CLINICAL TRAINING *for* REPRODUCTIVE HEALTH *in* EMERGENCIES

Emergency Obstetric Care

PROTOCOLS

RAISE
Reproductive Health Access, Information and Services in Emergencies

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ACRONYMS

AMDD	Averting Maternal Death and Disability Program
BCG	Tuberculosis vaccine
C	Centigrade
CBT	Competency-based training
cc	Cubic centimetres
cm	Centimetre
CNS	Central nervous system
CPD	Cephalopelvic disproportion
dL	Decilitre
dpm	Drops per minute
EmOC	Emergency obstetric care
ETT	Endotracheal tube
FH	Foetal heart rate
g	Gram
HELLP	Haemolysis elevated liver enzymes and low platelets
Hb	Haemoglobin
Hg	Mercury
HIV	Human immunodeficiency virus
IM	Intramuscular
IP	Infection prevention
IU	International units
IUD	Intrauterine device
IUGR	Intrauterine growth retardation
IV	Intravenous
Kg	Kilogram
LAM	Lactational amenorrhoea method
L	Litre
mcg	Microgram
MCPC	Managing Complications in Pregnancy and Childbirth reference manual
mg	Milligram
mL	Millilitre
mm	Millimetre
MSAF	Meconium stained amniotic fluid
MVA	Manual vacuum aspiration
PMTCT	Prevention of mother to child transmission (of HIV)
POC	Products of conception
PPH	Postpartum haemorrhage
OPV	Oral polio vaccine
RAISE	Reproductive Health Access, Information and Services in Emergencies
RH	Reproductive health
SVD	Spontaneous vaginal delivery
TBA	Traditional birth attendant
WHO	World Health Organisation

INTRODUCTION

The rights of displaced people to reproductive health (RH) were recognised at the International Conference on Population and Development in 1994. Since then RH service provision has progressed, but substantial gaps remain in services, institutional capacity, policy and funding. It has been shown that provision of emergency obstetric care, clinical family planning methods, care for survivors of gender-based violence and management of sexually transmitted infections (STIs) is lacking in most conflict affected settings.

One of the key barriers to the provision of comprehensive RH services is the lack of skilled providers. In order to address this, RAISE has developed a comprehensive training package, including training centres and course manuals. The clinical training teams provide theoretical and practical training to RH service providers at the training centres, as well as on-site supervision at the participants' workplace and on-going technical assistance. Providing clinical training to humanitarian agency and ministry of health staff from a range of conflict settings, the RAISE training team aims to improve the quality of care of RH services in conflict settings.

The manuals in the Clinical Training for Reproductive Health in Emergences series are based on existing materials and have been updated and adapted for use in emergency settings. All manuals have been pre-tested at the RAISE Training Centre at Eastleigh Maternity Home in Nairobi. Many procedures and protocols remain unchanged from non-emergency settings. However, in some instances it is necessary to adapt a protocol to recognise the particular challenges faced in emergency settings.

The Emergency Obstetric Care learning resource package[1] comprises materials and supervised clinical practice. The materials are:

- **trainer guide**
- **participant guide**
- **reference material:**
  - *IMPAC manual*
  - *Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors*
  - *Managing Newborn Problems: A Guide for Doctors, Nurses, and Midwives.*
- **protocols: a summary of the reference material.**

[1] The learning resource package does not provide detailed information on normal childbirth and routine newborn care, but focuses on the management of complications that occur during pregnancy, delivery and the immediate postpartum period.

HOW TO USE THESE PROTOCOLS

These protocols cover the immediate management of six common life threatening obstetric emergencies and five commonly encountered newborn emergencies, seen at the first referral level, and are designed as job aids for trained health workers.

Each protocol on obstetric care has **four** major headings. The user starts at the top with **Suspect** and goes down the chart through **Assess**, **Classify** and **Treat**. **Suspect** reminds the user of the symptoms and signs that should alert him/her to the obstetric emergency. **Assess** refers to the symptoms and signs that help the user to **Classify**. **Treat** refers to the specific management of the problem. In addition, some protocols have boxes **Key Points** or **Special Notes**. These provide additional useful and important information.

Each protocol on newborn care has **three** major headings. The user starts at the top with **Problem** and goes down the chart through **Findings** and **Management**. **Problem** refers to the common presenting symptoms that should alert the user to the neonatal emergency. **Findings** refer to the signs that help the user to identify the underlying problem and **Management** refers to the specific treatment modalities for the problem. In addition, some protocols have boxes labelled **Special Situations,** which contain some additional useful and important information.

