SAVING MOTHERS

Essential Steps In The Management Of Common Conditions Associated With Maternal Mortality

National Department Of Health
South Africa

health
Department:
Health
REPUBLIC OF SOUTH AFRICA

AIDS HELPLINE
☎ 0800-012-322

ORGANISERS

Department of Obstetrics
and Gynaecology
Nelson R Mandela School
of Medicine
University of KwaZulu-Natal
Durban, South Africa

National Department of Health
South Africa

ISBN 978-

Editor: Professor Jack Moodley

Design and Layout: Rockbottom Design

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CONTRIBUTORS

L Bamford
E Buchmann
S Fawcus
N Khaole
G Lamacraft
H Lombaard
M Masasa
S Monokoane
J Moodley
R C Pattinson
P Robinson
C Rout
M Schoon
W Steyn
M Titus
S Velaphi

INTRODUCTION

The reduction of maternal and neonatal deaths is one of the key goals of the Millennium Declaration. An important factor in reaching this goal is the provision of clinical guidelines, protocols and manuals for the clinical management of the major causes of maternal mortality. Furthermore, it has been estimated that 70% of neonatal deaths could also be prevented if good quality maternal health care is provided.

This publication has been purposefully structured in a step-wise user-friendly format so that it could be kept by all health care givers for use at the "bed-side". It includes the essential steps in the management of common conditions associated with maternal mortality. Where possible, the essential points in clinical management are structured in the forms of algorithms for ease of learning and implementation of knowledge gained into clinical practice.

Furthermore, the format of this publication may also lend itself to "fire drills". A **Fire Drill** is an organised event in which health care givers (clinicians, midwives, nurses and skilled attendants) will go step-wise through a mock situation to ensure competencies and administrative necessities / support (equipment, drugs, human resources) for that particular situation or obstetric condition.

It is hoped that this publication will improve the quality of care for some of the common conditions, which cause maternal deaths, viz. non-pregnancy related infections, hypertensive disorders of pregnancy and post partum haemorrhage.

J Moodley
Chairperson, NCCEMD
2007.

GLOSSARY

ALT	Alanine transaminase
ARV	Antiretroviral
AST	Aspartate transaminase
BP	Blood pressure
COETT	Cuffed oral endotracheal tube
CPAP	Continuous Positive Airway Pressure
EH	Emergency Hysterotomy
ESR	Erythrocyte sedimentation rate
Hb	Haemoglobin
HIV	Human Immunodeficiency Virus
HR	Heart Rate
ID	Intubation depth
IMI	Intramuscular injection
INR	International Normalised Ratio
IV	Intravenous
LDH	Lactate Dehydrogenase
MCS	Multiple Chemical Sensitivity
$MgS0_4$	Magnesium sulphate
MTCT	Mother to Child Transmission
MVA	Manual Vacuum Aspiration
PTT	Prothrombin Time
UTI	Urinary Tract Infection
Ventouse	Vacuum extraction
VQ	Ventilation-Perfusion Scan

GENERAL POINTS

- All health care should be based on the following standards:-
  - Women treated with respect
  - Care based on best available current evidence and practice
  - Health professionals committed to improving care through adhering to standard protocols of clinical management
- To achieve the above, acquire and practice effective communication skills
  - Ensure confidentiality and privacy in all contacts with the woman and her partners
  - Ensure knowledge of the referral patterns
  - Prioritise order of treatment

1.
HIV – ESSENTIAL STEPS

GENERAL

- Offer all women attending a maternal health care facility, HIV testing (follow National Policy on methods for testing and counselling). Testing should be on site and if the woman tests positive, do a CD_4 count on the same day. . If ARVs indicated, refer to the local "Comprehensive HIV/AIDS Care, Management and Treatment Programme" site. This means obtaining CD_4 results timeously and "fast-tracking" the appropriate use of ARVs.
- Ensure continued counselling about safe sexual practices for both HIV positive and negative women and if HIV negative, periodic re-testing throughout pregnancy, during any admission to a health facility, and in the puerperium.
- If a woman did not agree to testing at the first visit, counselling and the offer of testing must be offered at each subsequent antenatal visit.
- The offer of HIV testing should also be made to the woman's partner.
- **Aim to detect and treat concurrent conditions**, viz.:
  - Sexually transmitted infections
  - Tuberculosis (TB)
  - Oral and vaginal thrush
  - Lymphadenopathy
  - Herpes zoster (shingles)
  - Current herpes infections
- **Strongly consider special investigations**, viz.:
  - Urine culture
  - XRay chest and sputa for TB (treat on clinical grounds if appropriate; often the sputum is negative in the presence of HIV)

  - Cervical smear if not done in recent past
  - A full blood count including a differential count and ESR
- **Clinically stage HIV according to WHO recommendations**.
- Remember that **prevention strategies** remain the mainstay in the fight against HIV infections. Urge the consistent use of condoms, single-partner relationships, and the fact that there is now good evidence from 3 randomised trials that medically performed adult male circumcision will reduce HIV transmission in males by > 50%.

ANTENATAL MANAGEMENT

In addition to the **points above**, remember:

- Treatment for HIV-infected women if asymptomatic is the same as uninfected women. Continued counselling and advice on protected intercourse should be done regularly.
- Consider testing for asymptomatic bacteruria regularly; check for opportunistic infections at each visit, e.g. vaginal and chest infections
- Avoid invasive procedures. Carefully consider whether external cephalic version should be performed
- Advise on steps to reduce mother to child transmission including the use of nevirapine once labour is established **or appropriate antiretroviral prophylactic regimen according to the policy of the National Department of Health**.
- Provide advice on nutrition, healthy life style and the use of multivitamins
- Advise on safe infant feeding options
- Advise on
  - MTCT risks and prevention
  - Labour management
  - Continuum of care (mother) and infant, and schedule postpartum visits
- Discuss contraceptive options.

CARE DURING LABOUR

- Ensure that the mother has taken nevirapine (unless on ARVs) and ensure that the baby has been given nevirapine syrup within 72 hours of birth. Record these events
- Limit vaginal examinations and ensure aseptic techniques

- Keep the amniotic membranes intact, unless fetal distress or cephalo-pelvic disproportion is suspected
- Avoid episiotomy and invasive procedures
- If instrumental delivery is indicated, forceps are preferable to the ventouse (vacuum)
- Avoid unnecessary suctioning of the neonate's airways
- Use prophylactic antibiotics in emergency and elective caesarean sections
- Consider strongly, the use of therapeutic antibiotics in cases of prolonged labour; prolonged rupture of membranes and when a caesarean section is performed in the background of these settings.

