Obstetric Emergencies

- Cardiac Arrest
- Anaphylaxis
- Sepsis
- Maternal shock/ Maternal collapse
- Management of massive hemorrhage in Obstetrics
- Trauma
- APH
- Hypertension in pregnancy

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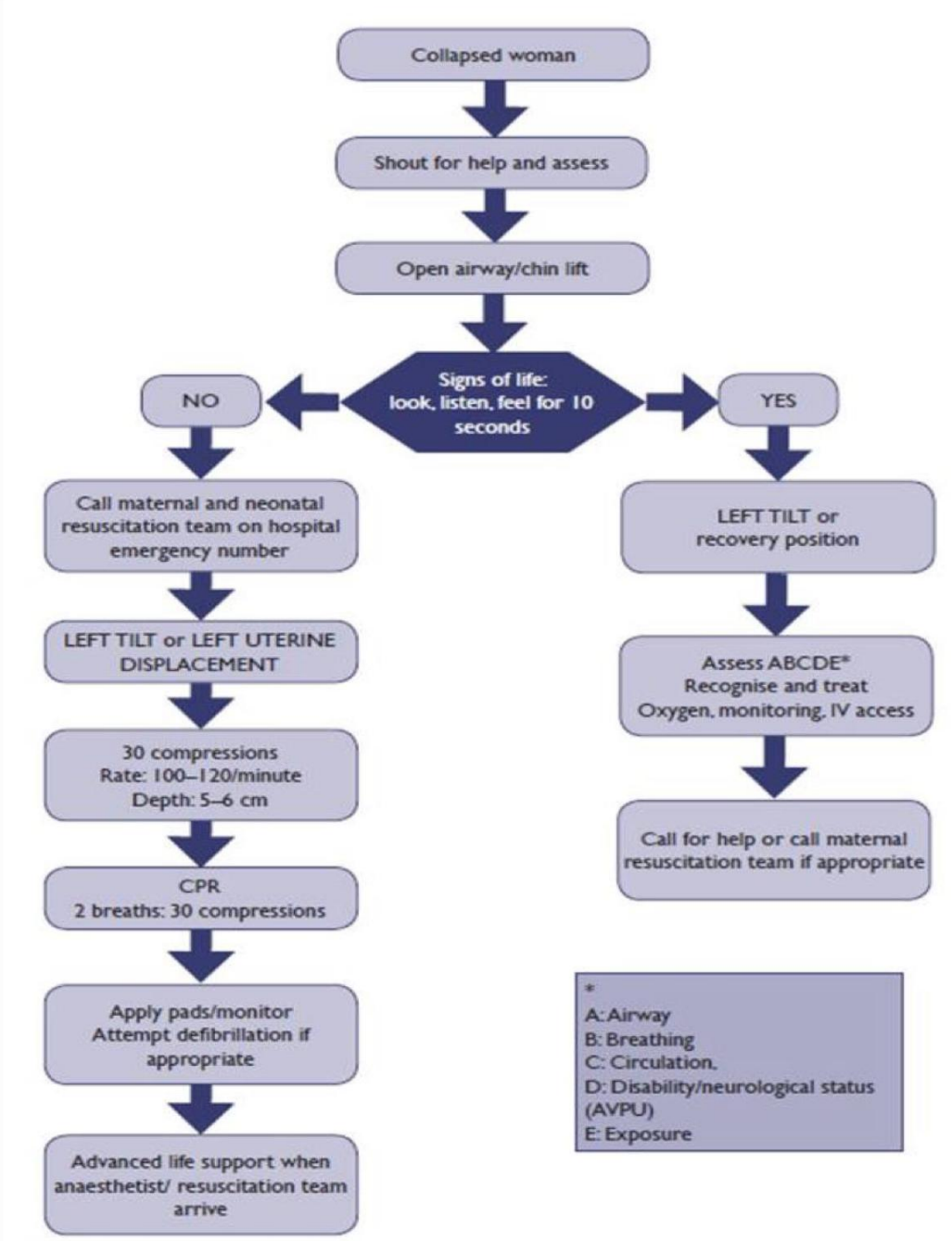
Cardiac arrest

Flowchart 1: Basic Life Support Algorithm



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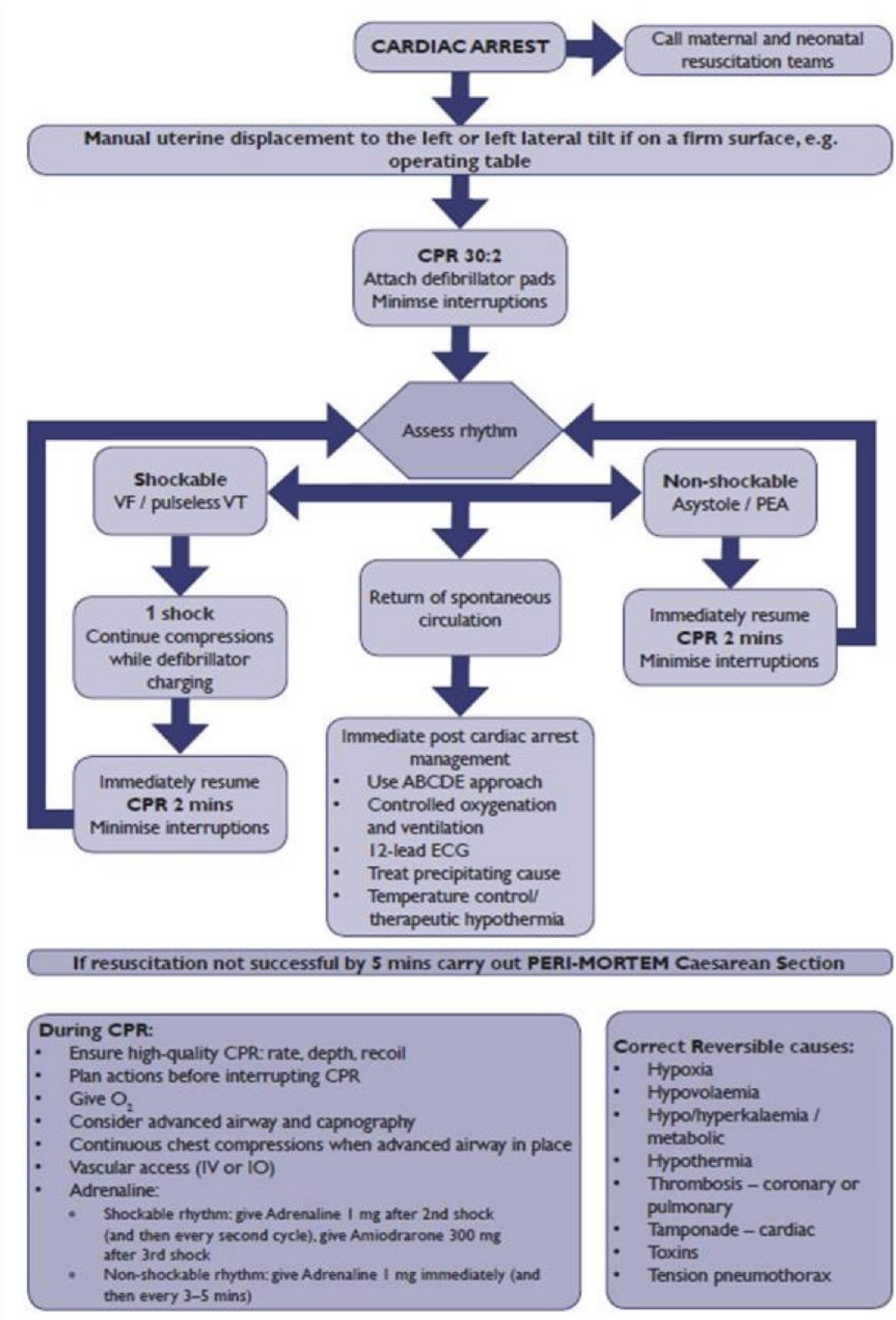
Flowchart 2: Advanced Life Support Algorithm



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Drugs during resuscitation

Feature	Drug to be considered
Cardiac arrest	IV Adrenaline 1mg Shockable rhythm – After 2nd shock then every other cycle Non-Shockable rhythm – Give immediately then every 3-5 min
VF/VT	IV Amiodarone 300 mg after 3rd shock
Opiate overdose	IV Naloxone 400 – 800 micrograms
Magnesium toxicity	IV Calcium gluconate 10% 10ml
Local anesthetic toxicity	1.5 ml/Kg 20% Lipid emulsion (Intralipid)

Reversible causes

Reversible Cause		**Cause in Pregnancy**
4H's	Hypovolaemia	Bleeding (may be concealed) or relative hypovolaemia of dense spinal block; septic or neurogenic shock
	Hypoxia	Pregnant women become hypoxic more quickly
	Hypo / hyperkalaemia and other electrolyte disturbances	
	Hypothermia	
4T's	Thromboembolism	AFE, PE, air embolus, MI
	Toxicity	Local anaesthetic, magnesium, other
	Tension pneumothorax	Following trauma, suicide attempt
	Tamponade (cardiac)	Following trauma, suicide attempt
Eclampsia and pre-eclampsia		Includes intracranial haemorrhage

Resuscitation consideration

- Fetal survival usually depends on maternal survival and initial resuscitation efforts should focus on the pregnant mother.