The technical basis for each protocol is discussed in this booklet. References are included for technical papers providing evidence on which the management of the six obstetric and five newborn emergencies are based. As the first step in the implementation of these protocols at each first referral unit, the officer in charge of the unit should discuss these protocols with his/her medical and nursing colleagues in the unit. During these discussions, the team should identify differences between existing practises in the unit with those recommended in these protocols, and use the technical papers to understand the rationale for the recommendation. If training is required in specific skills (such as aortic compression) or in the use of specific drugs (such as magnesium sulphate use in eclampsia), the officer in charge should make arrangements for the required training to be provided. The team could use clinical drills to familiarise themselves with the protocols. The officer in charge and his team should also ensure that all drugs listed in these protocols are available in the unit at all times.

The individual protocols (wall charts) should be displayed in the labour ward and in all other areas in the hospital where obstetric and newborn emergencies are seen. Each protocol will serve as a guide for staff involved in emergency obstetric and newborn care. As a quality assurance exercise, the quality of care in obstetric and newborn emergencies at the first referral unit should be audited by the team using these protocols as the standard.

ANAEMIA *in* PREGNANCY *and* LABOUR

Nutritional anaemia is a common problem in many developing countries, aggravated by pregnancy and parasitic infections. While early stages of anaemia in pregnancy are often symptomless, as haemoglobin concentration falls, oxygen supply to vital organs declines and the expectant mother begins to feel weak, tired and dizzy. Pallor of skin and mucous membranes as well as nail beds and tongue, is not usually apparent until haemoglobin levels fall to 7.0g/dL or lower. As haemoglobin falls further, most tissues of the body become starved of oxygen. The effect is most marked on the heart, which may fail altogether especially during childbirth. Women with anaemia tolerate blood loss poorly. Bleeding during childbirth in an anaemic mother can result in death.

Anaemia in pregnancy is diagnosed when haemoglobin concentration is less than 11.0g/dL. Mild to moderate anaemia is diagnosed when haemoglobin levels are between 7.0 and 10.9g/dL. Severe anaemia is diagnosed when haemoglobin levels are between 4.0 and 6.9g/dL and very severe anaemia when the level is below 4.0g/dL.

Healthcare should aim to prevent anaemia before the woman becomes pregnant. However, in reality, anaemia is often diagnosed for the first time during pregnancy. Iron and folic acid are essential during pregnancy. The daily requirements of iron and folic acid in pregnancy are approximately 60 to 70mg and 300 to 500mcg respectively. Green leafy vegetables are rich in iron and folic acid. Iron absorption is enhanced by ascorbic acid (vitamin C). Eating fruits along with iron tablets will increase absorption of iron. However, iron absorption is impaired by phytates in cereals and tannins in tea. Avoid eating cereals and drinking tea with iron tablets.

For a variety of reasons, the majority of women in developing countries require iron supplementation during pregnancy. Iron supplementation in pregnancy results in lesser anaemia in pregnancy and postpartum and a possible beneficial effect on the ability of the woman to tolerate pregnancy and childbirth. Folate supplementation improves haematological indices and may reduce the occurrence of low birth weight.

Oral iron is the preferred option in most cases of anaemia in pregnancy. The rate of increase of haemoglobin is approximately 1g every week. Thus when anaemia is diagnosed early in pregnancy, there is sufficient time to treat anaemia with oral iron. In more severe cases of anaemia, where there is heart failure or if the woman is close to delivery, a more rapid increase in haemoglobin level may be warranted. Here packed red cell transfusion would be the appropriate therapy. However, the availability of safe blood for transfusion is often a problem. Parenteral iron does not correct anaemia any faster than oral iron. Moreover, adverse reactions seen with parenteral iron limit its usefulness in most situations.

In places where malaria and hookworm infections are common, it is a good practice to treat for these infections. Anti-malarial prophylaxis and treatment may be given as required. Anti-malarial prophylaxis is associated with less anaemia and low birth weight. Antihelminthic therapy may be given safely after the first three months of pregnancy.

Pains during childbirth increase the risk for the anaemic woman and hence provide adequate pain relief in labour.

Blood loss during and after childbirth can be fatal to the anaemic woman. Active management of the third stage of labour reduces blood loss due to postpartum haemorrhage by 60% and should be practised in all cases (See protocol on postpartum haemorrhage for more details). Lacerations should be promptly sutured to avoid further blood loss.

Iron and folic acid therapy should be continued for at least six months after childbirth to ensure that the woman has adequate iron stores.

