or 24-hour urinary catecholamines should be undertaken

- Amongst women referred for assessment of new onset hypertension, a number will have normal blood pressure and investigations. These women are considered to have transient or labile hypertension. Repeat assessment should be arranged within 3-7 days as some of these women will subsequently develop preeclampsia

Ongoing investigation of women with hypertension in pregnancy

At each assessment following the detection of hypertension in pregnancy, the clinician should systematically review the woman's symptoms, examination, relevant laboratory investigations and fetal wellbeing.

Further laboratory assessment of women with hypertension in pregnancy should be based on the following recommendations

Table 2: Ongoing investigation of women with hypertension in pregnancy

	MODALITY	FREQUENCY
CHRONIC HYPERTENSION	Assess for proteinuria	EACH VISIT
	Blood tests as above	If sudden increase in BP or new onset proteinuria
GESTATIONAL HYPERTENSION	Assess for proteinuria	At least twice weekly (e.g. DAU)
	Blood tests as above	Weekly
PREECLAMPSIA	Assess for proteinuria	At diagnosis, repeat daily
	Blood tests as above	At least twice weekly. More frequent if unstable

6.0 Management

6.1 Overview

- All routine antenatal care guidelines also apply including the Maternal and Child Health Manual (MOH, 2015) and the SOP Obstetric and Midwifery Services (MOH, 2011) unless specifically updated in this guideline
- Include Sexual and Reproductive Health discussion during antenatal period including contraception (SRH policy, MOH)
- Delivery is the definitive management and is followed by resolution, generally over a few days but sometimes much longer
- **Senior level staff (Specialist Medical Officer)** must be involved in the management of these clients
- Long-term expectant management is unlikely to be of benefit in earlier gestations and more likely to result in adverse fetal and maternal outcomes
- In the presence of HELLP syndrome, expectant management is harmful with a 6.3% incidence of maternal death and an increased risk of placental abruption. In such cases, delivery should be planned as soon as feasible.
- A team approach, involving obstetrician, midwife, neonatologist, anaesthetist and physician provides the best chance of achieving a successful outcome for mother and baby.
- Regular and ongoing reassessment of both the maternal and fetal condition is required.
- Careful daily assessment for clinical symptoms and signs should be complemented by regular blood and urine tests as indicated (Table 2).
- The only controlled studies of bed rest for preeclampsia have shown no significant maternal or fetal benefit. However, admission to hospital allows close supervision of both mother and fetus as progress of the disorder is unpredictable.
- Outpatient monitoring may be appropriate in milder cases after a period of initial observation.
- **Avoid dropping the blood pressure to normal levels** as this will compromise placental perfusion

6.2 Treatment for mild-moderate hypertension

- Antihypertensive treatment should be commenced in all women with a systolic blood pressure of ≥160 mmHg or a diastolic blood pressure ≥ 110 mmHg
- Antihypertensive therapy does not prevent preeclampsia or the associated adverse perinatal outcomes, but it decreases by half the incidence of development of severe hypertension among women with mild hypertension
- Uncontrolled hypertension is a frequent trigger for delivery and control of hypertension may allow prolongation of pregnancy
- It is possible that treatment of even mild-moderate hypertension may lead to a clinically relevant reduction in the risk of preeclampsia and fetal or neonatal death, particularly early pregnancy loss
- In the absence of compelling evidence, treatment of mild to moderate hypertension in the range 140-160/90-100 mmHg should be considered an option and will reflect local practice. Above these levels, treatment should be considered mandatory.
- Commence antihypertensive treatment at 150/100 mmHg

6.3 Antihypertensive agents

6.3.1 The following oral drugs are available and considered as first line drugs

- Methyldopa dosage 250- 750 mg tds, onset of action is slow, do not increase dosage rapidly, avoid in depressed patients
- Labetalol 100-400 mg tds, avoid in asthma and COPD

6.3.2 Second-line drugs (under SMO guidance)

- Nifedipine 20 mg – 60 mg slow release twice daily, severe headaches may confuse signs of impending eclampsia
- Hydralazine 25-50 mg tds, variable bioavailability after oral administration
- ACE inhibitors and angiotensin receptor blockers are **contraindicated** during pregnancy. Enalapril, captopril and quinapril are however compatible with breastfeeding.