Prevention of cardiac arrest

- Many cardiovascular problems associated with pregnancy are caused by compression of the IVC.
  - Place the patient in the left lateral position or manually and gently displace the uterus to the left.
- Give high-flow oxygen guided by pulse oximetry.
- Give a fluid bolus if there is hypotension or evidence of hypovolaemia.
- Seek expert help early.
  - Obstetric and neonatal specialists should be involved early in the resuscitation.
- Identify and treat the underlying cause.

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Cardiac arrest

- Call for expert help early
  - Ensure early involvement of obstetric, anaesthetic, critical care and neonatal teams.
- Start basic life support according to standard guidelines.
- Compression
  - Use the standard hand position for chest compressions on the lower half of the sternum if feasible.
  - If over 20 weeks pregnant or the uterus is palpable above the level of the umbilicus:
    - Manually displace the uterus to the left to remove aortocaval compression.
    - If feasible, add left lateral tilt – the chest should remain on supported on a firm surface (e.g. in the operating room).
    - The optimal angle of tilt is unknown. Aim for a tilt between 15 and 30 degrees.
- Perimortem C-Section
  - Prepare early for emergency hysterostomy early – the fetus will need to be delivered if immediate (within 4 minutes) resuscitation efforts fail.
  - If over 20 weeks pregnant or the uterus is palpable above the level of the umbilicus and immediate (within 4 min) resuscitation is unsuccessful, deliver the fetus by emergency caesarean section (Start at 4 min) aiming for delivery within 5 min of collapse.
  - The best survival rate for infants over 24-25 weeks gestation occurs when delivery of the infant is achieved within 5 min after the mother's cardiac arrest.
  - At older gestational ages (30-38 weeks), infant survival is possible even when delivery was after 5 minutes from the onset of maternal cardiac arrest.
  - Delivery relieves caval compression and permitting an increase in venous return during the CPR attempt.
  - Enables access to the abdominal cavity so that aortic clamping or compression is possible.
  - Gestational age < 20 weeks.
    - Urgent Caesarean delivery need not be considered, because a gravid uterus of this size is unlikely to compromise maternal cardiac output and fetal viability is not an issue.
  - Gestational age approximately 20-23 weeks.
    - Initiate emergency delivery of the fetus to permit successful resuscitation of the mother, not survival of the delivered infant, which is unlikely at this gestational age.
  - Gestational age approximately > 24 weeks.
    - Initiate emergency delivery to help save the life of both the mother and the infant.
- Defibrillation

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    - Place defibrillator pads in the standard position as far as possible and use standard shock energies.
- Ventilation
    - Consider early tracheal intubation by a skilled operator as there is an increased risk of pulmonary aspiration of gastric contents in pregnancy.
    - Early tracheal intubation decreases this risk, but can be more difficult in the pregnant patient.
    - A tracheal tube 0.5-1 mm internal diameter (ID) smaller than that used for a non-pregnant woman of similar size may be necessary because of maternal airway narrowing from oedema and swelling.
- Reversible causes
    - Identify and treat reversible causes (e.g. haemorrhage).
    - Focused ultrasound by a skilled operator may help identify and treat reversible causes of cardiac arrest.
        - Evaluation of fetal viability, multiple pregnancy, and placental localisation.
    - 4 Hs and 4 Ts approach.
        - Hemorrhage
            - Ectopic pregnancy, placental abruption, placenta praevia and uterine rupture.
            - Stop the bleeding.
            - Massive haemorrhage protocol.
            - Correction of coagulopathy, oxytocin, ergometrine and prostaglandins to correct uterine atony, uterine compression sutures, intrauterine balloon devices, radiological embolisation of a bleeding vessel, and surgical control including aortic cross clamping/compression and hysterectomy.
            - Placenta percreta may require extensive intra-pelvic surgery.
        - Drugs
            - Overdose can occur in women with eclampsia receiving magnesium sulphate, particularly if the patient becomes oliguric.
                - Give calcium to treat magnesium toxicity.
            - Central neural blockade for analgesia or anaesthesia can cause problems due to sympathetic blockade (hypotension, bradycardia) or local anaesthetic toxicity.
        - CVS
            - Acquired cardiac disease - MI and aneurysm or dissection of the aorta or its branches, and peripartum cardiomyopathy.
            - ACS - atypical features such as epigastric pain and vomiting.
                - Percutaneous coronary intervention (PCI) is the reperfusion strategy of choice for STEMI.

        - Thrombolysis should be considered if urgent PCI is unavailable.
    - Eclampsia - Development of convulsions and/or unexplained coma during pregnancy or postpartum in patients with signs andsymptoms of pre-eclampsia.
        - Magnesium sulphate treatment may prevent eclampsia developing in labour or immediately postpartum in women with pre-eclampsia.
    - Amniotic fluid embolism
        - Presents around the time of delivery often in the labouring mother with sudden cardiovascular collapse, breathlessness, cyanosis, arrhythmias, hypotension, and haemorrhage associated with DIC.
        - Mx - supportive based on the ABCDE approach and correction of coagulopathy. There is no specific therapy.
    - Pulmonary embolism
        - Cardiopulmonary collapse can present throughout pregnancy.
        - CPR should be started with modifications as necessary.
        - Use of fibrinolysis (thrombolysis) needs considerable thought, particularly if a peri-mortem Caesarean section is being considered.
        - If the diagnosis is suspected and maternal cardiac output has not returned it should be given.
- Consider extracorporeal CPR (ECPR) as a rescue therapy if ALS measures are failing.

Anaphylaxis

- Management for anaphylaxis in pregnant women is the same as for non-pregnant women, with modifications to positioning, and multidisciplinary team consideration of emergent birth of the baby.
- Pregnant women should be in left lateral position.
- IM adrenaline should be administered into the mid-outer thigh:
    - Women >/= 50 Kg – 0.5 mg (500 microgram)
    - Women < 50 kg - give 0.01 mg / kg (10 micrograms / kg)
    - The dose can be repeated every 5 minutes.
- If woman is in cardiac arrest and there is no response to cardiopulmonary resuscitation within 4 minutes, perform perimortem caesarean section.

Sepsis

Figure A2.1: Flowchart and checklist for the assessment and management of sepsis in pregnancy