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MANAGEMENT OF ANAEMIA IN PREGNANCY AND LABOUR		
SUSPECT	▪ woman is pale, tired, weak, easily fatigued and breathless on mild exertion or has dizziness ▪ last delivery within one year or history of bleeding, malaria, hookworm disease or chronic diarrhoea.	
ASSESS	▪ pale ▪ breathlessness on exertion ▪ Hb concentration 7 to 11g/dL.	▪ pale ▪ generalised oedema ▪ breathlessness at rest ▪ Hb concentration <7g/dL.
CLASSIFY	**Mild/moderate anaemia** **Remote from labour:** ▪ give ferrous sulphate or ferrous fumarate containing 120mg elemental iron by mouth PLUS folic acid 500mcg by mouth daily ▪ give anti-malarial prophylaxis in endemic areas according to national guidelines ▪ treat hookworm infection and diarrhoea ▪ evaluate and treat urinary tract infection.	**Severe/very severe anaemia** **Remote from labour:** ▪ give ferrous sulphate or ferrous fumarate containing 120mg elemental iron by mouth PLUS folic acid 500mcg by mouth daily ▪ if malaria is suspected, examine and treat ▪ treat hookworm infection, diarrhoea and urinary tract infection ▪ decide on blood transfusion based on clinical symptoms ▪ prescribe blood only when the benefits outweigh the risks.
TREAT	**In labour:** ▪ provide analgesics ▪ actively manage third stage of labour (prophylactic utertonic in third stage) ▪ repair lacerations promptly ▪ give ferrous sulphate or ferrous fumarate containing 120mg elemental iron by mouth PLUS folic acid 500mcg by mouth daily for six months in the puerperium.	**In labour:** ▪ give packed cell transfusion (preferably) or blood ▪ provide analgesics ▪ closely monitor for cardiac failure ▪ actively manage third stage of labour (prophylactic uterotonic in third stage) Avoid ergometrine in cardiac failure ▪ repair lacerations promptly ▪ give ferrous sulphate or ferrous fumarate containing 120mg elemental iron by mouth PLUS folic acid 500mcg by mouth daily for six months in the puerperium.
KEY POINTS	▪ all pregnant women should be given the standard dose of ferrous sulphate fumarate containing 60mg elemental iron by mouth PLUS folic acid 500mcg by mouth everyday for 100 days. Use ferric compound where available ▪ give oral anti-helminthic treatment (mebendazole, albendazole or pyrantel). Avoid anti-helminthic in the first trimester ▪ advise all pregnant women to eat fruits and leafy vegetables.	

BLEEDING *in* LATE PREGNANCY *and* CHILDBIRTH *(Antepartum haemorrhage)*

Bleeding associated with pregnancy and childbirth accounts for 25% of maternal deaths. While most of these fatal cases occur after childbirth (postpartum haemorrhage), lifethreatening bleeding may also occur in late pregnancy and before the delivery of the baby (antepartum haemorrhage).

The two major causes for bleeding in late pregnancy and before delivery of the baby are **abruptio placentae** and **placenta praevia**. In the former, the placenta is located in the upper part of the uterus, while in the latter condition the placenta is located partly or completely in the lower part of the uterus.

Bleeding occurs when the placenta separates from the uterus. Bleeding from placental abruption may be obviously visible (revealed) or may be hidden behind the placenta (concealed). The woman may have abdominal pain associated with bleeding. The uterus may be tender to palpation and tense especially when bleeding is concealed. If a significant portion of the placenta is detached, the foetus may show signs of distress or may die. Maternal complications such as hypovolaemic shock, renal failure and coagulation failure may occur in severe cases. Delivery of the baby with steps to prevent and correct complications is the treatment of choice in abruptio placenta. Bleeding may occur after delivery of a woman with abruptio placentae.

In contrast, bleeding from placenta praevia is usually painless and recurrent. Bleeding can occur several weeks before delivery and is usually mild. The aim of treatment here is to prolong pregnancy until the baby is mature. However if early delivery is necessary, an attempt should be made to hasten foetal lung maturity by administration of corticosteroids. *Treatment with corticosteroids reduces mortality due to prematurity, respiratory distress and intraventricular haemorrhage in the newborn*.

Caesarean delivery is preferred in most cases of placenta praevia. *Postpartum haemorrhage can occur following delivery, as the vessels supplying the placenta in the lower part of the uterus may not contract after delivery.*

Vaginal examination in the presence of a low placenta can provoke torrential and life threatening bleeding. **Vaginal examination should be avoided in all cases of bleeding in late pregnancy until placenta praevia has been satisfactorily excluded**.

Bleeding in late pregnancy and during childbirth may occur following **rupture of the uterus**. Although this condition is not normally considered as antepartum haemorrhage, it is included in this protocol as it may present with bleeding and pain. Rupture may occur in prolonged and obstructed labour when the uterus has been scarred from previous surgery and when uterotonics are used inappropriately. Uterine rupture should be recognised and treated early to prevent maternal morbidity and mortality and is hence included in this protocol. It is important to stabilise the mother's condition first. If surgical expertise is not available, the woman should be referred for surgical intervention after stabilising her condition.