6.4 Treatment of severe hypertension

- Blood pressure greater than or equal to 170mmHg systolic or 110mmHg diastolic constitute severe hypertensio requiring urgent treatment. It is recommended that treatment be administered promptly aiming for a gradual and sustained lowering of blood pressure.
- A variety of medications have been used for the treatment of severe hypertension in pregnancy (Table 6).
- There is concern that a precipitous fall in blood pressure after antihypertensive treatment, particularly intravenous hydralazine, may impair placental perfusion resulting in fetal distress. This can be prevented by co-administration of a small bolus of fluid e.g. normal saline 250mL, at the time of administration of antihypertensive therapy. Continuous CTG monitoring should be considered in these situations, particularly when there is evidence of existing fetal compromise. However, fetal distress as a result of such treatment is rare.
- The concurrent administration of longer acting oral agents (see Table 5) will achieve a more sustained blood pressure lowering effect.

The following drugs are considered first line and are available

- Labetalol 20-80 mg, Intravenous bolus, maximal effect within 5 minutes after dose. May cause bradycardia, hypotension and fetal bradycardia. Follow up infusion 20-160 mg/hr
- Nifedipine 10-20 mg SR oral, maximal dose 40 mg (never sublingual)
- Hydralazine 5-10 mg, IV bolus, repeat every 20 minutes up to 30 mg. Follow-up infusion 10-20 mg/hr
- Diazoxide 15-45 mg, IV rapid bolus, 3-5 mins, repeat every 5 minutes

6.5 Thromboprophylaxis

- All women should undergo risk factor assessment for VTE in early pregnancy
- This assessment should be repeated if a pregnant woman is admitted to hospital or develops a complication.
- Hospitalised women are generally less mobile and mechanical thromboprophylaxis such as graduated compression stocking should be considered
- Preeclampsia is considered a major risk factor for VTE

6.6 Fluid management

- Although maternal plasma volume is often reduced in women with preeclampsia, there is no maternal or fetal benefit to maintenance fluid therapy
- The choice between colloid and crystalloid remains controversial as previous trials generally excluded pregnant women
- Administration of fluid at a rate greater than normal requirements should only be considered for:

    1. Women with severe preeclampsia immediately prior to parenteral hydralazine, regional anaesthesia or immediate delivery: 250 mL bolus (as above)
    2. Initial management in women with oliguria where there is a suspected or confirmed deficit in intravascular volume: 300 mL challenge, repeat with careful assessment

As vascular permeability is increased in women with preeclampsia, administration of large volumes of intravenous fluid before or after delivery may cause pulmonary oedema and worsen peripheral oedema. This tendency is further aggravated by hypoalbuminemia. Appropriate blood product replacement is necessary when there has been haemorrhage, as in cases of placental abruption. Post-partum oliguria is a regular accompaniment of preeclampsia and care must be taken to avoid its' overtreatment. Persistent oliguria beyond 24 hours post-partum with rising plasma creatinine suggests the possibility of postpartum renal failure. There is no evidence that fluid manipulation is able to prevent this rare complication

Monitoring in a high dependency care unit is ideal for these cases because of the risk of pulmonary edema as mentioned above. Invasive monitoring should only be considered when there is developing renal failure or pulmonary edema.