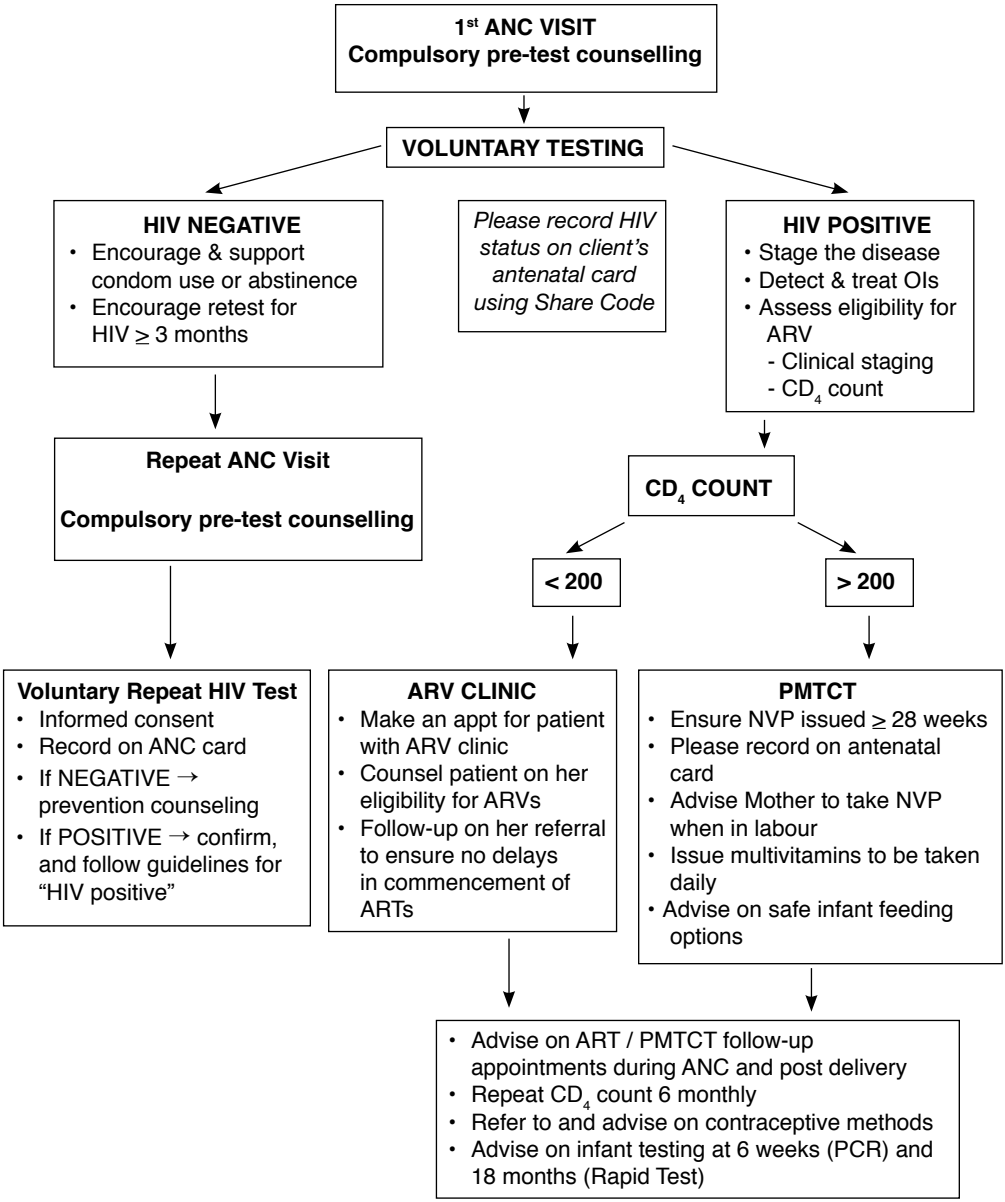
POSTPARTUM CARE

- Remember reinforcing the advice on safe infant feeding options
- Stress contraceptive advice and services prior to discharge
- Ensure that all HIV-infected women are given a definite date for a postnatal visit so that counselling, advice and a planned programme for continued HIV care for the mother and baby can be instituted. If CD_4 counts are not available, ensure that a blood draw is obtained for this test and result obtained.
- Remember the complications associated with caesarean section done in a background of prolonged labour. Ensure the detection of early clinical signs of sepsis. Consider strongly, the need to observe in hospital for 7-10 days, especially if spikes of temperature are developed or there is tachycardia. Ensure follow-up.

SUMMARY

STEP 1	Ensure regular counselling on a health life style, safe sexual practice and exclude other STIs and concurrent infections
STEP 2	Offer HIV testing for all women and their partners attending maternal health facilities
STEP 3	Remember to adhere to aseptic techniques; keep membranes intact in labour; avoid an episiotomy and ensure that the MTCT programme is strictly followed
STEP 4	• Ensure safe feeding options • Advise on contraception • Ensure follow-up and post-partum visit

ALGORITHM:
MANAGEMENT OF HIV INFECTION IN PREGNANT WOMEN



2.
SEVERE PRE-ECLAMPSIA AND ECLAMPSIA

AIM

- To recognise severe pre-eclampsia and eclampsia
- To practice an effective response to a woman with severe pre-eclampsia or eclampsia

RECOGNISING PRE-ECLAMPSIA

- BP > 160mmHg systolic; and > 110mmHg diastolic
- Proteinuria 2+ or more
- Headache
- Blurred vision
- Epigastric pain, upper abdominal pain
- Hyperreflexia, clonus
- Jittery
- Breathlessness (pulmonary oedema)
- Reduced urine output (< 400ml/24 hrs)
- "Puffy", swollen face

PRINCIPLES OF MANAGEMENT

- The cure for pre-eclampsia (& eclampsia) is delivery of fetus & placenta. However, a rushed delivery in an unstable patient is incorrect. Only if severe hypertension has been corrected and haemodynamic stabilisation achieved, can delivery be expedited.
- Treat hypertension with rapid acting agents if systolic BP > 170mmHg, or diastolic > 110mmHg and patient is symptomatic. Aim to reduce BP to 130-149/90-95. Commonly used rapid antihypertensive drugs are hydralazine, nifedipine and labetalol. In addition, prescribe aldomet IG stat and 500mgms 6 hourly.
- Do FBC (incl. platelets), urea & electrolytes
- Give steroids (betamethasone) to promote lung maturity in a fetus of gestational age of < 34 wks.
- Strongly consider the need for $MgS0_4$:

  - $MgS0_4$ is given if eclampsia seems imminent and/or there is significant hyperreflexia & clonus (> 3 beats) on clinical examination
  - $MgS0_4$ is given in all cases of eclampsia (fitting / convulsions)
- Mode of delivery is decided at senior level after vaginal examination to assess the possibility of induction of labour. Always consult with your referral hospital.
- Ensure that monitoring of vital signs occurs at frequent intervals during antenatal, intrapartum periods, and following delivery for up to 24 hours.
- All health facilities must establish an "Eclampsia Box" for the management of severe pre-eclampsia / imminent / impending eclampsia

ECLAMPSIA BOX

- ❒ $MgS0_4$ in sufficient quantities for the loading dose
- ❒ Infusion Set (standard set)
- ❒ Appropriate strapping & appropriate size syringes
- ❒ Calcium gluconate (10mls of a 10% solution = IG IVI over 10 minutes) – for $MgS0_4$ toxicity
- ❒ 200 ml Normal saline
- ❒ Flow / Drip controller
- ❒ Venflows or equivalent for venepuncture
- ❒ Aldomet (1 gram)
- ❒ Rapid acting anti hypertensive agent: either Nepresol or Nifedipine (Adalat) 5mgms
- ❒ Protocol on principles of management of eclampsia
- ❒ In patients with platelet counts < 150,000, liver function tests should be done as proportion of these patients will have HELLP Syndrome

N.B. replenish the eclampsia after use

ECLAMPSIA

- **Recognising eclampsia:**
  - Convulsions (or unconscious) – convulsing (now or recently): tonic-clonic spasms like epilepsy, OR
  - Unconscious: if unconscious, ask relative "Has there been a recent convulsion?"
    - ❒ ***A small proportion of women with eclampsia have a normal BP. Treat all women with convulsions as if this is eclampsia until another diagnosis is confirmed.***

ACTION

- Do not leave the woman on her own: call for help
- Place the woman in the left lateral position
- Maintain patency of airway at all times
- Insert IV cannula & give fluids slowly (normal saline or Ringer lactate); 1L in 6-8 hrs (3ml / min. or 30 drops per min.)

MAGNESIUM SULPHATE

(intramuscular "Pritchard Regimen")

- Start with loading dose (4 g IV and 5g IMI in each buttock)
  i. $MgS0_4$ 4g in 200mls normal saline IVI slowly over 10-15 minutes
  ii. Give 5g IM deep in upper outer quadrant of each buttock. Add 1ml of 2% lignocaine in same syringe

Maintenance Dose:

- 5g IMI every 4hrs, until 24hrs after birth or after last convulsion (whichever is later)

Do not give the next dose of $MgS0_4$ if any of the following signs:

- Knee jerk absent
- Urine output < 100ml / 4 hrs
- Respiratory rate < 16 breaths / min

Rapid injection may cause respiratory failure or death.