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MANAGEMENT OF ANTEPARTUM HAEMORRHAGE

SUSPECT	Vaginal bleeding after 22 weeks of pregnancy but before the delivery of the baby. Blood stained mucus (show) heralds the onset of labour and should not be considered as antepartum haemorrhage.		
ASSESS	Bleeding associated with: ▪ intermittent or constant abdominal pain ▪ fainting ▪ decreased or absent foetal movements ▪ shock out of proportion to observed bleeding ▪ tense/tender uterus ▪ foetal distress or absent foetal heart sound.	Bleeding associated with: ▪ severe abdominal pain in labour relieved suddenly ▪ collapse/shock out of proportion to observed bleeding ▪ tender distended abdomen ▪ abnormal uterine contour with easily palpable foetal parts ▪ absent foetal heart sounds.	Bleeding associated with: ▪ no pain ▪ precipitated by vaginal examination or intercourse ▪ shock in direct proportion to observed bleeding ▪ non tender, relaxed uterus ▪ foetal presentation not in pelvis ▪ normal foetal heart sounds.
CLASSIFY	**Placental abruption** (Early separation of normally situated placenta)	**Ruptured uterus*** Intra-abdominal bleeding may not cause vaginal bleeding.	**Placenta praevia** (Placenta implanted at or near the lower uterine segment)
TREAT	▪ restore blood volume with IV fluids and blood if required ▪ do bedside clotting time test-failure of clot to form after seven minutes or a soft clot that breaks easily indicates coagulopathy ▪ monitor and maintain hourly urine output of at least 30mL/hour ▪ plan for immediate delivery ▪ if bleeding is heavy, deliver by Caesarean section unless quick vaginal delivery is likely ▪ if bleeding is mild to moderate, rupture membranes and augment contractions with oxytocin infusion ▪ deliver by Caesarean section if cervix is unfavourable and there is foetal distress ▪ anticipate postpartum haemorrhage.	▪ restore blood volume with IV fluids and blood if required ▪ resuscitate and perform laparotomy when condition is stabilised ▪ repair the rent. Hysterectomy may be required if the rent cannot be safely repaired. **NOTE:** If there are no facilities for hysterectomy, undertake life saving measures and refer to tertiary care centre.	▪ restore blood volume with IV fluids and blood if required ▪ if bleeding is heavy and continuous, deliver by Caesarean section irrespective of foetal maturity ▪ if bleeding is light and the foetus is alive but pre-term, manage expectantly until term or occurrence of heavy bleeding ▫ correct anaemia ▫ give 2 doses of betamethasone 12mg IM 12 hours apart for promoting lung maturity ▫ ensure availability of blood ▫ confirm placental site by ultrasound ▪ if bleeding recurs, weigh the benefits and risks to the mother and foetus of further expectant management versus delivery ▪ when delivery is planned at term, recheck placental site ▫ if placenta praevia is noted to reach cervix, deliver by Caesarean section ▫ if placenta does not reach cervix, induce labour ▪ anticipate postpartum haemorrhage.
SPECIAL NOTE	Give ferrous sulphate or ferrous fumarate containing 120mg elemental iron by mouth PLUS folic acid 500mcg by mouth daily for six months in the puerperium.		

* Bleeding associated with ruptured uterus is not commonly referred to as antepartum haemorrhage. However, it is included here, as bleeding may occur before the baby is delivered.

PRE-ECLAMPSIA *and* ECLAMPSIA

Hypertension complicates 5 to 10% of all pregnancies and is associated with 13% of all maternal deaths. Hypertension in pregnancy is defined as systolic blood pressure of 140mm Hg or greater and/or diastolic blood pressure of 90mm Hg or greater. Hypertension diagnosed for the first time after 20 weeks of pregnancy is referred to as pregnancy induced hypertension; a pregnant woman with hypertension diagnosed before 20 weeks is said to have chronic hypertension.

Diastolic blood pressure is a good indicator of prognosis for the management of hypertension in pregnancy as it measures peripheral resistance and does not vary with the woman's emotional state to the degree that systolic pressure does. Diastolic blood pressure is taken at the point at which arterial sounds disappear. This protocol uses only diastolic blood pressure measurements for the classification and management of hypertension in pregnancy. Diastolic blood pressure measurements between 90 and 109mm Hg are considered *mild to moderate hypertension* while measurements above these levels are considered *severe hypertension*.

Pre-eclampsia is pregnancy induced hypertension with proteinuria. **Eclampsia** is the occurrence of convulsions in a pregnant woman with hypertension in pregnancy. Since eclampsia is the commonest reason for convulsions among pregnant women and since it is associated with significant maternal and perinatal morbidity and mortality, it is recommended that *any pregnant woman with convulsions should be considered and managed as eclampsia unless there is sufficient information to consider another cause for convulsions*.