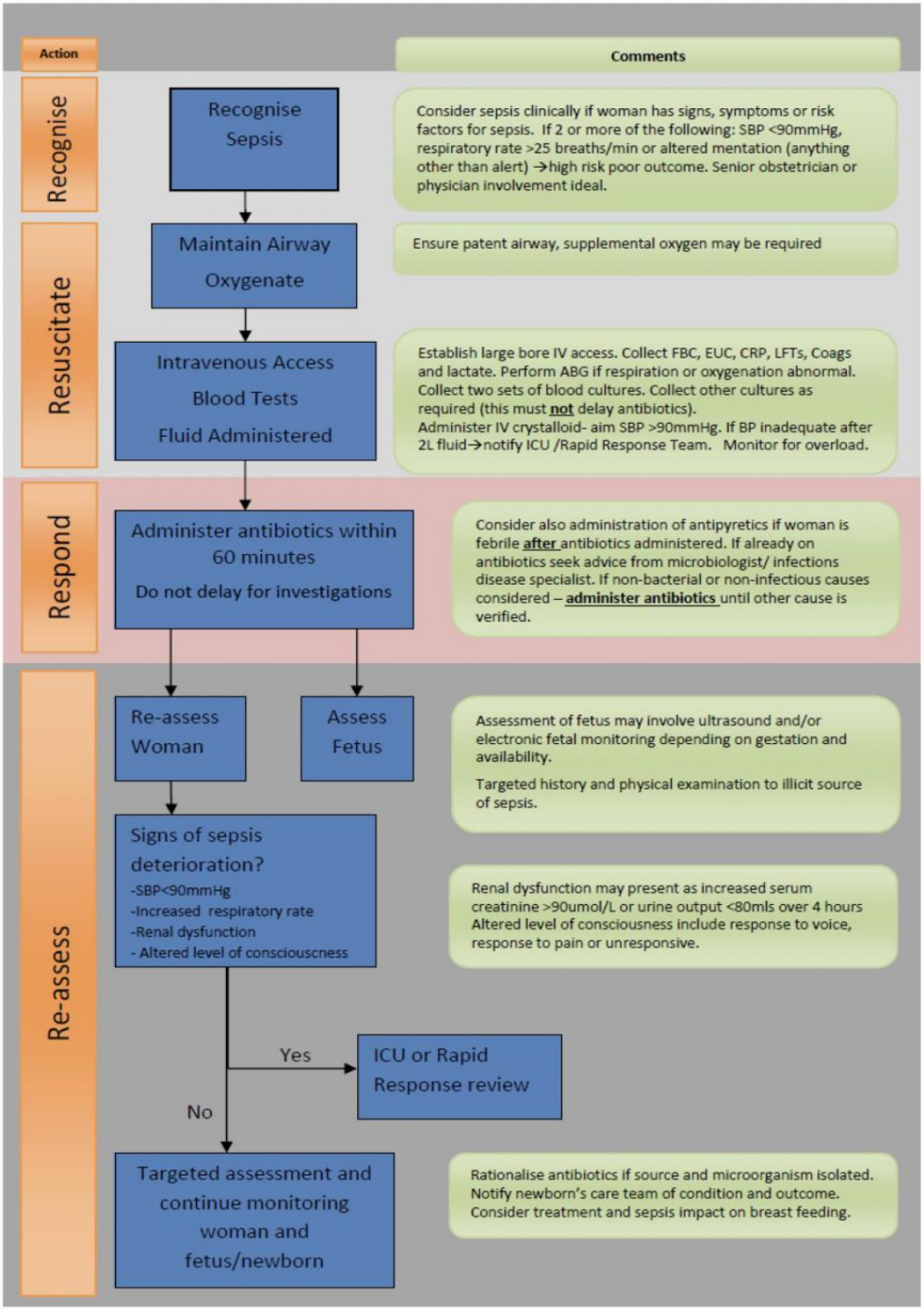

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TABLE 1 Obstetrically modified qSOFA score

Parameter	Score 0	1
Systolic blood pressure	≥90 mmHg	<90 mmHg
Respiratory rate	Less than 25 breaths/min	25 breath/min or greater
Altered mentation	Alert	Not alert

Min, minute; mmHg, millimetres of mercury; qSOFA, quick Sequential (sepsis-related) Organ Failure Assessment score.

TABLE 2 Obstetrically modified SOFA score

System parameter	Score 0	1	2
Respiration			
PaO_2/FIO_2	≥400	300 to <400	<300
Coagulation			
Platelets, $\times 10^9$/L	≥150	100-150	<100
Liver			
Bilirubin (μmol/L)	≤20	20-32	>32
Cardiovascular			
Mean arterial pressure (mmHg)	MAP ≥ 70	MAP < 70	Vasopressors required
Central nervous system	Alert	Rousable by voice	Rousable by pain
Renal			
Creatinine (μmol/L)	≤90	90-120	>120

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Maternal shock/ Maternal collapse

Causes

Possible causes of maternal collapse

Head	Eclampsia, epilepsy, cerebrovascular accident, vasovagal response
Heart	Myocardial infarction, arrhythmias, peripartum cardiomyopathy, congenital heart disease, dissection of thoracic aorta
Hypoxia	Asthma, pulmonary embolism, pulmonary oedema, anaphylaxis
Haemorrhage	Abruption, uterine atony, genital tract trauma, uterine rupture, uterine inversion, ruptured aneurysm
Whole body and Hazards	Hypoglycaemia, amniotic fluid embolism, septicaemia, trauma, complications of anaesthesia, drug toxicity

Primary obstetric survey

Head	How responsive is the woman? Is she alert, responsive to voice, responsive to painful stimuli or unresponsive (AVPU)? Is the woman fitting?
Heart	What is the capillary refill like? What is the pulse rate and rhythm? BP? Is there a murmur?
Chest	Is there good bilateral air entry? What is the breath sounds like? Is the trachea central?
Abdomen	Is there an 'acute' abdomen (rebound and guarding)? Is there tenderness (uterine or non-uterine)? Is the foetus alive? Is there a need for a laparotomy or delivery?
Vagina	Is there bleeding? What is the stage of labour? Is there an inverted uterus?

PPH

Definition

- PPH
  - Blood loss of 500 ml or more from the genital tract within 24hours of the birth of a baby.
- Major PPH
  - Blood loss of over 1000 ml

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    - Major can be further sub-divided into moderate (1001 -2000ml) and severe >2000ml.
- Massive PPH
    - The loss of 40% or more of the blood volume is life threatening (Blood volume = 100ml/Kg)

Causes

- TONE – Rub down.
    - UTERINE ATONY – associated with chorioamnionitis, prolonged labour, polyhydramnios, macrosomia, multiple gestations.
    - UTERINE INVERSION
- TRAUMA – uterus, vaginal or cervical laceration
- TISSUE – retained placenta, accrete.
    - ACCRETA – invasion into first 1/3 of myometrium
    - INCRETA – invasion further into myometrium
    - PERCRETA – invasion through myometrium into surrounding structures (bladder and bowel)
- THROMBIN – coagulopathy from multiple causes (AFE, retained products, intrauterine death, sepsis, PET, abruption)

Management

- Identification of severity of haemorrhage
    - Visual estimation of post-partum blood loss is inaccurate.
    - Clinical signs and symptoms should be included in the assessment of PPH.
    - Shock index (SI)– (Heart rate/Systolic Blood Pressure) as an effective predictor for PPH.
        - SI <0.9 provides reassurance, whereas SI ≥ 1.7 indicates a need for urgent attention in haemorrhage.
    - Call for help.
        - Any PPH should be informed to the highest level of obstetric team.
        - Inform- clear instruction to telephone operator
            - The obstetric middle grade - SHO
            - The aesthetic middle grade; Where available, the early involvement of the aesthetic team, even while the patient is still in the labour room is recommended.
            - Inform theatre.
            - Alert MO blood bank
            - Alert Consultant Obstetrician
            - Alert Consultant Anaesthetist
            - Transfusion medicine specialist / Haematologist.
            - Alert the head of the institution.

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        - Telephone operator should document the list of staff informed and submit it to the ward to be attached to the Bed Head Ticket.
    - Communication
        - Maintain a calm atmosphere.
        - Keep the mother (and labour companion/family) informed and reassure the mother regularly where feasible.
        - Allocate one staff to documentation.
    - Resuscitation
        - ABCDE approach
        - Clear airway. High flow oxygen to keep SPO2> 95%, attach oximeter probe.
        - Intubate, ventilate-if abnormal breathing, unconscious, unresponsive.
        - Insert two 14-16 g cannula, draw 20 ml blood for grouping, DT, FBC, BU, Electrolytes, APTT, PT/INR, ROTEM, S. Fibrinogen.
        - Request 6 U blood, Cryoprecipitate 20 U, FFP 4 U, platelets 1 adult dose.
        - Inform blood bank to activate massive haemorrhage protocol.
        - Monitor BP, ECG, AVPU, CBS, UOP, CVP
        - Transfuse blood as soon as possible - Minimise crystalloid, Replace blood loss with blood.
        - In emergency use on the availability of specific blood.
            - O-ve → O+ve→ group-specific uncross matched →cross-matched.
        - Warm patient with forced air warmer, Warm fluids/blood using rapid warmer infuser. Or normal blood warmer.
        - Control bleeding- medical/ physical manoeuvres & surgical.
        - Get ROTEM result within 5- 10 min. Replace as indicated by ROTEM.
        - If ROTEM not available Start giving shock packs 4:4: I adult dose of platelets.
        - Due consideration must be given to keeping transport facilities available to obtain blood and blood products from another institution.
- Atonic uterus
    - Uterine massage by 'rubbing up the fundus.
    - Clear the cervical canal and vagina of blood clots by vaginal examination.
    - Ergometrine plus Oxytocin combination, misoprostol plus oxytocin combination is more effective in preventing PPH [500ml than using current standard of Oxytocin alone. (Cochrane review 25th April 2018)

- Ergometrine maleate 0.5 mg slow IV or methyl Ergometrine 0.2 mg slow IV or oxytocin 5 IU IV and start an infusion of 40 IU of Oxytocin in 500 ml of Hartmann's / Normal Saline solution at 125 ml per hour via an infusion pump.
- Ergometrine can be repeated in every 2hours up to 3 doses.
- Start bimanual compression of uterus.
- If the bleeding fails to abate completely in 5- 10 minutes administer/repeat Ergometrine 0.5mg IV.
- Tranexamic acid 1 g by slow IV over 10 minutes. Maximum benefit is achieved if given within 30 minutes.
- This dose may be repeated after 30 minutes if necessary and later if bleeding recommences.
- Re-assess in 10 min – If fail to control bleeding
- Misoprostol 1000mic per rectally or sublingually.
- Uterine balloon tamponade.
- Compression of Aorta just above the bifurcation helps to minimize the loss until other measures are readily available.