If unable to give IV, give IM only (loading dose):

- If respiratory depression (breathing < 16 breaths/min) occurs after $MgS0_4$, do not give any more $MgS0_4$. Give the antidote: calcium gluconate 1g IV (10ml 10% solution) over 10 minutes.

If convulsions recur:

- After 15 minutes, give an additional 2g $MgS0_4$ IV over 20 minutes. After receiving $MgS0_4$ a woman may feel flushing, thirst, headache, nausea or may vomit
  - ❒ ***DO NOT give intravenous fluids rapidly (1L in 6-8 hrs, or 3ml/min or 30 drops/min***
  - ❒ ***DO NOT give intravenously 50% $MgS0_4$ without diluting it to 20%***

Intravenous $MgS0_4$ Regimen

- Administer 6g $MgS0_4$ diluted in 200 minibag of normal saline over 15-20 minutes using a standard infusion set. Thereafter, administer $MgS0_4$ at 2g/hour by inserting 8g in a 200ml minibag to run at 54mls/hour using an infusion pump. This will last for approximately 6 hours.

MANAGEMENT OF HIGH BLOOD PRESSURE

If diastolic BP > 110mmHg or systolic BP > 170mmHg, give a rapid-acting antihypertensive.

Give appropriate antihypertensive drug:
[!] $MgS0_4$ is not an anti-hypertensive: give **hydralazine**
or labetalol
or nifedipine

- **Hydralazine 5mg IV slowly (3-4 minutes).** If IV not possible, give IM.
  - – If diastolic BP remains above 90mmHg, repeat dose at 30 min intervals until diastolic BP is around 90mmHg
  - – DO NOT give > 20mg in total
  - – If hydralazine is not available, give Nifedipine or labetalol
- **Labetalol 10mg IV**
  - – If response is inadequate (diastolic BP remains above 110mmHg) after 10 minutes, give labetalol 20mg IV.
  - – Increase dose to 40mg & then 80mg if satisfactory response is not obtained after 10 minutes of each dose.

- **Nifedipine 5mg orally**
  - If response to the initial dose of Nifedipine is inadequate (diastolic remains above 110mmHg) after 10 minutes, give an additional 5mg. Note: Nifedipine should be swallowed, not bitten, placed under tongue (sublingually) or in the cheek (bucally).

OTHER POINTS OF MANAGEMENT:

- Involve anaesthetists early in the management. Consider epidural anaesthesia for caesarean section or labour in the "stable", conscious eclamptic.
- Do not give fluids rapidly – 1L in 6-8 hours (3ml/min or 30 drops/min)
- Ensure that patient is "nursed" in a high dependency area for 24 hrs following delivery. Continue antihypertensive therapy and reduce dosage in a step-wise fashion
- Ensure a postnatal visit 3 weeks following delivery.
- Provide information on contraception and future pregnancies.
- **Monitor urine output**:
  - Using a catheter if possible
  - Check for proteinuria 4 hourly
  - Keep a fluid in and output chart

  ❒ ***DO NOT give IV fluids rapidly (30 drops/min)***
- **Assess pregnancy status:**
  - For the woman with eclampsia:
    - ❒ Delivery should take place as soon as haemodynamic stabilisation is established (this is normally 2 – 4 hrs after admission)
    - ❒ Delivery should occur regardless of the gestational age
- **Assess the cervix:**
  - If the cervix is favourable (soft, thin, partly dilated), rupture the membranes & induce labour using oxytocin
  - Consider delivery by emergency C/S:
    - ❒ If vaginal delivery is not anticipated within 12 hrs
    - ❒ If cervix is unfavourable (firm, thick, closed)
    - ❒ If there are fetal heart abnormalities (< 100 beats / min, or > 180 beats / min)
  - If safe anaesthesia is not available for C/S or if fetus is dead or too premature for survival, aim for vaginal delivery.

  - Platelet counts < 70 or evidence of clinical bleeding for instance, bleeding from puncture sites may require platelet transfusion.
- **Remember**:
  - Avoid ergometrine / syntometrine for active management of thirds stage of labour – use oxytocin.

PATIENTS WITH SEVERE PRE-ECLAMPSIA / ECLAMPSIA AT CLINICS OR DISTRICT HOSPITALS:

- Stabilise as suggested previously ($MgS0_4$; antihypertensives, keep patient on side) and transfer – accompanied by an experienced nurse.
- Ensure you phone the doctor at the base hospital and send all the hospital records. Continue observations of vital signs while waiting for ambulance.
- DO NOT leave the woman alone.

ECLAMPTICS REQUIRING ASSISTED VENTILATION

(Level II and III facilities)

General Guidelines:

- ❒ Pulmonary aspiration
- ❒ Poor arterial blood gases
- ❒ Glasgow Coma Scale < 9
- ❒ Pulmonary oedema not responding to medical management
- ❒ Possibly the "restless eclamptic", the patient who has to be "tied down" to monitor vital signs.

3.
EMERGENCY MANAGEMENT OF POST PARTUM HAEMORRHAGE (PPH)

(Definition: Excessive bleeding from genital tract after delivery)

A) TO KNOW

- MAJOR CAUSES OF PPH: atonic uterus
  - retained placenta or retained fragment of placenta
  - trauma - vaginal lacerations
    - ❒ cervical tears
    - ❒ perineal tears
    - ❒ ruptured uterus
  - bleeding associated with caesarean section

- IMPORTANT PREVENTIVE MEASURES
  - Provide information on nutrition and healthy life style
  - Routine iron supplementation in pregnancy
  - At risk women (e.g. APH, grand multipara, previous PPH, multiple pregnancy, prolonged labour) to deliver in level 1 or 2 hospital.
  - **Active management of 3rd stage of labour.**
  - Routine post partum monitoring of vital signs and bleeding

B) BE PREPARED

- PPH protocol to be displayed in Labour ward area.
- ADEQUATE SUPPLY OF INFUSION SETS and IV FLUIDS.
  [Level 1 clinic – Ringer's lactate
  Level 1 hospital –Emergency blood, Freeze dried plasma; colloids
  Level 2 + 3 – Blood bank.]
- ADEQUATE SUPPLY DRUGS [Oxytocin, Prostaglandin F2 alpha, Misoprostol, ergometrine] AND EQUIPMENT [Cervical inspection kits + good light source, functional theatre]

- FIRE DRILLS [NEW STAFF]
- Skills training for midwives and doctors in additional measures for PPH

C) **TO DO**

- CALL FOR ASSISTANCE
- DO NOT LEAVE PATIENT
- ACT QUICKLY [Major Emergency]

RESUSCITATION

Site 2 large bore intravenous cannulae
Replace volume
(Ringer's lactate, Blood)
Monitor vital signs BP. Pulse
Urine output
(catheter)
Send bloods for crossmatch

STOP BLEEDING

Placenta Retained

- PV: remove if felt in cervical os
- If not separated, Manual removal under anaesthesia
- IV oxytocin 20u/litre infusion
- Antibiotics
- Observe post manual removal in high care area

Placenta delivered

The initial emergency management of all patients with post partum haemorrhage must include:

- **Step 1:** The uterus must immediately be rubbed up. This will cause the uterus to contract and reduce the blood loss.
- **Step 2:** A rapid intravenous infusion of 20 units oxytocin in a litre of intravenous fluids must be started. Once again make sure the uterus is well contracted.
  - **These 2 steps must always be carried out irrespective of the cause of the postpartum haemorrhage.**
- **Step 3:** The patient's bladder must now be emptied. A full bladder may cause poor contraction of the uterus with resultant haemorrhage. If the uterus remains atonic, intravenous or intramuscular ergometrine, 0.5mgs, can also be given, provided the patient is not hypertensive or cardiac, or 600 micrograms misoprostol can be give rectally,

  (The latter medication is not currently available in all clinics, pending further research on its efficacy.)
- **Step 4:** Suture any vaginal or perineal tears that are bleeding.
- **Step 5:** All patients managed at level 1 clinics or hospitals with no theatre facilities, where bleeding persists following these initial steps must be referred to the next level of care as an acute emergency.