The aetiology of pre-eclampsia and its prevention are not clear. Both the mother and the foetus may be affected in pre-eclampsia depending on the severity of the condition and the age of onset of disease. The mother may suffer from the adverse effects of high blood pressure (convulsions, cerebral haemorrhage, cardiac and renal failure) while the baby may suffer from inadequate placental blood flow (foetal growth restriction, foetal distress and foetal death). The only definitive treatment for pre-eclampsia is delivery of the baby.

This results in rapid and almost complete resolution of symptoms and signs. Decision regarding delivery is dependent on many factors, in particular the maturity of the baby, the condition of the mother and the facilities available for maternal and neonatal care. In severe pre-eclampsia and eclampsia, the risks to the mother's health are sufficiently high to warrant delivery of the baby irrespective of its maturity. However in cases of mild to moderate hypertension in pregnancy when the baby is not mature, there is a place for expectant management of pregnancy.

Methyldopa is most widely used and time-tested anti-hypertensive in pregnancy. Use of anti-hypertensive for mild to moderate hypertension reduces the risk for developing severe hypertension. *Use of beta-blockers is associated with foetal growth restriction while use of nifedipine for mild to moderate hypertension is associated with worsening of pre-eclampsia*.

Consider delivery if the baby is mature, or if there is increasing proteinuria or if hypertension is not adequately controlled with anti-hypertensive medication. Sedatives, tranquillisers and diuretics have no role in the management of mild to moderate hypertension in pregnancy.

A woman with severe pre-eclampsia or eclampsia should be delivered as soon as possible. **Magnesium sulphate is the drug of choice for prevention and treatment of convulsions**. *Magnesium sulphate is superior to lytic cocktail, diazepam and phenytoin*. The loading dose of 4g administered intravenously as a 20% solution over five minutes and 10g IM (5g as 50% solution in each buttock with lidocaine) controls and prevents convulsions in most cases. If convulsions occur more than 15 minutes after administration of the loading dose, an additional dose of 2g should be given

intravenously. To prevent further seizures, maintenance doses of 5g IM are given every four hours until 24 hours have elapsed after delivery or last convulsion whichever occurred last. Since magnesium depresses neuromuscular transmission, monitor her for respiratory depression (rate should be more than 16/min) and deep tendon reflexes (the knee jerk should be elicitable before the next dose is given). Also since magnesium is excreted through the kidney, decreased urine output can be associated with magnesium toxicity. Ensure that urine output is at least 100mL in the preceding four hours before giving further doses of magnesium sulphate. If knee jerks are not elicited or if the urine output is less than 100mL/hour or if respiratory rate is less than 16/min withhold the next dose until these have returned to normal.

Anti-hypertensive drugs should be used to lower blood pressure rapidly in cases of severe pre-eclampsia and eclampsia. Nifedipine is a rapidly acting drug that is available widely. Use nifedipine in small doses to lower blood pressure. However there is a theoretical risk of interaction between nifedipine, a calcium channel blocker and magnesium sulphate. Anti-hypertensive therapy should be continued in the postpartum period if the blood pressure is more than 100mm Hg (diastolic). Nifedipine and beta-blockers may be used in the postpartum period. Follow up after discharge and reduce/stop treatment as appropriate.

A woman with convulsions should be protected from injury. Gently hold her to prevent her from hurting herself. Introduction of a mouth gag may cause injury and is best avoided. Maintain adequate intravenous hydration. Plan delivery after initiating anti-convulsant and anti-hypertensive treatment.

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MANAGEMENT OF PRE-ECLAMPSIA / ECLAMPSIA