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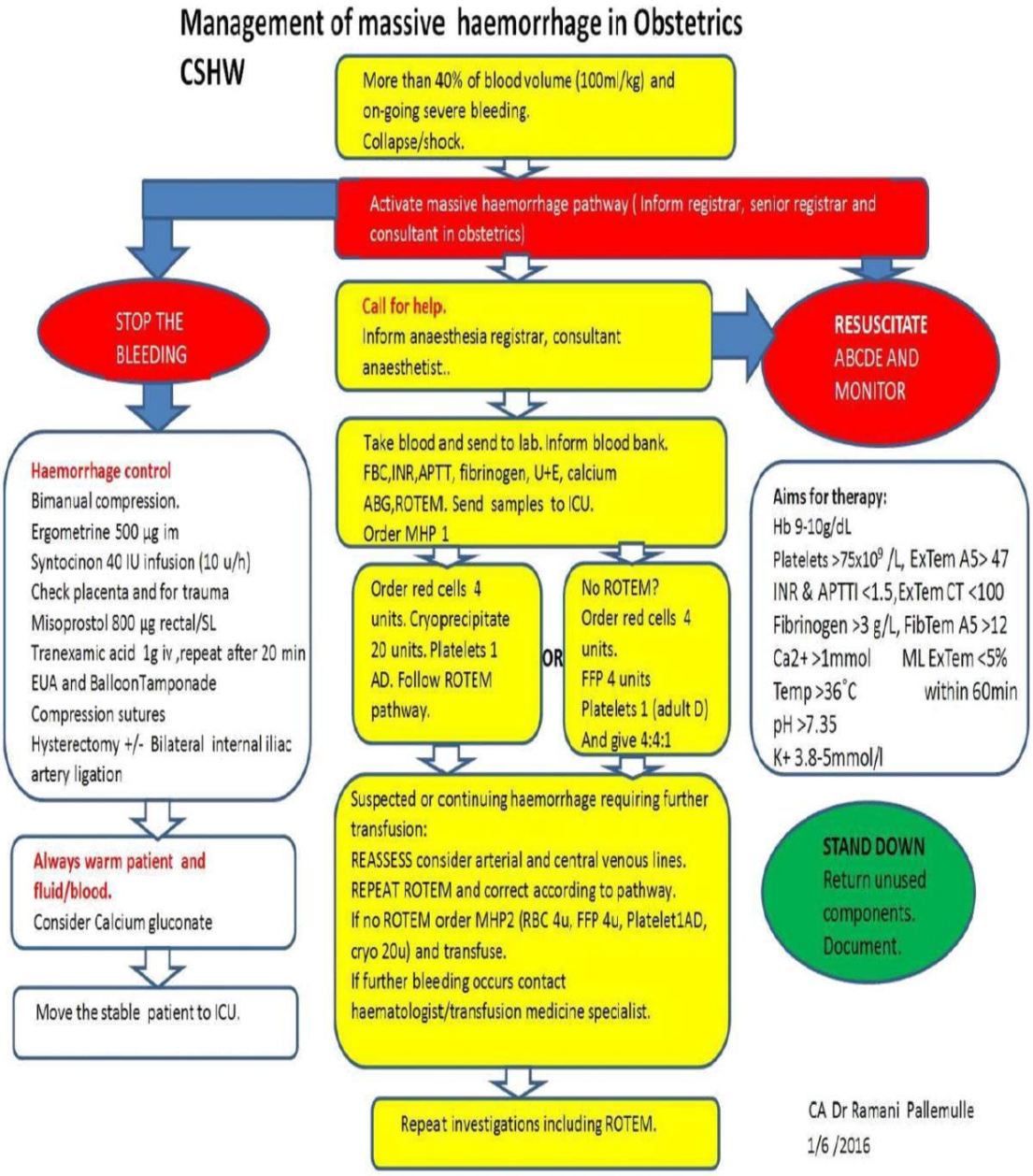

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Trauma

Fundus palpation chart

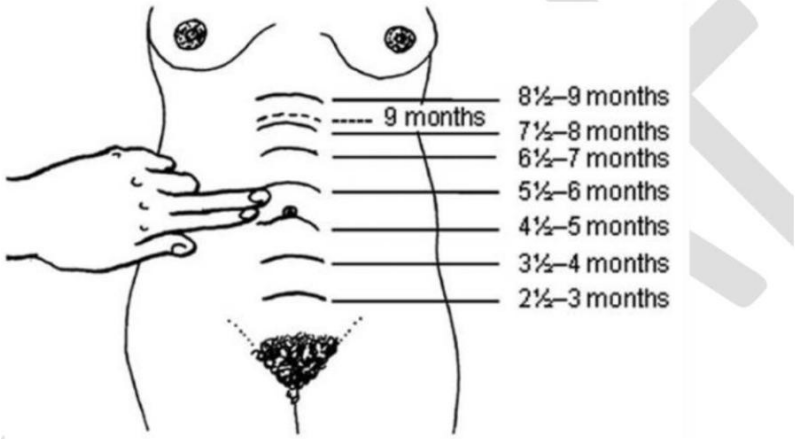
Identifying the top of the fundus

Walk your fingers up the side of the belly.

Find the top of the uterus (it feels like a hard ball under the skin).

You can feel the top by curving your fingers into the belly.

Measuring fundal height. Each increment is approximately two fingers' width.



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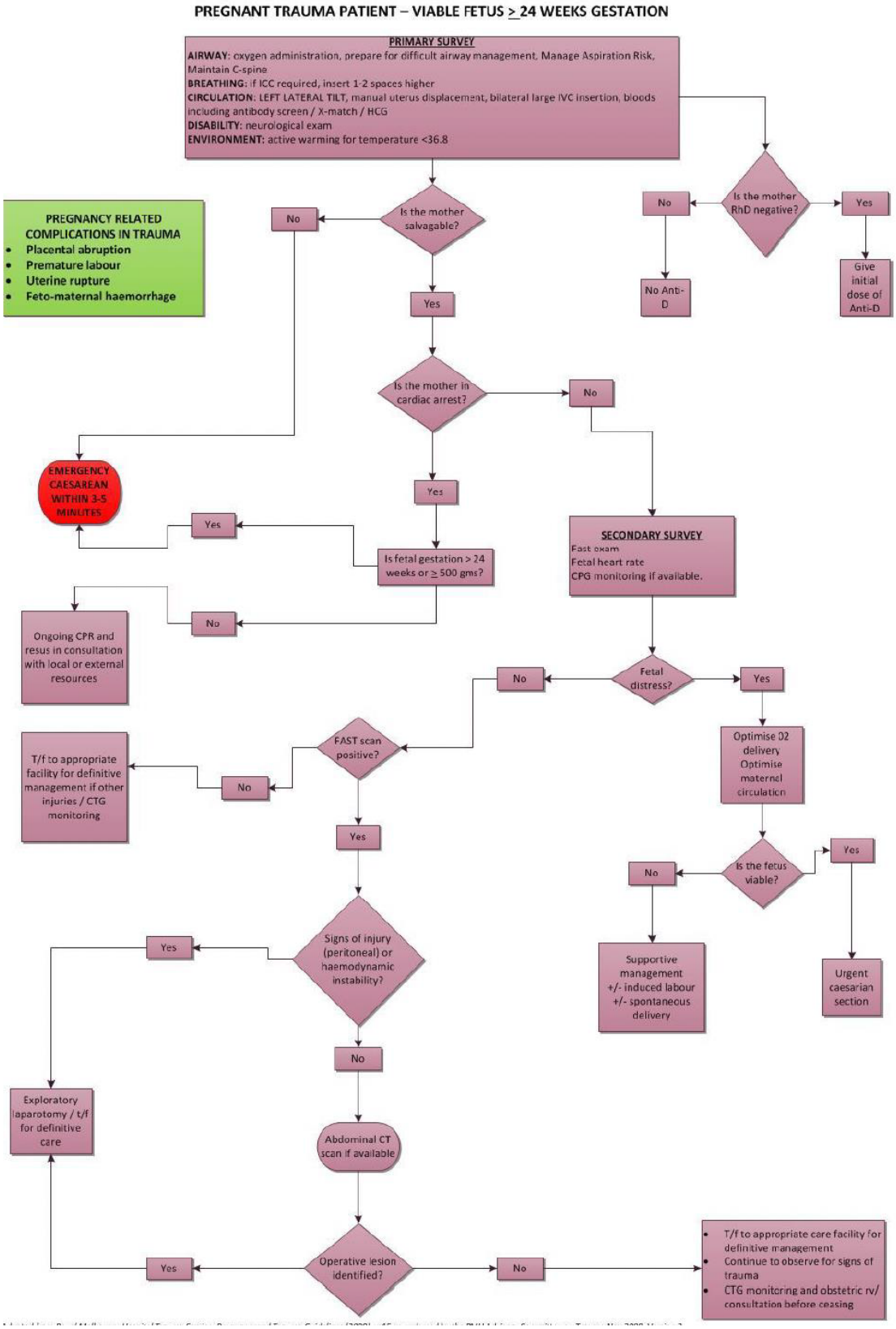
Obstetric emergencies