An atonic uterus not responding to step 1 to 4 must be bimanually compressed while the patient is being transferred to the next level of care. Paramedics need to be taught this manoeuvre.

Persistent Bleeding / Further Treatment Modalities
This section refers to further treatment of persistent bleeding at referral hospital: level 1 hospital with theatre facilities and appropriately skilled personnel, level 2, and level 3 hospitals.

Step 6:
Review the initial diagnosis of the cause of bleeding / Consider the possibility of intractable uterine atony, retained products of conception, cervical tears, or uterine rupture. Suspect coagulopathy secondary to massive haemorrhage.

Step 7:
Cross match extra blood and order fresh frozen plasma. Assign responsibility for resuscitation to one staff member, who will also document events.

Step 8:
Further treatment modalities to arrest haemorrhage:-

- **Level 1 Hospital (theatre facilities)**
  - Additional uterotonic drugs to aid uterine contraction: ergometrine, prostaglandin F2 alpha .or rectal misoprostol
  - Explore for cervical or high vaginal tears and suture them.
  - Uterine tamponade using condom or rubber glove filled with fluid
  - Examination under anaesthesia –
    - Suture Cervical tear
    - Removal of retained products of conception
  - Laparotomy –
    - B lynch compression suture
    - Uterine artery ligation / stepwise devascularisation of the uterus.

NB. *These procedures are also useful for treating caesarean section associated haemorrhage and should be taught to all doctors learning to do caesarean section.*

In the event of doctors at level 1 hospital being unable to definitely arrest the bleeding at laparotomy, then clamping of major bleeding vessels plus tight intra-abdominal packing may temporize the situation

so the abdomen can be closed and the patient referred. Telephonic communication between level 1 doctor and specialists in level 2 may be useful in this situation.

- **Level 2 and Level 3 hospitals**
  - All of the above.
  - Hysterectomy. This procedure is a skilled surgical procedure that should be performed timeously. Maternal deaths have occurred from delays in performing a life saving hysterectomy due to persisting for too long with attempts to conserve the uterus, particularly in women of low parity.

4.
COMPLICATIONS DURING OBSTETRIC ANAESTHESIA

A. SPINAL ANAESTHESIA:

Most deaths result from poorly treated or unrecognised catastrophic cardiovascular collapse with or without high motor blockade.

Hypotension:

Treated *early* and *aggressively*: (aim to keep BP at pre-op baseline)

1. Maximise relief of aortocaval compression (increase lateral tilt).
2. Do not put head-down as block will spread higher
3. Vasopressors:
   a. Phenylephrine 25-50 μg IV boluses (or infusion)*.
   b. Ephedrine 5-10mg IV boluses (or Effortil® 1-2mg IV)
   c. Severe bradycardia and hypotension: adrenaline IV 1:10,000, 2-3ml boluses.
4. Fluids: colloids work quicker than crystalloids
5. Delivery of the foetus: alleviates aortocaval compression.

*Phenylephrine must be diluted (1 ampoule = 10mg, dilute in 200ml 0.9%. Saline $\rightarrow$ 50μg/ml)

High Motor Block ("High Spinal"):

Results in hypotension and paralysis: varies from immediate collapse to a slower onset. If doubt exists with a profoundly hypotensive and unconscious patient, immediately administer a dose of vasopressor

Treat according to speed and severity. Base on the ABC + full stomach principle i.e.:

A = **A**IRWAY - insert airway, apply cricoid pressure

B = **B**REATHING - hand ventilate using bag and mask, 100% oxygen, and then intubate.

C = **C**IRCULATION – Aggressively treat hypotension as above.

N.B.: ***Patient may be paralysed but still awake, so when BP is restored, either volatile or IV agents should be given to anaesthetise the patient.***

B. GENERAL ANAESTHESIA

Deaths occur usually after failed intubation with subsequent hypoxia or aspiration.

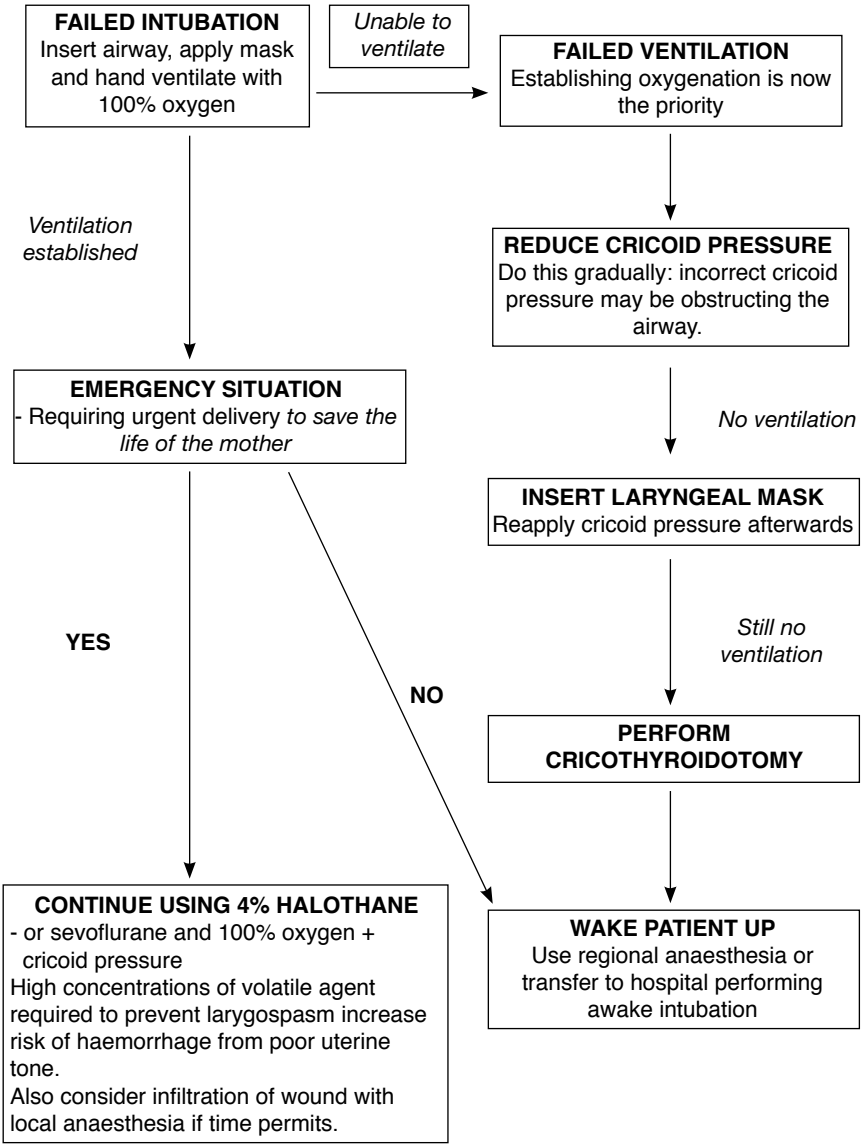
Failed Intubation Drill

- Should be practiced regularly by all those administering and assisting with obstetric anaesthesia, as death can occur within only a few minutes.
- Recognise a failed intubation early and rapidly provide oxygenation before hypoxia ensues. Consider prevention of aspiration after oxygenation is established.

Note:

- Do not try to intubate more than twice (once 7.0 COETT, once 6.0 COETT with better head position or move cricoid pressure more backwards, upward and to the right i.e. "BURP" manoeuvre")
- Call for help
- Do not give a second dose of suxamethonium
- Do not turn the patient onto her side

FAILED INTUBATION DRILL



5.
CARDIAC ARREST IN PREGNANCY

A. Modifications to Basic Life Support:

i. Beyond 20 weeks gestation alleviate aortocaval compression by left lateral tilt of the uterus (e.g. place rolled blanket under right hip).

ii. Airway and Breathing:
- Increased risk of regurgitation: apply cricoid pressure during mask ventilation.

iii. Circulation:
- Chest compressions higher, just above the centre of the sternum (uterus elevates the diaphragm).

iv. Defibrillation:
- Remove fetal or uterine monitors before performing shocks. Use standard DC shocks.

v. Move patient to an operating theatre and call someone experienced in emergency hysterotomy. Beyond 25 weeks gestation, maternal resuscitation is unlikely to be successful unless the baby is surgically removed. The baby is unlikely to survive intact following 3 minutes of cardiopulmonary arrest, although survival after 10 minutes has been documented. **Therefore once appropriate CPR has been commenced the overriding concern is to get the baby delivered in the interest of both mother and baby.**

B. Emergency Hysterotomy (EH)

Consider whenever a pregnant woman arrests and is >20/40 gestation

Perform within minutes if maternal resuscitation is not immediately successful. Primarily performed in order to relieve aortocaval obstruction by delivery of the baby and so improve ***maternal*** resuscitation.