SUSPECT	▪ blood pressure is 140/90mm Hg or greater or ▪ the woman has convulsions or is found unconscious.			
ASSESS	▪ diastolic BP 90 to 110mm Hg ▪ proteinuria ++ ▪ no convulsions.	▪ diastolic BP > 110mm Hg ▪ proteinuria +++ or more ▪ reduced urine output ▪ headache, blurred vision.	▪ diastolic BP > 90mm Hg ▪ proteinuria ++ or more ▪ convulsions/coma.	
CLASSIFY	**Mild to moderate pre-eclampsia**	**Severe pre-eclampsia**	**Eclampsia**	
TREAT	▪ advise rest and normal diet ▪ no salt restriction ▪ monitor BP and proteinuria ▪ do not give sedatives, tranquillisers, anti-convulsants or diuretics ▪ prescribe methyldopa if diastolic BP > 100mm Hg to lower it to between 90 and 100mm Hg ▪ monitor foetal growth by symphysis-fundal height measurements ▪ plan delivery at term or earlier if: ▫ proteinuria worsens ▫ there is significant intra-uterine growth retardation ▫ BP control is unsatisfactory.	▪ plan to deliver within 24 hours ▪ there is no place for expectant care in severe pre-eclampsia ▪ reduce BP and prevent convulsions with magnesium sulphate as for eclampsia ▪ watch for HELLP syndrome (H. Haemolysis, EL. Elevated liver enzymes, LP. Low Platelet count.) If detected refer to tertiary centre.	▪ delivery must occur within 12 hours of onset of convulsion ▪ maintain airway ▪ give oxygen at 4 to 6L per minute ▪ protect the woman from injury ▪ place the woman on her side ▪ aspirate the mouth and throat as necessary after the convulsion ▪ magnesium sulphate is the drug of choice as anti-convulsant ▪ if diastolic BP is above 100mm Hg give anti-hypertensive ▪ do not reduce diastolic BP to less than 90mm Hg ▪ start IV Infusion (ringer lactate) do not give more than 60 to 80mL per hour ▪ catheterise the bladder and monitor urine output and proteinuria ▪ if urine output is less than 30mL per hour withhold magnesium sulphate and infuse normal saline or ringer lactate.	▪ watch for pulmonary oedema ▪ never leave the woman alone. Watch for aspiration following a convulsion ▪ observe vital signs, reflexes and foetal heart rate hourly ▪ auscultate lung base hourly for rales, indicating onset of pulmonary oedema. If rales are heard, withhold fluid and give furosemide 40mg IV once ▪ watch for coagulopathy using bedside clotting test; failure of clot to form after seven minutes and a soft clot that breaks easily suggest coagulopathy ▪ watch for HELLP syndrome ▪ expedite delivery ▪ if cervix is favourable (soft, thin, partly dilated), rupture membranes and induce labour using oxytocin infusion ▪ if cervix is unfavourable, deliver by Caesarean section.

Anti-hypertensives		Magnesium sulphate solution	
▪ give anti-hypertensive for pre-eclampsia when the diastolic BP is >100mm Hg ▪ alpha methyldopa is the anti-hypertensive of choice for treatment in pregnancy but onset of action is slow ▪ dosage depends on the response of the client ▪ keep diastolic BP between 90 and 100mm Hg	▪ Hg to prevent cerebral haemorrhage ▪ for quicker onset of action give tab nifedipine 5mg oral (If not conscious puncture the capsule and administer as 3 to 4 nasal drops; avoid sublingual medication) ▪ if response is inadequate after 10 minutes, repeat the dose ▪ watch for possible interaction when nifedipine and magnesium sulphate are used together.	**Loading dose:** ▪ give magnesium sulphate 20% solution, 4g IV over 5 minutes ▪ follow with 10g of 50% magnesium sulphate solution, 5g in each buttock deep IM with 1mL of 2% lidocaine in the same syringe ▪ if convulsions recur after 15 minutes give 2g magnesium sulphate (50% solution) IV over 5 minutes.	**Maintenance Dose:** ▪ 5g magnesium sulphate (50% solution) with 1mL 2% lidocaine IM every four hours in alternate buttocks ▪ continue treatment for 24 hours after delivery or after the last convulsion, whichever occurred last ▪ watch respiratory rate, patellar reflex and urinary output ▪ withhold the drug if respiratory rate is below 16 per minute, patellar reflexes are absent, urinary output is less than 30mL per hour for the preceding four hours ▪ in case of respiratory arrest assist ventilation and give calcium gluconate 1g (10mL of 10% solution) IV slowly until respiration begins and the effects of magnesium sulphate are antagonised.

KEY POINTS			
	Postpartum care:		**Consider referral to tertiary centre:**
	▪ maintain anti-convulsant therapy for 24 hours after delivery or last convulsion whichever is later ▪ continue anti-hypertensive till diastolic BP reduced to 90mm Hg.	Do not use ketamine in women with pre-eclampsia/eclampsia.	▪ oliguria persisting 48 hours after delivery ▪ coagulopathy ▪ HELLP syndrome ▪ persistent coma more than 24 hours after convulsion.

PROLONGED LABOUR

Prolonged labour is an important cause of maternal and peri-natal ill health and death. Prolonged labour and the associated problems can be prevented by close monitoring of events in labour, recording progress of labour on a partograph and intervening when the partograph shows evidence of slow labour.

The partograph is a graphic representation of events in labour. In its simplest form, it records cervical dilatation and descent of the head against time. After 4cm dilatation, the cervix dilates normally at a minimum rate of 1cm/hour. Slow labour is diagnosed when the rate of dilatation of the cervix is slower than 1cm/hour after 4cm dilatation.