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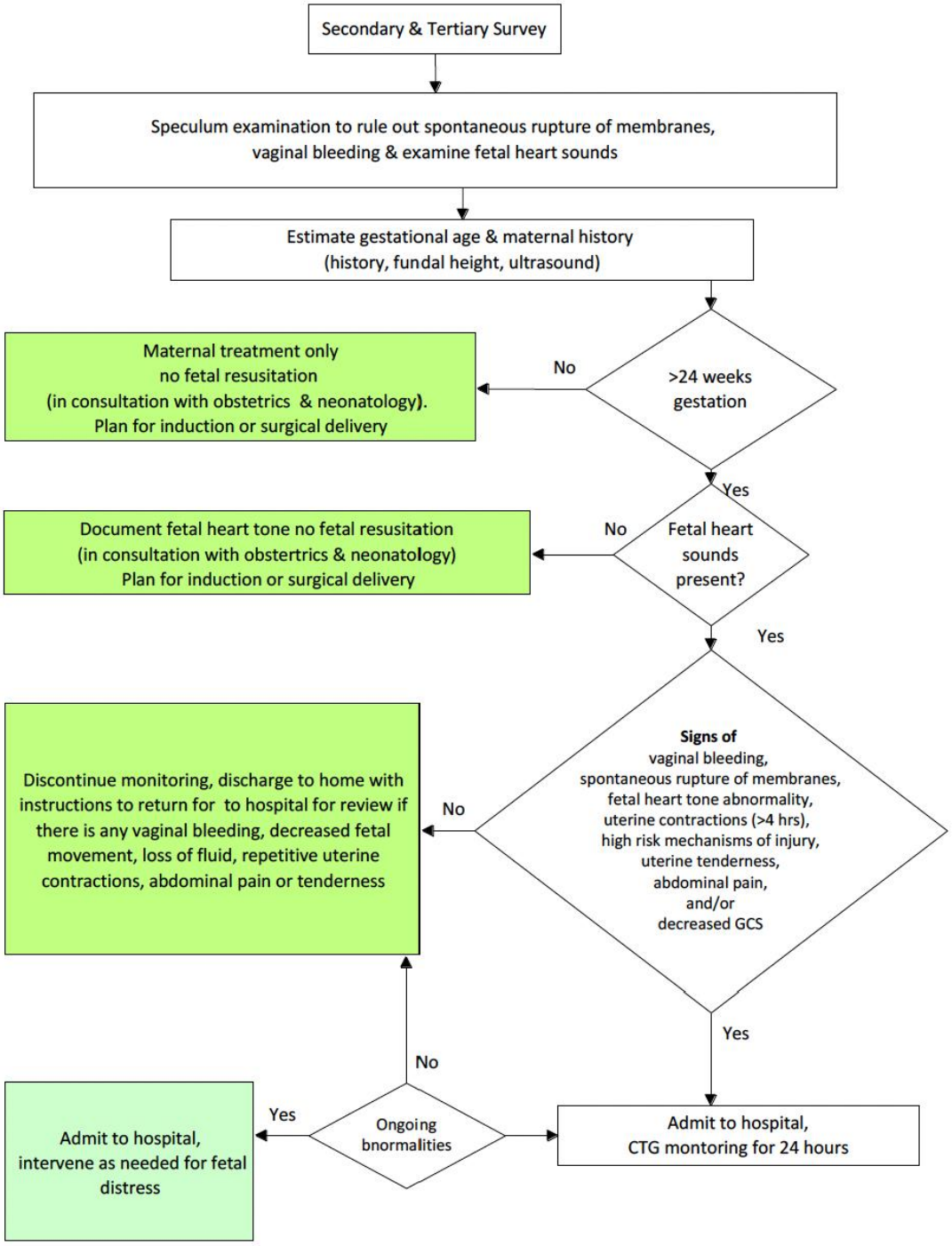

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APH

Life threatening causes

Less than 20 weeks	More than 20 weeks
• Ruptured ectopic pregnancy. • Retained products of conception (RPOC) • Complication of pregnancy termination. • Miscarriage – Threatened, incomplete, complete, missed.	• Placental abruption • Placenta previa • Uterine rupture • Postpartum haemorrhage (PPH)

	Symptoms	Signs
Placenta praevia	Painless +/- signs of foetal distress	Non-tender uterus Shock in proportion to PV loss.
Placental abruption	Constant pelvic pain Foetal distress	Tense tender uterus – woody feel. Shock out of proportion to PV loss
uterine rupture	Painful or painless, foetal distress.	Loss of the normal uterine contour

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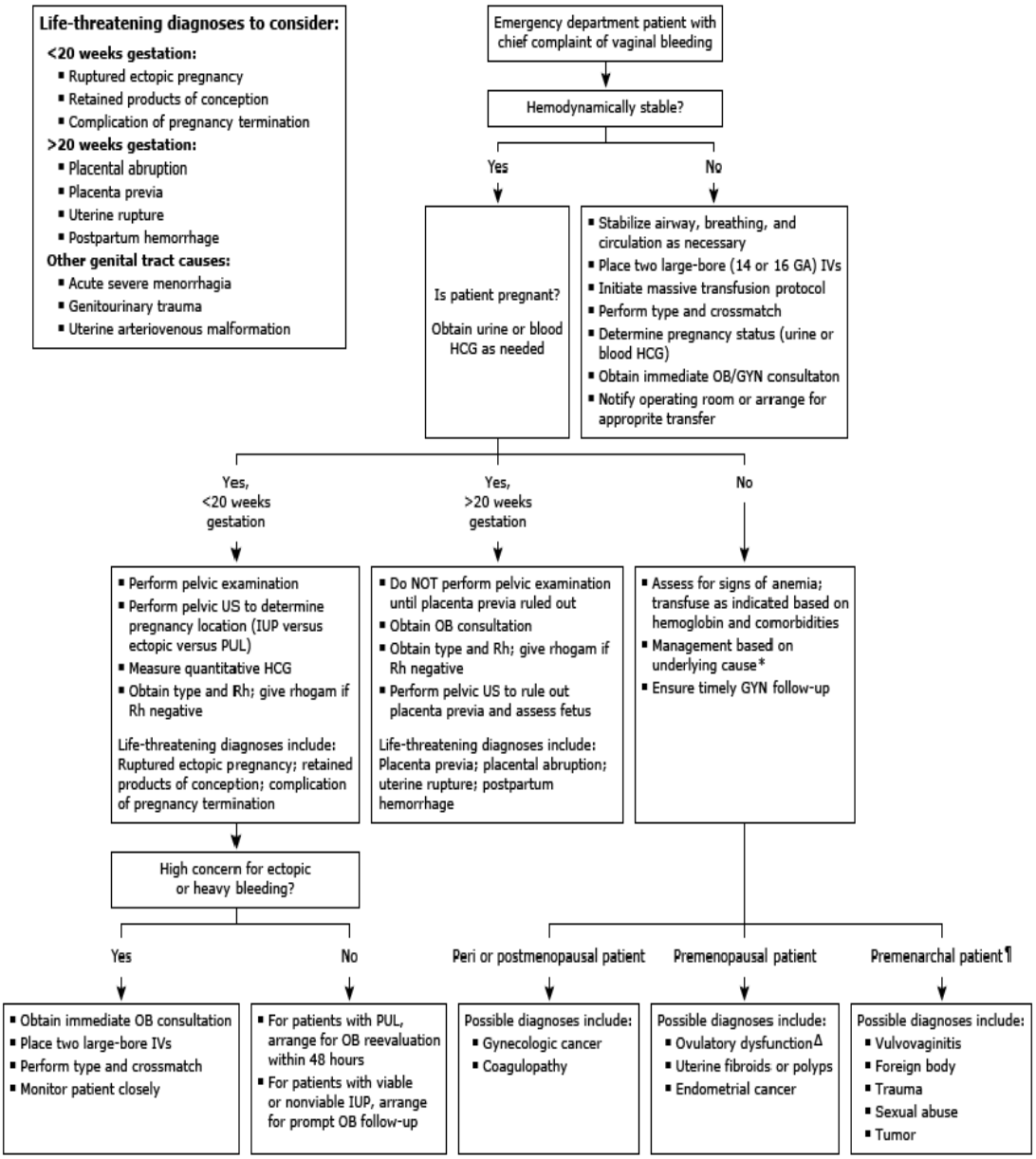
Obstetric emergencies