Maternal and fetal factors determining the need for (EH) include:

a. Gestational Age.

<20 weeks- EH not appropriate

20-23 weeks – EH to resuscitate mother. Fetus unlikely to be viable
≥24-25 weeks – EH performed to save life of mother and baby.

b. Professional Setting
Rescuer must be competent at EH
Appropriate equipment and personnel to support mother after delivery must be available

C. Modifications to Advanced Cardiovascular Life Support (ACLS):

Whilst the baby is being delivered:

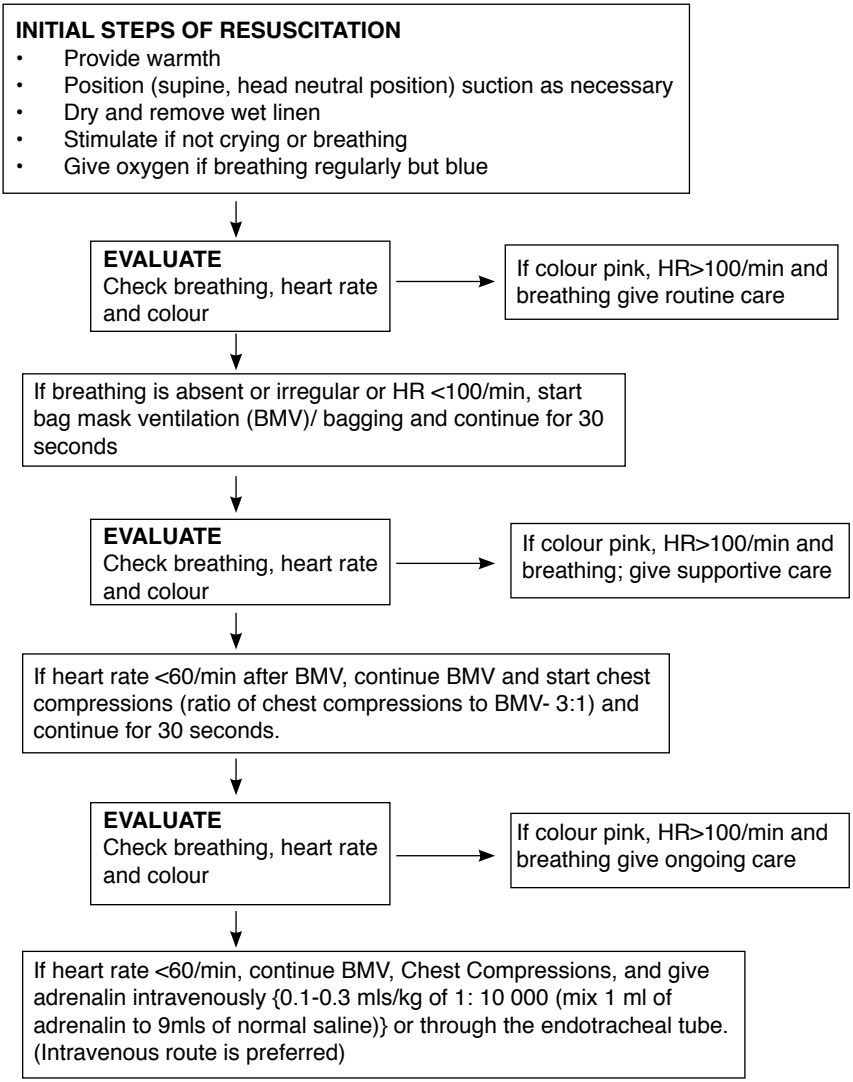
i. Airway:
Secure early. Apply cricoid pressure before and during tracheal intubation.
Use smaller cuffed oral endotracheal tube (7.0 or 6.0mm ID)

ii. Breathing:
Oxygenate and ventilate early (hypoxaemia develops rapidly).
Check endotracheal tube is not in oesophagus using capnograph.

iii. Circulation:
Use standard ACLS guidelines for resuscitation drugs.

iv. Differential Diagnosis:
   A. Same reversible causes of cardiac arrest that occur in the non-pregnant patient.
   B. Others more specific to pregnancy:
      a. Excess Magnesium sulphate. Especially if oliguric. Treat with calcium gluconate (1 ampoule or 1g).
      b. Acute coronary syndromes.
      c. Pre-eclampsia/eclampsia.
      d. Aortic dissection (e.g. Marfan's syndrome)
      e. Pulmonary embolism (fibrinolytics where life-threatening)
      f. Trauma and Drug overdose e.g. murder and suicide

6.
ALGORITHM FOR NEONATAL RESUSCITATION



- If there is no gasping or breathing after 20 minutes of ventilation, or gasping but no breathing after 30 minutes of ventilation, stop all procedures.
- Provide emotional support to family

REMEMBER TO AVOID THE FOLLOWING:

- Slap, blow on, or pour cold water on the baby
- Hold the baby upside down
- Routinely suction the mouth and nose of a well baby
- Use "heavy" suctioning of the back of the throat of any baby
- Give injections of respiratory stimulants or routine sodium bicarbonate

TESTING / FIREDRILL FOR NEONATAL RESUSCITATION

Testing objectives

- To ensure that the candidate can safely and effectively perform neonatal resuscitation.

Preparation

- Level surface e.g. radiant warmer, table
- Heat source e.g. radiant warmer, or heater
- Warm dry towels
- Mannequin
- Resuscitation equipment
  - Suction catheters
  - Oxygen source
  - Stethoscope
  - Mask- different sizes
  - Resuscitator bag with reservoir
  - Laryngoscopes with straight blades
  - Spare bulbs for laryngoscopes
  - Endotracheal tube sizes 2.5, 3.0, 3.5
  - Adrenalin ampoules
  - Normal saline solution
  - Syringes

– Needles
– Intravenous catheters
– Feeding tube

Candidate should demonstrate the following successfully

	Yes	No
Airway		
• Head position		
• Clearing the airway when necessary		
	☐	☐
Breathing	☐	☐
• Checks for breathing		
• Bag valve mask ventilation (mask size appropriate, good seal, position)	☐	☐
• Chest moving with bag mask ventilation and/ or heart rate increasing	☐	☐
Circulation	☐	☐
• Checks for heart rate		
• Chest compressions (check technique, check ratio is 3:1 with BMV)	☐	☐
• Adrenalin administration when appropriate	☐	☐
Others	☐	☐
• Oral intubation when appropriate e.g. for adrenalin administration		
• Insertion of umbilical venous catheter		
	☐	☐
	☐	☐

7.
BREECH PRESENTION - LABOUR AND DELIVERY

Elective caesarean section is the safest method of delivery for a baby with a breech presentation. Women with breech presentation at 38 weeks should be admitted to hospital for elective caesarean section

Admission of a woman with breech presentation in labour

1. Transfer the mother from a clinic or community health centre to hospital
2. Exclude fetal abnormality or multiple pregnancy, by ultrasound if necessary
3. Attempt external cephalic version if there are no contraindications
4. Estimate fetal weight and pelvic adequacy
5. Determine cervical dilatation and station of presenting part
6. Perform caesarean section unless suitable for vaginal delivery (below)

Vaginal breech delivery

Some women may prefer vaginal breech delivery, and some may arrive at hospital or at a community health centre in advanced labour. The most experienced person available must personally supervise vaginal breech delivery.