6.7 MgSO4 prophylaxis in severe or impending preeclampsia

- The drug of choice for the prevention of eclampsia is magnesium sulphate, given as a 4g loading dose (diluted in normal saline) followed by an infusion of 1g/hour

6.8 Fetal Surveillance

- Adverse perinatal outcome is increased in women with all subcategories of hypertensive disease in pregnancy as compared to normotensive women
- This increase in adverse outcomes is greatest in those with early gestation at onset of disease, severe hypertension and/or chronic hypertension with superimposed preeclampsia and is predominantly related to an increase in the rate of FGR
- Balancing the fetal risks of FGR with the neonatal risks of prematurity and the maternal risks, is particularly important in early onset disease

6.9 Neonatal Consultation

- Obstetric consultation is mandatory in all women with severe preeclampsia. In those women with preeclampsia presenting at extreme preterm gestations (< 32 weeks), consultation with a tertiary institute should be arranged since the neonate may require intensive care after delivery.
- Every effort should be made to transfer a woman with very preterm-preeclampsia to a unit with appropriate neonatal and maternal care facilities prior to delivery.
- In local settings, **early transfer** may be required instead of an unplanned emergency transfer from a district facility. This must be conducted at the level of the SMO. The Referral and Transfer Policy of the MOH guides this process.

6.10 Timing of delivery

- Timing of delivery is dependent upon the severity of the maternal disease and the gestation at which the preeclampsia or gestational hypertension presents.
- Immediate management refers to delivery planned within 48 hours, usually after blood pressure stabilisation and corticosteroid administration to accelerate fetal pulmonary maturity.
- Expectant management refers to prolongation of the pregnancy beyond these 48 hours with maternal and fetal monitoring
- Fetal mortality and morbidity is strongly associated with gestational age at delivery.
- Prolongation of pregnancy in the presence of preeclampsia carries little benefit for the mother but is desirable at early gestations to improve the fetal prognosis
- When the onset of preeclampsia occurs at a pre-viable gestation there is little to be gained from prolonging the pregnancy with increasing serious maternal morbidity rates and high perinatal mortality rates of greater than 80%. The onus remains on the clinician to advise on delivery, particularly in resource poor settings. Consultation with another senior SMO is recommended.
- Where delivery is anticipated, consider administration of Antenatal steroids at 26-34 weeks e.g. dexamethasone 6 mg every 12 hours, four doses (24 mg). Antenatal MgSO4 is recommended for fetal neuroprotection when given to women who will deliver preterm up to 34+0 weeks of pregnancy. A similar dosage regime (as in impending eclampsia above, is recommended at this time).
- Preeclampsia presenting in the late preterm period (34-36 weeks gestation) is associated with increasing risk of SGA neonates with a higher risk of delivery via Caesarean section, respiratory distress syndrome and longer neonatal intensive care admissions. Therefore, antenatal steroid prophylaxis may be beneficial in this group. The use of antenatal steroids beyond 34 weeks should be considered based on individual patient circumstances. In women with hypertensive disorders of pregnancy undergoing planned Caesarean section after 34 weeks gestation, urgent delivery should not be delayed purely for the benefits of corticosteroid therapy.
- At a mature gestational age, delivery should not be delayed in the case of severe preeclampsia. Even so, it is important to control severe hypertension and other maternal derangements before subjecting the woman to the stresses of delivery.

Table 3. Timing of delivery and gestation of presentation of preeclampsia

GESTATION AT ONSET	PREVIABLE	26-32 WEEKS	>32-37	>37
Delivery plan	Consult with Tertiary institution. If severe early onset, likely to need delivery for maternal reasons in line with existing laws and MBTT Code of Practice	Consult and consider transfer to Tertiary institution: likely to need preterm delivery. Aim to prolong pregnancy where possible if benefits outweigh risks	Aim to prolong pregnancy where possible if benefits outweigh risks; deliver in an institution with appropriate Neonatal care Transfer to tertiary institution in utero if indicated	Plan delivery on best day in best way. Avoid delivery when there may be limited resources e.g. weekends, after-hours, on-call days, holidays

- **Avoid planned delivery when there may be limited resources e.g. weekends, after-hours, on-call days, holidays**