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Hypertension in pregnancy

Definition

- Hypertension:
  - Systolic blood pressure 140 – 159 mmHg and/or diastolic blood pressure 90 - 109 mmHg.
- Severe hypertension:
  - Systolic blood pressure >/=160 mmHg and/or diastolic blood pressure >/=110 mmHg.
- Chronic Hypertension
  - Women with pre-existing hypertension or hypertension detected before 20th week of gestation in the absence of trophoblastic disease and persisting more than 42 days post-partum.
- Gestational Hypertension
  - New onset of hypertension after 20 weeks gestation without any maternal or foetal features of preeclampsia.
  - Return of BP to normal within 3 months postpartum.
- Pre-eclampsia
  - Gestational hypertension associated with significant proteinuria (UPCR >/=30mg/mmol or 2+ or more on dipstick or 300mg/24 hours).
- Eclampsia
  - Development of convulsions and/or unexplained coma during pregnancy or postpartum in patients with a background of pre-eclampsia or gestational hypertension.

Diagnosis

Pre-eclampsia

- Diagnosed by presence of de novo hypertension after 20 weeks' gestation accompanied by evidence of at least one other organ involvement. (Biochemical and/or haematological impairment).
  - Evidence of maternal acute kidney injury
  - Liver dysfunction
  - Neurological features
  - Haemolysis or thrombocytopenia
  - and/or uteroplacental dysfunction (such as fatal growth restriction, abnormal umbilical artery doppler waveform analysis, or stillbirth).
- Proteinuria is the most commonly recognised additional feature after hypertension (not mandatory for clinical diagnosis).

Clinical features

- Severe headache.

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- Visual disturbances (blurring of vision or flashing before eyes or neurological symptoms such, altered mental status, blindness, stroke, or persistent visual scotomata).
- Epigastric or right hypochondrial pain, liver tenderness +/- nausea and vomiting
- Sudden swelling of the face, hands or feet
- Clonus (3 beats or more)
- Papilledema.
- Oliguria (less than 400 ml per day or 0.5 ml/Kg/ hour over a 4-hour period)

Biochemical

- Abnormal liver enzymes (ALT or AST rising to above 40IU/liter)
- Thrombocytopenia (platelet count below 150,000/ microliter
- Renal insufficiency (creatinine >/=90micromol/liter)
- HELLP syndrome
- Uteroplacental dysfunction (fetal growth restriction, abnormal umbilical artery doppler waveform analysis, or stillbirth.)

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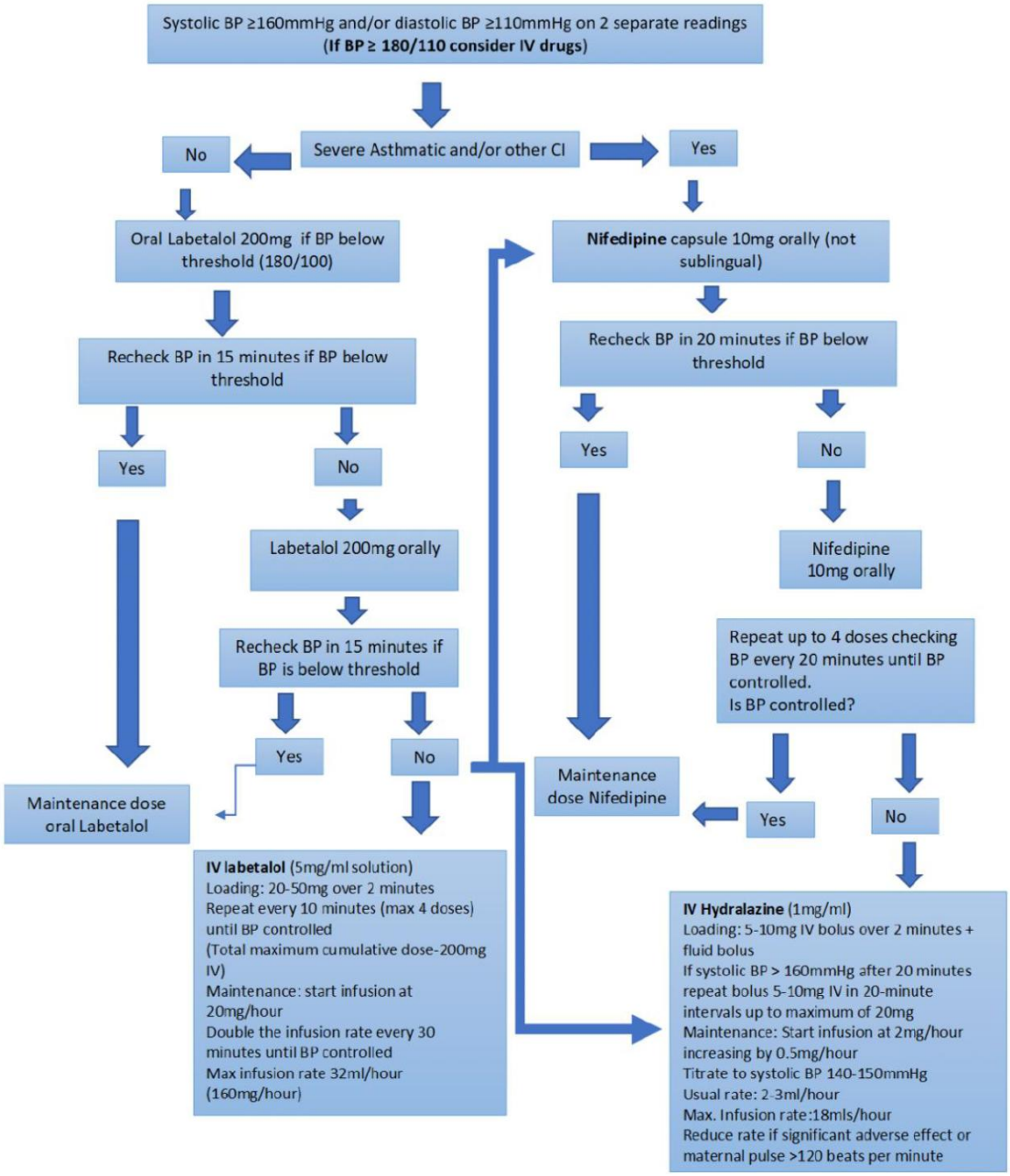
Severe hypertension

Algorithm for management of severe hypertension



- Avoid non-steroidal anti-inflammatory medication postnatally.
- BP monitoring and a gradual withdrawal of antihypertensive therapy may be required for up to 3 months postnatally.