Breech presentation suitable for vaginal delivery

- Mother understands and accepts vaginal delivery
- Operator experienced and confident with vaginal breech delivery
- No signs of pelvic contraction on clinical assessment
- Estimated fetal weight less than 3.5 kg
- Frank or complete breech
- Presenting part at or below the level of ischial spines
- Labour progress ≥1 cm per hour

Dead and grossly abnormal babies, and those with estimated weight <1 kg should be delivered vaginally

Technique of delivery

1. Put the mother in lithotomy position
2. Perform an episiotomy after infiltration of the perineum with local anaesthetic
3. Encourage spontaneous breech delivery and only assist in keeping the fetal back facing upwards
4. For extended knees, assist by flexing at the knees and gently delivering each leg
5. After delivery of the trunk, allow the breech to hang, pull the cord down and cover the delivered parts with a cloth
6. As the scapulae appear, be ready to assist with delivery of the arms
7. Deliver the arms if necessary by running the fingers from the fetal back over the shoulder and sweeping the arms down in front of the chest, and then out
8. The neck will deliver up to the nape
9. Deliver the head by lying the fetus over the right forearm (right-handed midwife or doctor) and inserting the right middle finger into the baby's mouth, with the index and ring fingers supporting the cheek, to flex the head
10. Simultaneously, the left hand exerts suprapubic pressure to flex the head (Wigand-Martin method) or pushes directly onto the occiput to assist flexion (Mauriceau-Smellie-Veit method)
11. Ease the baby out, with gentle traction, and continuous flexion as described
12. Should the fetal back face downwards after delivery of the arms, the head may be trapped. The best chance of delivery is to swing the fetus anteriorly over the maternal abdomen to flex the head

❒ ***Breech delivery technique video in WHO Reproductive Health Library (also videos on ECV, vacuum, C/S technique)***

8.
CORD PROLAPSE

If the fetus is alive (fetal heart heard) and viable (estimated weight ≥1 kg):

1. Call for assistance
2. Explain the problem to the mother
3. Perform vaginal examination:

If the cervix is fully dilated and the fetal head has engaged in the pelvis, immediately deliver the baby, by vacuum extraction if necessary

If the cervix is not fully dilated, make arrangements for urgent caesarean section and/or transfer to hospital and proceed as follows:

1. Replace the cord in the vagina or wrap it in warm wet towels
2. Handle the cord as little as possible
3. With the fingers, push the presenting part off the cord. Do not remove the fingers from the vagina if the presenting part compresses the cord
4. Insert an indwelling urinary catheter, at least size 18
5. Fill the mother's bladder with 500ml normal saline and clamp the catheter
6. Give oxygen to the mother by face mask at 6 L/minute
7. Start an intravenous infusion of Ringer-Lactate
8. Give hexoprenaline 10 micrograms IV as a single dose
9. Place the mother in a left lateral Sims position*
10. Make accurate notes of all that was done, with times
11. Before starting the caesarean section, make sure the fetus is alive (heart beat, cord pulsation)
12. If the baby is dead, or not yet viable, and there is no other indication for caesarean section, await vaginal delivery

* *If the head is engaged in the pelvis or bladder filling fails to relieve cord compression, put the mother in a knee-elbow position*

9.
SHOULDER DYSTOCIA

This occurs with large babies (usually >3.5 kg) when delivery of the head is not followed by delivery of the shoulders.

Emergency management is as follows:

1. Call for at least 2 assistants to help with delivery
2. Explain the problem to the mother
3. Immediately move the mother to the edge or end of the delivery bed
4. Tell the mother to hyperflex the hip joints (McRoberts' position) with the help of assistants. Her knees should almost touch her shoulders
5. Cut a wide episiotomy
6. Apply suprapubic pressure to force the anterior shoulder under the symphysis pubis
7. Push the head downwards to apply traction on the anterior shoulder. Do not stretch the neck, and avoid forceful jerking movements
8. If unsuccessful at this stage, deliver the posterior arm by locating the posterior shoulder in the vagina and sweeping the arm in front of the fetal chest. Once the posterior arm is delivered, proceed to deliver the anterior shoulder as mentioned above.
9. If this fails, rotate the baby through 180 degrees through a face-to-pubis position, to bring the posterior shoulder forward and make it anterior. It important to hold both the arm and head together to facilitate rotation and reduce the risk of injury. Rotation is by rotary pressure on shoulders.
10. If delivery has not been achieved so far, the baby is likely to die
11. If the baby is dead, await spontaneous delivery, although breaking the clavicle(s) may assist the process

10.
THE MANAGEMENT OF SEVERE PREGNANCY RELATED SEPSIS

Pregnancy related sepsis includes:

- Abortion
- Puerperal sepsis

The principles in the management of a patient with pregnancy related sepsis are:

- To resuscitate the patient
- To empty the uterus
- To remove the septic focus

When examining any woman with pregnancy related sepsis, the organ systems must be systematically evaluated for signs of organ dysfunction.

If there is any abnormal clinical finding, indicating organ failure, prompt special investigations must be done to confirm such organ failure and start supportive treatment. If these investigations cannot be done or supportive treatment cannot be offered, the patient must be referred to a higher level of care, without delay.

Systematic evaluation of post abortion patients for the presence of organ dysfunction:

The approach to a patient with puerperal sepsis and abortion is the same. The patient needs to be examined thoroughly according to each different organ system and if any abnormalities are detected the special investigations are as follows:

- **Central Nervous System**
  Clinical signs: Confusion, delirium, decreased level of consciousness, Glasgow Coma Scale < 14/15

For puerperal sepsis:
– Signs of meningitis or encephalitis

Special investigations:
– Blood glucose
– Blood gas analysis or pulse oximetry
– If indicated, investigation for brain abscess or septic emboli
– Lumbar puncture

Supportive treatment:
– Treatment of underlying sepsis

- **Circulatory system**
  Clinical signs: Hypotension < 90 mm Hg systolic pressure, tachycardia >100 beats per minute, cold and clammy extremities, pulmonary oedema, hepatomegaly, arrhythmias

  Special investigations:
  – Chest X-ray,
  – Possibly an ECG

  Supportive treatment:
  – Adequate venous access, possibly with a high flow line or central venous pressure monitoring,
  – Fluid replacement
  – Inotrope support

- **Respiratory system**
  Clinical signs: Tachypnoea > 22 breaths per minute use of the accessory respiratory muscles, central or peripheral cyanosis

  For puerperal sepsis:
  – Crepitations
  – Wheezes
  – Dullness on percution

  Special investigations:
  – Pulse oximetry (saturation < 90%),
  – Blood gas analysis (pao_2 < 3 times Fio2, acidosis, and alkalosis),

- X-ray
- Sputum for MCS
- VQ scan if pulmonary embolism is suspected

Supportive treatment:
- Oxygen via nasal prongs or facemask,
- CPAP mask,
- Intubation
- Ventilation

- **Gastrointestinal and hepatic systems**

Clinical signs:
- Jaundice
- Hepatomegaly
- Ileus
- Peritonitis

For puerperal sepsis:
- Signs of wound infection if delivered via caesarean section

Special investigations:
- Blood glucose
- Raised liver enzymes ALT, AST, LDH
- Standing Chest X ray

Supportive treatment:
- Treatment of the underlying sepsis
- Laparotomy if bowel injury is suspected

- **Renal System**

NB: The patient must have an indwelling catheter, and the urinary output must be carefully measured and recorded.