Table 4. Possible indications for delivery

MATERNAL	FETAL
Gestational age ≥ 37 weeks	Placental abruption
Uncontrollable hypertension	Severe FGR
HELLP syndrome features	Non-reassuring fetal status
Persistent neurological symptoms	
Pulmonary oedema	
Deteriorating renal function	
Visual disturbances, vision loss, scintillating photophobia	
Persistent epigastric pain, nausea, vomiting with abnormal LFTs	

6.11 Management of eclampsia

Comprehensive protocols for the management of eclampsia (and severe hypertension) should be available in all appropriate areas. **An algorithm should be laminated and kept for easy reference.**

There are four main aspects to care of the woman who sustains eclampsia:

I. Resuscitation

These seizures are usually self-limiting.
Airway: Resuscitation requires assuring a patent airway, oxygen by mask and institution of intravenous access.
Magnesium sulphate is the drug of choice. Intravenous diazepam (2mg/min to maximum of 10mg) or clonazepam (1-2mg over 2-5 mins) may be given whilst the magnesium sulphate is being prepared if the seizure is prolonged.

II. Prevention of further seizures

Following appropriate resuscitation, administer

- Intravenous magnesium sulphate 4g loading dose (diluted in normal saline, over 15-20 minutes) followed by an infusion of (1-2g/hr, diluted in normal saline). Prediluted magnesium sulphate should be available in all appropriate areas for this purpose (4g/100ml normal saline).
- In the event of a further seizure, a further 2-4g of magnesium sulphate is given IV over 10 minutes.
- Magnesium sulphate is usually given as an intravenous loading dose although the intramuscular route is equally effective.
- Monitoring should include blood pressure, respiratory rate, urine output, oxygen saturation and deep tendon reflexes.
- Magnesium sulphate by infusion should continue for 24 hours after the last seizure.
- Serum magnesium levels do not need to be measured routinely unless renal function is compromised.
- Magnesium sulphate is excreted via the kidneys and extreme caution should be used in women with oliguria or renal impairment. Serum magnesium concentration should be closely monitored in this situation.
- Magnesium is not universally successful and the recurrence rate of seizures despite appropriate magnesium therapy is 10-15%.

III. Control of hypertension [See Section 3]

Control of severe hypertension to levels below 160/100 mmHg is essential as the threshold for further seizures is lowered after eclampsia, likely in association with vasogenic brain edema. In addition, the danger of cerebral haemorrhage is real. See above for antihypertensive drugs.

IV. Delivery

- Arrangements for delivery should be decided once the woman's condition is stable.
- In the meantime, close fetal monitoring should be maintained.
- There is no role, with currently available treatment, for continuation of pregnancy once eclampsia has occurred, even though many women may appear to be stable after control of the situation has been achieved.

7.0 Intra-partum period

- Delivery planning under the guidance of the SMO
- Delivery planning along with neonatal team
- Automated continuous blood pressure monitoring
- CTG monitoring during labour
- Adequate hydration
- Large bore cannula
- CBC, Group and cross matching, Clotting, Renal and Liver Function tests
- Adequate analgaesia. Epidural if available.

8.0 Post-partum period

- Rare cases of eclampsia can occur after the 48 hours of delivery. Arrangements for follow up of the patient and her blood pressure must be made before discharge from hospital up to a minimum of two-weeks postpartum
- Clinical and laboratory derangements of preeclampsia recover, but there is often a delay of several days and sometimes longer to return to normal.
- On the first day or two after delivery, liver enzyme elevations and thrombocytopenia will often worsen before they improve
- NSAIDs may adversely affect hypertension, renal function and platelet function
- Hypertension may persist for days, weeks or even up to three months and will require monitoring and slow withdrawal of antihypertensive therapy.
- Resolution is still assured if the diagnosis was preeclampsia and there is no other underlying medical disorder.
- The woman and her family are often overwhelmed and distressed from their experience and appropriate management postpartum should include psychological and family support.
- All women who develop preeclampsia and gestational hypertension are at risk of these disorders in future pregnancies

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