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Sever pre-eclampsia

- Severe preeclampsia has been defined as BP ≥160/110 mmHg with proteinuria (urinary protein : creatinine ratio > 30mg/mmol or 24 hour urinary protein > 300 mg) **OR** BP 140/90 – 159/109 mmHg with proteinuria with at least one of the following:
  - Severe headache
  - Visual disturbances
  - Severe pain just below the ribs or vomiting
  - Papilloedema
  - Signs of clonus (≥ 3 beats)
  - Liver tenderness
  - HELLP syndrome
  - Platelet count < 100 x 109/L
  - Abnormal liver enzymes

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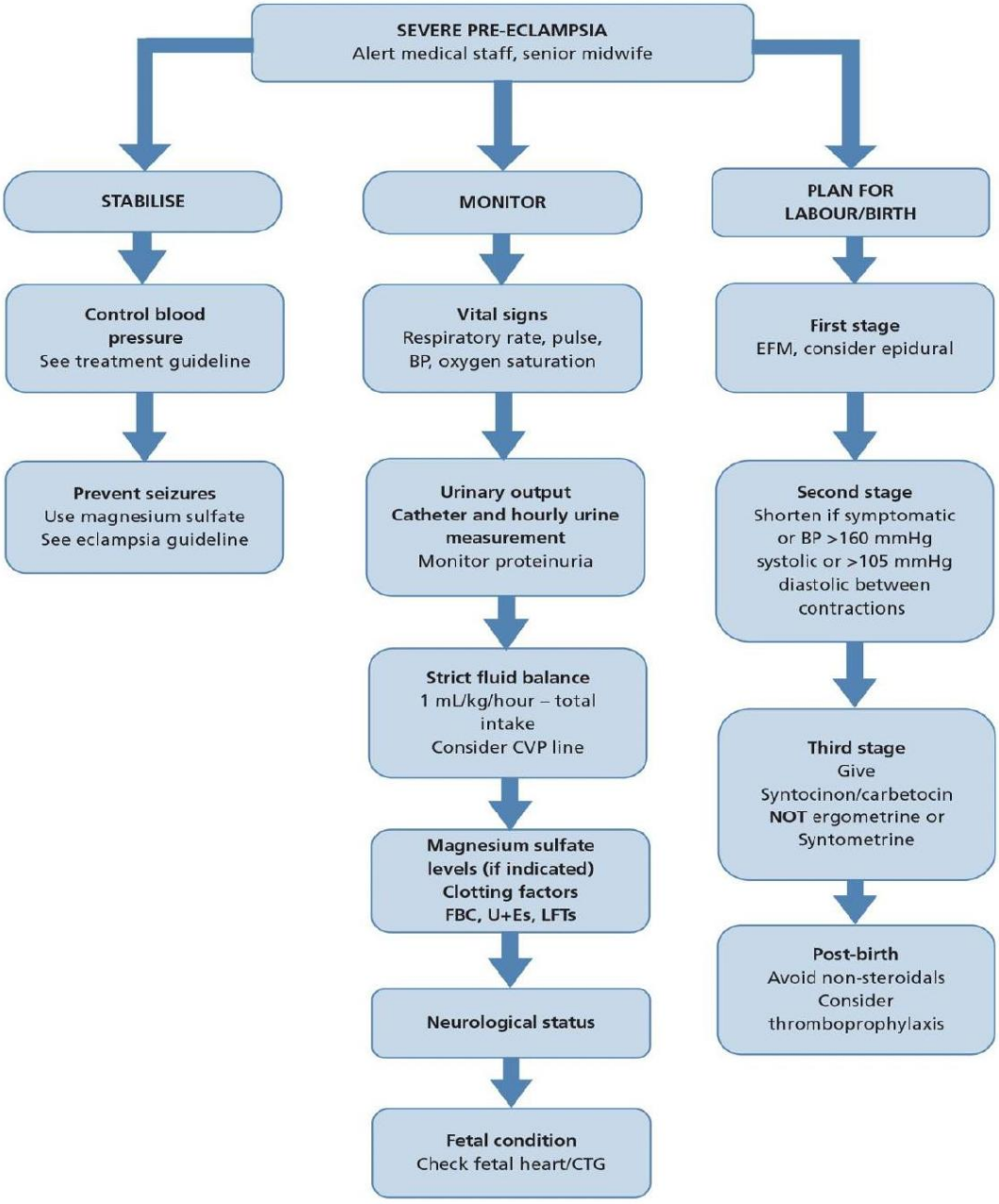
Severe pre-eclampsia management algorithm



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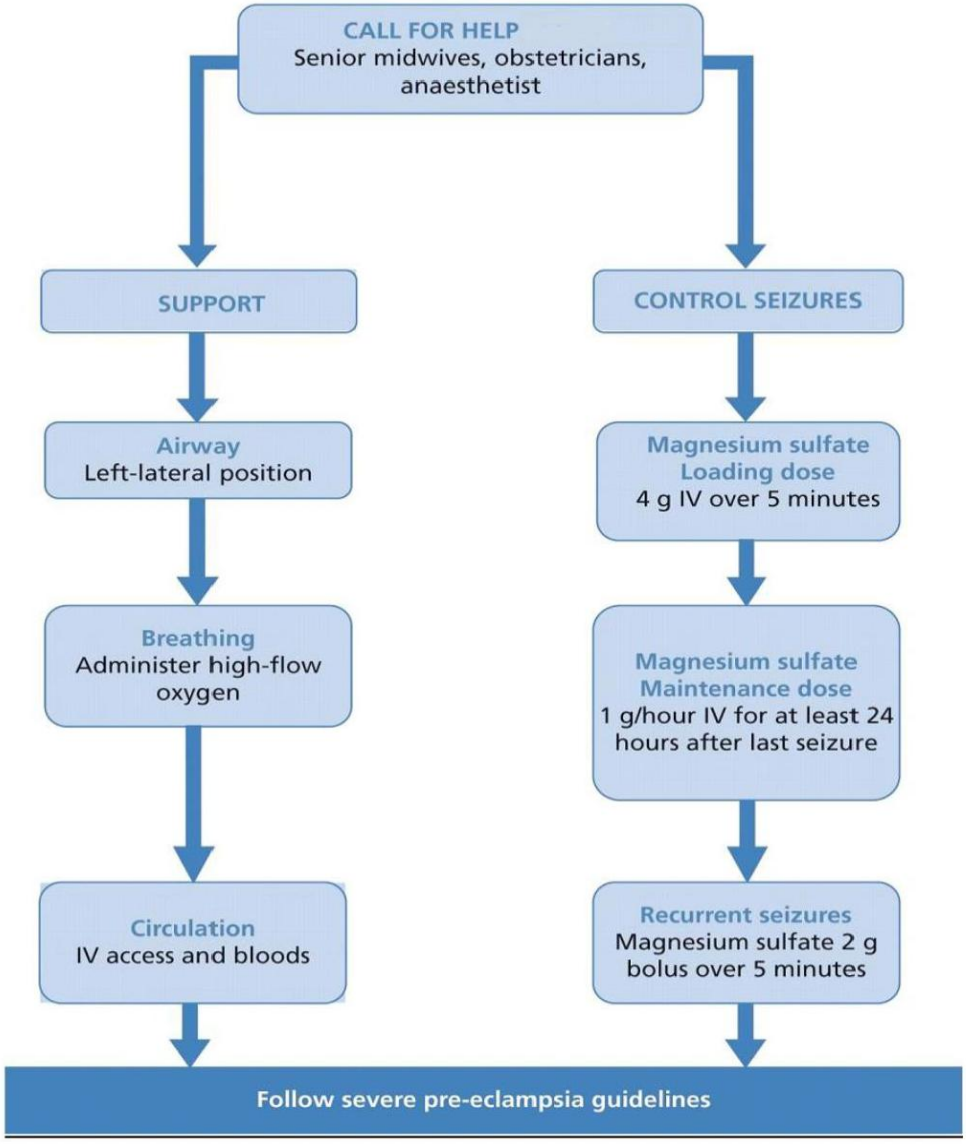
Eclampsia

Eclampsia is characterised by coma and / or convulsions.

Eclampsia may occur at any time up to 24 hours after birth and occasionally later.

Management of eclampsia algorithm



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Obstetric emergencies

Hypertension

- Antihypertensive treatment, If they have:
    - Sustained systolic blood pressure of >/=140 mmHg or sustained diastolic blood pressure of >/=90 mmHg.
- Target blood pressure of 135/ 85mmHg.
- Goal
    - Lower BP to prevent cerebrovascular and cardiac complications while maintaining uteroplacental blood flow, until the delivery is affected.
    - But it does not alter the progression of preeclampsia.