Clinical signs:
- Oliguria (<1ml urine/kg/hr or <30ml/hr),
- Anuria
- Very concentrated urine

For puerperal sepsis:
- Renal angle tenderness
- Fever
- Tenderness over the bladder

Special investigations:
- Urine dipstix,
- Raised urea and creatinine
- Urine MCS

Supportive treatment:
- Rehydration and fluid replacement.
- If there is progressive renal failure - diuretics, dialysis

- **Genital System**
  Clinical signs:
  - Pus or foul-smelling products of conception
  - Very tender uterus
  - Peritonism
  - Signs of trauma or
  - Foreign body
  - An open cervical os

  For puerperal sepsis:
  - Sub-involuted tender uterus
  - Foul smelling and excessive lochia
  - Open cervical os
  - Septic episiotomy scar

  Special investigations:
  - Pre-evacuation culdocentesis
  - Prompt evacuation of uterus
  - Examination for non-genital sepsis
  - Possibly hysterectomy, to remove the origin of the sepsis

- **Haematological system**
  Clinical signs:
  - Pallor
  - Petechiae
  - Bruising

– Bleeding from the gums or infusion sites
– Deep venous thrombosis

For puerperal sepsis:
– Signs of thromboflebitis and pelvic vein trhombosis

Special investigations:
– Low Hb (<10g/dl),
– Hematocrit (<30%),
– Low or high white cell count,
– Low platelet count (<$100x10^9/1$),
– Raised fibrinogen degradation products or D-dimmers,
– Prolonged INR or PTT
– Duplex Doppler

Supportive treatment:
– Blood transfusion if needed,
– Treatment of DIC, with either fresh frozen plasma or heparin

- **Immunological system (any of the following)**
  Clinical signs:
  – Pyrexia > 38ºC,
  – Lymphadenopathy

  Special investigations:
  – Increased or decreased white cell count,
  – HIV-testing

  Supportive treatment:
  – Aggressive treatment of the underlying sepsis

- **Endocrine System (Thyroid, Breasts, Diabetes)**
  For puerperal sepsis:
  – Examine the breasts for mastitis or abses

  Special investigation:
  – Blood glucose

  Supportive treatment:
  – Correction of any metabolic abnormalities

DEFINITIONS:

Abortion: The ending of pregnancy before the fetus is viable.

Safe abortion: Any abortion where the temperature is ≤ 37.2^{0}C, the pulse is < 90 beats per minute, the respiratory rate is <20 breaths per minute, the uterine size is < 12 weeks, and the ward haemoglobin concentration is >10g/dl. Furthermore, there are no clinical signs of infection, no system or organ failure and no suspicious findings on evacuation of the uterus.

An **unsafe abortion** is defined as anything else.

Puerperal sepsis is defined as pyrexia of ≥38^{0}C, on two separate occasions within the first fourteen days post-delivery, the first 24 hours excluded, if observations are taken on a 4-6 hourly basis.

Assessment and evaluation of the severity of sepsis complicating an abortion:

Three categories of abortion, with regard to the clinical severity thereof, can be distinguished:

1. **Low Risk Abortion:**
   - Temperature ≤ 37,2^0 C
   - Pulse <90 beats per minute
   - Respiratory rate <20 breaths per minute
   - Ward haemoglobin >10g/dl
   - No clinical signs of infection;
   - No system- or organ failure; and
   - No suspicious findings on evacuation of the uterus

2. **Moderate Risk: Unsafe Abortion**
   - Temperature 37,3-37,9^0 C, or
   - Offensive products of conception, or
   - Localised peritonitis
   - Uterine size 12 – 16 weeks
   - Pulse 90- 119 beats per minute
   - Respiratory rate 20-24 breaths per minute.

3. **High Risk (Severe) Unsafe Abortion**
   - Temperature ≥ 38^0 C, or
   - Respiratory rate > 24 breaths per minute
   - Organ failure, or
   - Peritonitis, or
   - Pulse ≥ 120 beats per minute, or
   - Presence of a foreign body or mechanical injury, on evacuation of the uterus, or
   - Systolic blood pressure <90 mmHg
   - Uterine size >16 weeks

Management at different levels of care of abortion:
Abortion below 14 weeks can be evacuated with the fetus still in utero. In a patient with an abortion more than 14 weeks the fetus needs to be delivered before evacuation of the uterus.

Prevention of Puerperal Sepsis
Part of the management of puerperal sepsis is the prevention. These include identification of women at high risk for example prolonged labour, pre labour rupture of membranes and immunocompromised women. The correct use of prophylactic and therapeutic antibiotics at time of caesarean section and normal vaginal delivery is also important.

The following should be checked before discharge:
Ward haemoglobin concentration,
Rhesus status
Syphilis serology should be known,
Counselling for HIV-testing should be provided and the test carried out Contraceptive advice must be given..

1. **Level 1** (excluding sub-district hospitals with 24-hour theatre facilities and blood available)

   Abortion (safe abortions only)
   i. Prompt evacuation of the uterus, preferably by manual vacuum aspiration (MVA) under local anaesthesia.
   ii. Antibiotic prophylaxis

Puerperal sepsis

i. Referral to next level for postpartum temperature.
ii. Start on triple antibiotics

2. **Level 1** (sub-district hospitals with 24-hour theatre facilities and blood available) and **Level 2**

Abortions:

a. resuscitation of the patient
b. prompt evacuation of the uterus, preferably by MVA, but with the facilities for evacuation in theatre, for moderately unsafe abortions
c. Antibiotics in therapeutic dosage, for unsafe abortions
d. Referral of all patients, where there is dysfunction of 2 or more organ systems, and/or where it is contemplated to change antibiotics. Such patients may require urgent laparotomy.

Puerperal sepsis:

a. Intravenous antibiotic coverage, special investigations to localise origin of sepsis, prophylactic anticoagulation for pelvic thrombophlebitis. Referral if poor or no response on treatment.
b. Laparotomy should be considered instead of changing antibiotics and any case where there is 2 or more organ system dysfunction and the patient should be referred.

3. **Level 3:**

Abortion:

a. Prompt evacuation of the uterus in theatre, for high risk abortions, and evaluation of the need for hysterectomy.

b. Supportive care, for single – or multi – organ failure, in an ICU or high care facility.
c. Careful evaluation of the need for laparotomy, where there is dysfunction of 2 or more organ systems, and/or where it is contemplated to change antibiotics.

Puerperal sepsis:

a. Prompt theatre evacuation of uterus if a vaginal delivery occurred and evaluation for hysterectomy
b. Post caesarean section, evaluation for hysterectomy

c. Supportive care for single or multiple organ failure in an ICU or high care facility.
d. Laparotomy should be considered instead of changing antibiotics and any case where there is 2 or more organ system dysfunction.

Observations post procedure
The specific type of observation need to be described in detail and the frequency specified to ensure that the patient is monitored optimally. Any change or abnormality should be communicated with the attending physician.

Basic guidelines for observations

1. **Post-uncomplicated evacuation of uterus/MVA**
   a. blood pressure, pulse rate, respiratory rate, checks on excessive vaginal bleeding, directly post-procedure
   b. Ward haemoglobin concentration must be checked within 24 hours of delivery and must be known before the patient is discharged
   c. Temperature, blood pressure, pulse rate, respiratory rate, and vaginal pad checks – hourly for 2 hours, and then 6 hourly until discharge, if normal.

2. **Abortion complicated by single – or multi-organ dysfunction**
   a. Continuous or at least every 15-30 minutes' evaluation of the blood pressure, respiratory rate, and pulse rate, according to the ICU – or high care protocol of the facility. Temperature and urinary output hourly, as well as other parameters, such as central venous pressure.