Prolonged labour may result from obstruction to the passage of the foetus through the birth canal or for other reasons. **Obstructed labour** is more common if the baby is very large or there is a foetal malpresentation. When labour is obstructed, the woman is usually distressed with pain and is dehydrated, and the lower part of the uterus may be stretched. The head may feel jammed in the pelvis with overlapping of the foetal skull bones. Untreated obstructed labour can result in uterine rupture and even genital fistula. Hence if labour is obstructed, the woman should be delivered as quickly as possible.

Non-obstructed prolonged labour is more common than obstructed prolonged labour. Slow progress of labour without obstruction is usually because of inefficient uterine contractions. Uterine contractions may be weak especially in a woman in her first labour. If slow labour is demonstrated on the partograph, uterine contractions should be strengthened by amniotomy, in the first place, followed by oxytocin infusion. If progress is unsatisfactory even after ensuring adequate uterine contractions, she should be delivered by Caesarean section.

Slow progress may also result from foetal **malpresentations**. Here the presenting part may be large and not fit adequately in the pelvis. Clinical examination can identify slow progress due to malpresentations. In some malpresentations (e.g. face), oxytocin may be used to strengthen uterine contractions. In other malpresentations (e.g. brow) Caesarean section is the preferred treatment.

Disproportion between the size of the foetal head and the maternal pelvis (cephalopelvic disproportion) is a diagnosis made after excluding poor uterine contractions and malpresentations.

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MANAGEMENT OF PROLONGED LABOUR

SUSPECT	Labour pains have reportedly lasted 12 hours or more and the woman is undelivered.				
ASSESS	■ prolonged labour ■ longitudinal lie ■ no stretching of lower segment ■ weak uterine contractions ■ foetal heart sounds normal.	■ prolonged labour ■ head not engaged ■ abnormal lie/presentation (refer to boxes below on abnormal presentations) ■ stretched lower segment ■ bladder distended, Bandl's ring ■ maternal tachycardia and dehydration ■ foetal distress and marked moulding.			
CLASSIFY	**Non-obstructed labour**	**Obstructed labour**			
TREAT	■ evaluate vital signs, correct dehydration and provide analgesia ■ plot progress on partograph. If progress is slow, augment contractions with oxytocin infusion provided presentation is vertex and there are no signs of obstruction ■ deliver by Caesarean section if there is no progress on partograph after augmentation or there is malpresentation or signs of obstructed labour ■ give antibiotics if there is evidence of infection.			■ evaluate vital signs ■ correct dehydration and provide analgesia ■ arrange for immediate Caesarean section ■ give antibiotics if there is evidence of infection.	
Occipito Posterior: ■ flattened lower abdomen, palpable foetal limbs per abdomen, foetal heart sounds in the flanks, posterior fontanelle felt towards sacrum on vaginal examination ■ if membranes intact and cervix not fully dilated with no signs of obstruction, Rupture membranes and give oxytocin infusion ■ if there are signs of obstruction, normal foetal heart sound, fully dilated cervix, no descent, deliver by Caesarean section.	**Brow Presentation:** ■ brow and nose felt on vaginal examination ■ more than half of foetal head is above symphysis pubis ■ if foetus is alive, deliver by Caesarean section.	Abnormal Presentations **Face Presentation:** ■ groove felt between the occiput and the back per abdomen ■ examiner's finger enters the foetal mouth and the bony jaws are felt ■ if cervix is fully dilated and the chin anterior, try vaginal delivery ■ if cervix fully dilated and chin posterior, deliver by Caesarean section.	**Compound Presentation:** ■ arm prolapses along with the presenting part ■ proceed with normal delivery only if the foetus is very small, dead and macerated Otherwise Caesarean section is the management of choice.	**Transverse lie:** ■ neither head nor buttocks felt at the lower pole and head felt at flanks ■ arm prolapse or elbow, arm or hand felt per vaginum ■ if in early labour with intact membranes, do external version and if successful, try vaginal delivery ■ if version fails or membranes are ruptured, deliver by Caesarean section ■ monitor for signs of cord prolapse. If cord prolapses, deliver by Caesarean section.	**Breech presentation:** ■ head felt in fundus and breech at pelvic brim, foetal heart sounds heard higher than expected ■ try external version if >37 weeks and no other complications ■ if version fails and if it is an extended/ flexed breech of average size, and pelvis is adequate, consider vaginal delivery. Otherwise deliver by Caesarean section.

BLEEDING FOLLOWING CHILDBIRTH
(Postpartum haemorrhage)

Bleeding during pregnancy and childbirth accounts for 25% of all maternal deaths. Severe blood loss is more common following birth. After the placenta separates, the contractions of the uterus occlude the blood vessels supplying the placenta and prevent excessive blood loss. Failure of the uterus to contract (atonic uterus) is the most common cause of bleeding after childbirth. Other causes for postpartum haemorrhage include lacerations of the genital tract, retention of placental fragments and uterine infections.