Pre-eclampsia

- Admit to hospital and inform Consultant – Life threatening emergency.
- Observe and monitor.
- Treat hypertension if:
    - SBP >/= 140 mmHg, or if DBP >/= 90 mm Hg
- Target
    - aim for an initial realistic target around 140-150/ 90-100 mmHg.
    - Rapid fall in maternal BP may cause FHR abnormalities and compromise, especially in growth restricted/compromised fetuses.
- Medications
    - Blood pressure <180/110 mmHg - Oral anti-hypertensive medications.
    - If adequate response is not obtained within 30 minutes – IV anti-hypertensives.
- **Nifedipine**
    - Oral nifedipine If BP <180/110mmHg, in asymptomatic patients. (Avoid SL administration as it can cause sudden hypotension and fetal compromise).
    - Give 10mg orally.
    - Repeat at 20-minute intervals up to a maximum of 40mg.
    - If there is no response proceed to intravenous labetalol or hydralazine.
- **Labetalol orally or intravenously**
    - Dose - PO 200mg stat (If BP < 180/110)
    - Check BP in 15 mins and 30 mins.
    - Repeat dose in half an hour if no adequate response.
    - Recheck BP in 15 mins and 30 mins.
    - If inadequate response, consider oral Nifedipine or IV labetalol regimens.
    - 20-50 mg IV loading over two minutes.
    - Record blood pressure after 10 minutes.
    - If either value is still above 160 mmHg systolic and/ or 110 mmHg diastolic, repeat 20-50 mg IV over 2 minutes.
    - Record blood pressure after 10 minutes.
    - Repeat every 10 mins maximum up to 4 doses until BP controlled. (Max. cumulative dose up to 200 mg IV).
    - If the blood pressure is still above 160 mmHg systolic and/or 110 mmHg diastolic, Consider IV labetalol infusion or IV Hydralazine.

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    - Maintenance IV labetalol infusion – starting at 20 mg/hr (4ml/hr), double the infusion rate at every 30 minutes intervals until BP is controlled. (Max Infusion rate 32ml/hr. Total of 160 mg/ hour max).
- **Hydralazine**
    - Hydralazine 5-10 mg IV bolus over 2 minutes.
    - Must be accompanied by fluid bolus of 5ml/kg of 0.9% Nacl or Ringer's lactate solution over 30 min, started at the same time as iv hydralazine.
    - Hydralazine is a direct vasodilator.
    - Fluid bolus helps to overcome vasodilatation and prevents drastic hypotension.
    - This should not be used in the presence of pulmonary oedema.
    - Record blood pressure at 20-minute intervals.
    - Repeat boluses of 5-10 mg IV after a 20-minute interval. may be given if necessary, up to a maximum of 20 mg (the effect of a single dose can last up to 6 hours).
    - If no lasting effect with above boluses, consider an infusion of hydralazine 2.0 mg/hour increasing by 0.5 mg/hour as required (2-18 mg/hour usually required).
- Monitor
    - Foetal heart with continuous CTG during and for 60 minutes after commencing anti-hypertensive therapy.
    - BP must be monitored at l5 minute intervals for 1st hour. Then every 30 min interval.
    - **Foetal surveillance**
        - **Cardiotocography**
        - **USS**
            - Fetal growth and amniotic fluid volume assessment with umbilical artery Doppler velocimetry.
- Evaluate the need for MgSO4.
    - Indications
        - Severe hypertension (>/=160/110 mmHg) and proteinuria
        - Premonitory signs of eclampsia.
            - Should be considered in any woman with features of impending/imminent eclampsia.
                - Presence of >/=3 beats clonus
                - Severe headache
                - Visual disturbances such as scotoma, blurring or flashing before the eyes, papilledema.
                - HELLP syndrome, platelet count falling to below 100×109 per litre, rising liver enzymes.
    - Prevention of convulsion
        - Dose - LD of 4 g should be given IV over 5 to 20 minutes, followed by an infusion of 1g/hour maintained for 24 hours.

- If the woman has had an eclamptic fit, the infusion should be continued for 24 hours after the last fit.
- Recurrent fits should be treated with a further dose of 2-4 g given intravenously over 5 to 20 minutes.
- No IV access
  - LD - 5g deep intramuscularly into each buttock with 1ml of 2% lignocaine in the same syringe.
  - Maintenance - 5g to alternate buttocks 4 hourly, with l ml of 2% lignocaine in the same syringe.

- Administration
  - **Via infusion pump or manually**
    - 4 g, diluted to a total volume of 20 ml with 0.9% sodium chloride solution, given via an infusion pump or 'manually'.
    - (20ml of the loading dose in a syringe pump and administered at a rate of 60ml/ hour, i.e. 4g will be given over a 20 minute period or 240ml/hour if given over 5 minutes in the case of an eclamptic fit).
  - **Via burette set:**
    - Diluted to a total volume of 80 ml with 0.9% sodium chloride solution via a burette.
  - Maintenance
    - 10g in 50ml via a syringe pump:
    - The 50ml syringe containing 50ml of the maintenance dose is to be attached to a syringe pump and administered on completion of loading dose; set rate at 5ml/hour which equates to 1g/ hour.
    - Or
    - Remove 80ml of sodium chloride 0.9% from a 500ml bag of sodium chloride 0.9% and add 80ml of magnesium sulphate injection 50% (This produces 40g in 500ml).
    - The 500ml bag to be attached to a giving set and administered on completion of loading dose set rate at 12.5ml/ hour which equals to 1g/hour).
  - Target
    - Ensure hourly UOP of 30 ml per hour
    - RR >16/ minute
    - SPO2 >90%
    - Presence of patellar reflexes.
  - Toxicity/ Discontinue
    - UOP in the preceding 4 hours <100mls.
    - Absent patellar (knee jerk) reflexes.
    - Respiratory rate <12 per minute.

Source: Major presentations in Medical Practice. ISBN 978-624-6246-12-9

        - Weakness, sensation of warmth, flushing, drowsiness, double vision and slurred speech.
        - Mx
            - Antidote is calcium gluconate, 1g IV (10ml of 10% solution), given over 10 minutes.
    - Mg levels
        - **If rate exceeds 2g/hr**
            - Normal serum level 0.7-1.0mmol/L
            - Therapeutic level 2.0-4.0mmol/L
            - Disappearance of tendon reflexes at 5.0mmol/L
            - Muscular paralysis and respiratory depression at 6-8mmol/L
            - Cardiac arrest at 12mmol/L
- Strict fluid balance
    - Limit maintenance fluids to 80ml/hour (1ml/Kg/ hr) unless there are other ongoing fluid losses (E.g. haemorrhage).
    - If urine output falls to less than 0.5ml/ kg/hr over 4 consecutive hours a Central Venous Pressure line is to be considered and fluid replacement done cautiously.
    - Diuretics must be restricted to specific instances only - Pulmonary oedema.
- Look for complications – Such as HELLP/ pulmonary oedema/cerebral haemorrhage/ AKI.
- Only known cure is delivery of the baby.
    - Timing of delivery
        - In-utero transfer where necessary evaluate the fetus
        - Continue vigilance post-delivery.
- Prognosis
    - Severe hypertension should be treated as a medical emergency.
    - Main cause of death in severe pre- eclampsia
        - Poorly controlled systolic hypertension causing cerebral haemorrhage.

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Physiology

Cardiovascular	
Blood pressure	Minimal change Slight ↓ in first and second trimester, normal in third
Heart rate	↑ 15–20% ↑
Cardiac output	↑ 30–40% 6–7 L/min during pregnancy
ECG	Non-specific ST changes, Q waves in leads III and AVF, atrial and ventricular ectopics
Systemic vascular resistance	↓ to 1,000–14,000 Due to progesterone and blood volume
Respiratory	
Respiratory rate	No change
Oxygen demand	↑ 15%
Functional residual capacity	↓ 25%
Minute ventilation	↑ 25–50% or 7–15 mL/min
Tidal volume	↑ 25–40% or 8–10 mL/kg
PaO2	↑ 10 mmHg or 104–108 mmHg
PaCO2	↓ 27–32 mmHg
Arterial pH	↑ 7.40–7.45
Bicarbonate	↓ 19–25 mmol/l
Haematological	
Blood volume (mL)	↑ 30–50% volume
White cell count (mm^3)	↑ to 5,000–14,000
Haemoglobin (g/dL)	↓ to 100–140
Haematocrit (%)	32-42
Plasma volume (mL)	↑ 30–50%
Red blood count volume (mL)	↑ to 1900
Coagulation factors ↑ 30–50%	↑ factors VII, VIII, IX, XII
Platelet (mm3)	200,000–350,000
Fibrinogen, plasma (mg/dL)	264-615

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