REFERRAL CRITERIA

Level 1 / Community or primary health care level, sub-district hospitals (without 24 hour theatre facilities):

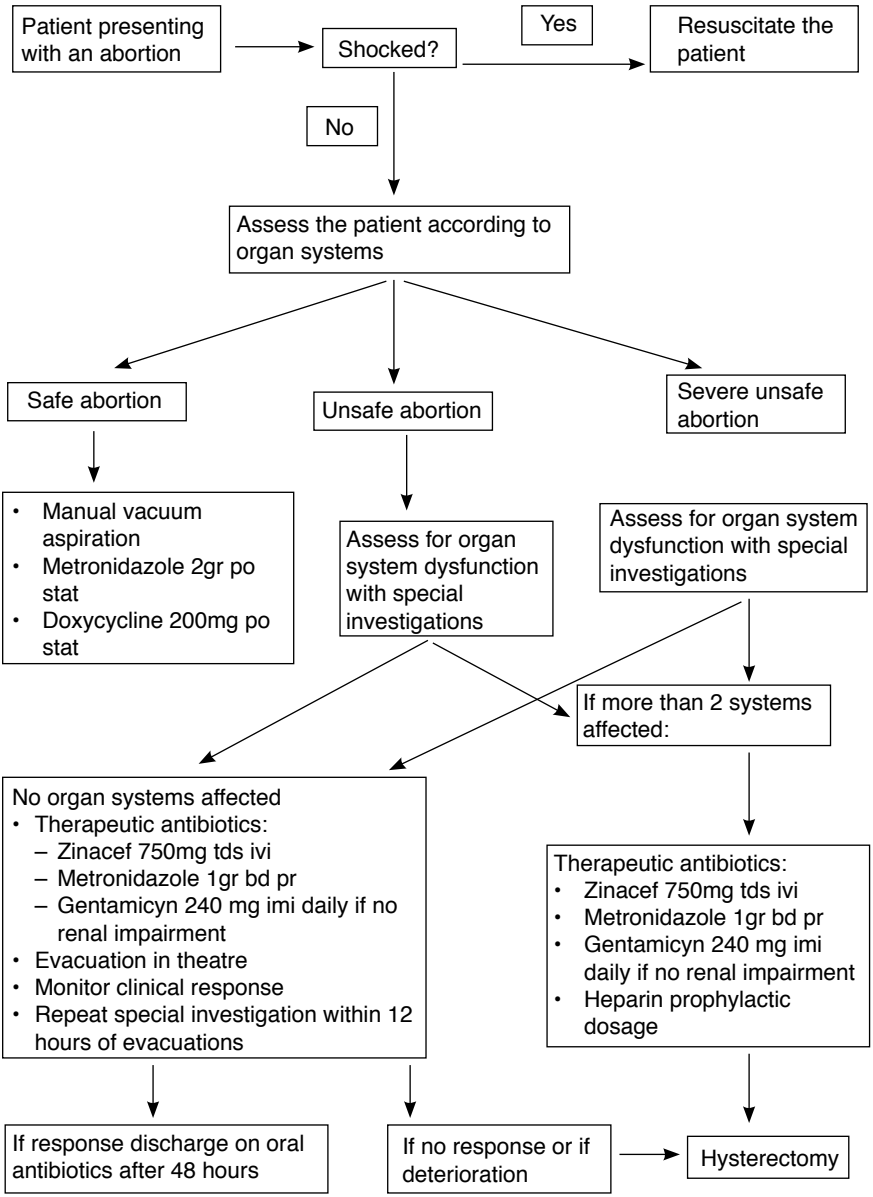
Postpartum sepsis:
referral of any case where the sepsis is thought to be from genital origin.

Level 1:
Sub-district hospitals (i.e. hospitals which have blood products available, 24h anaesthetic capabilities and expertise to perform theatre evacuations of a uterus) and Level 2 district or regional hospitals.

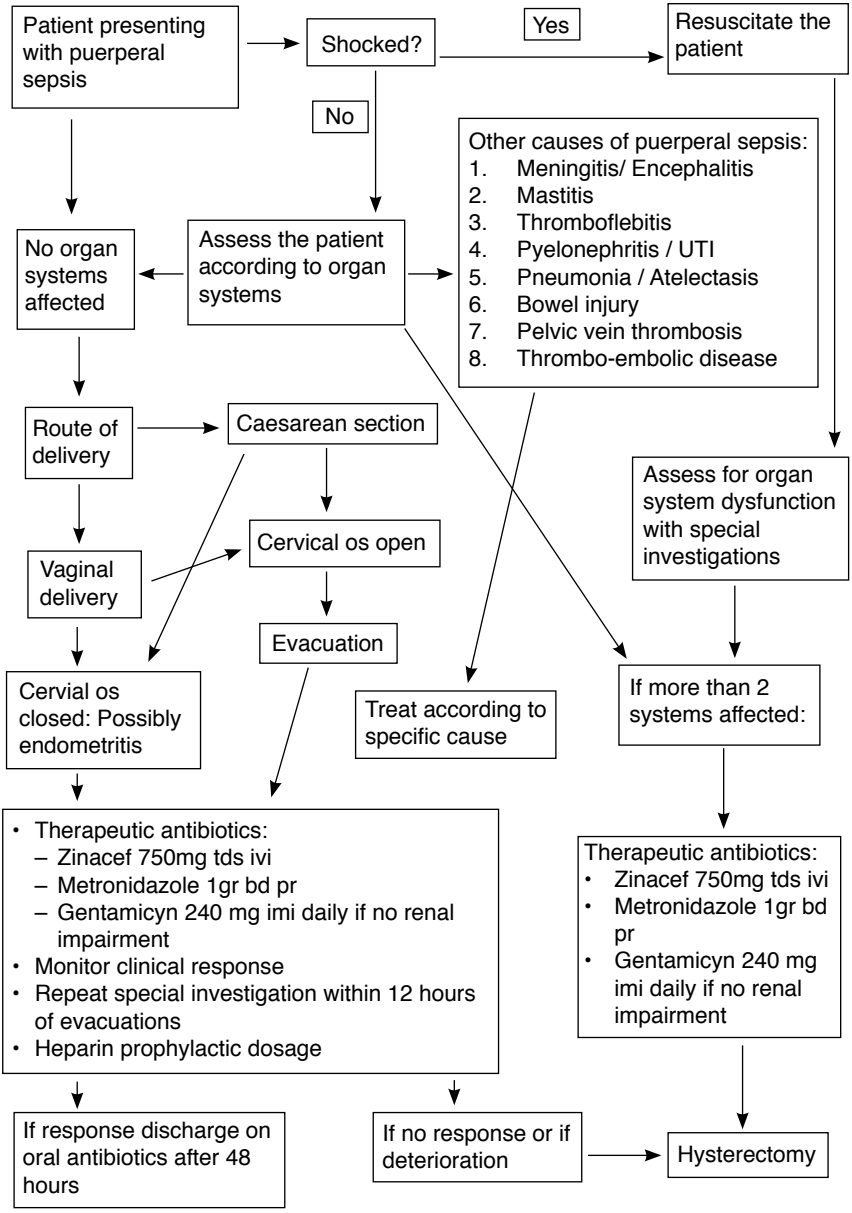
- Referral of any patient with signs of organ failure except anaemia, or if supportive treatment not available if needed.
- Referral of any patient (septic abortion or puerperal sepsis) with a poor or no response on intravenous antibiotics for genital sepsis.

Level 2:
(i.e. institutions with 24h consultant and intensive care /high care facilities available, which can provide adequate treatment and support for single or multiple organ failure patients whether post-abortion or postpartum patients) and Level 3/ Tertiary or central hospitals.

ALGORITHM FOR MISCARRIAGE (ABORTION)



ALGORITHM FOR MANAGEMENT OF PEURPERAL SEPSIS



REFERENCES

- National Committee on the Confidential Enquiries into Maternal Deaths. Saving Mothers: Report on Confidential Enquiries into Maternal Deaths in South Africa 2002-2004. Dept of Health, Pretoria, 2006.
- Guidelines for maternity care in South Africa. 3rd edition. Dept of Health, Pretoria, 2007.
- Royal College of Obstetricians and Gynaecologists. Life saving skills manual: essential obstetric care. RCOG, UK. 2006.
- American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Cardiac arrest associated with pregnancy. Circulation. 2005; 112: IV-150-IV-153.
- Eclampsia Trial Collaborative Group. Which anticonvulsant for women with eclampsia? Evidence from the Collaborative Eclampsia Trial. Lancet 1995; 345: 1455-63.
- Magee LA et al. Management of hypertension in pregnancy. Br Med J 1999; 318: 1332-36.
- Tuffnell DF et al. Outcomes of severe pre-eclampsia / eclampsia in Yorkshire 1999-2003. Br J Obstet Gynaecol 2005; 112(7): 875-80.