Atonic postpartum haemorrhage may follow any delivery. There is no reliable predictor for this condition. It is therefore essential to ensure that the uterus contracts in all women after childbirth. Active management of the third stage of labour (the stage when the placenta is expelled) has been shown to reduce postpartum haemorrhage in over 60% of women. Active management includes the administration of a uterotonics drug soon after the baby is born and before the placenta is expelled, early cord clamping, delivery of the placenta by controlled cord traction, and uterine massage to ensure that it is contracted. It is important to carefully monitor the mother for bleeding, especially in the first two hours after childbirth.

Interventions to stop bleeding should be taken immediately should bleeding become excessive. These interventions may include uterine massage to ensure contractions, administration of therapeutic uterotonics, prevention and treatment of shock and other measures (bi-manual uterine compression, aortic compression) to reduce blood loss. If the woman is bleeding and the placenta is retained, it should be removed manually. Genital lacerations may occur following spontaneous childbirth but are more often seen following instrumental delivery. Here bleeding occurs even when the uterus is contracted. Prompt visualisation of the lacerations and repair are required to control bleeding. Occasionally the uterus may rupture during delivery.

Bleeding may occur through the vagina or into the abdomen. Surgical intervention should be carried out as soon as the woman's haemo-dynamic condition is stabilised.

Inversion of the uterus is a rare complication of childbirth and may present with shock and bleeding. Prompt correction of shock and repositioning of the uterus should be undertaken.

Uterotonics

Oxytocin and ergometrine have been used in the active management of third stage of labour. Unlike oxytocin, ergometrine is associated with increased blood pressure, nausea and vomiting. Ergometrine is best avoided in women with hypertension or heart disease. Further, ergometrine preparations in tropical storage conditions deteriorate faster than oxytocin preparations. Hence, the preferred uterotonic for routine active management of third stage of labour in all cases is an intramuscular injection of 10units of oxytocin. However, ergometrine may be used as intramuscular or intravenous injections of 0.2mg in the treatment of postpartum haemorrhage (maximum 5 doses at 15 minute intervals). Similarly larger doses of oxytocin (20 units in 1L of saline) are infused rapidly in the treatment of postpartum haemorrhage (not more than 3L of fluids containing oxytocin should be infused in 24 hours).

The use of misoprostol for the prevention of postpartum haemorrhage has been shown to be as effective as oxytocin, when given by a trained provider. However, side effects are more common with misoprostol. Therefore oxytocin remains the drug of choice for prevention of postpartum haemorrhage and should be provided when available. If oxytocin is not available, 600mg misoprostol should be given orally or sublingually. Untrained providers should give misoprostol only after delivery of the placenta.

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MANAGEMENT OF POSTPARTUM HAEMORRHAGE (PPH)

SUSPECT	▪ vaginal bleeding of 500mL or more after delivery of the baby ▪ any vaginal bleeding after delivery associated with rise in pulse rate.						
ASSESS	▪ excess bleeding or shock soon after delivery ▪ uterus soft and relaxed.	▪ excess bleeding or shock soon after delivery ▪ uterus contracted.	▪ excess bleeding or shock soon after delivery ▪ placenta not delivered ▪ uterus soft or contracted.	▪ portions of maternal surface of placenta missing or torn membranes ▪ sometimes immediate PPH ▪ uterus contracted.	▪ uterine fundus not felt on abdominal palpation ▪ slight or severe pain ▪ inverted uterus seen at vulva ▪ immediate PPH and/or shock.	▪ bleeding occurs more than 24 hours after delivery ▪ uterus softer and larger than expected for elapsed time since delivery ▪ variable bleeding ▪ foul-smelling discharge ▪ anaemia.	▪ excess bleeding or shock soon after delivery ▪ tender abdomen with free fluid ▪ uterine scar, prolonged labour or difficult vaginal delivery ▪ immediate PPH or intra-abdominal bleeding ▪ shock, tender abdomen, rapid maternal pulse.
CLASSIFY	**Atonic uterus**	**Tears of cervix or perineum**	**Retained placenta**	**Retained placental bits**	**Inverted uterus**	**Delayed PPH**	**Ruptured uterus**
TREAT	▪ resuscitate with IV fluids and blood ▪ give uterine massage ▪ give oxytocin: 20units in 1L IV fluid (60 drops/m) and/or ergometrine 0.2mg IM or IV. Repeat after 15 minutes and if required every four hours to a maximum of 5 doses and/or 15 methyl prostaglandin F2 0.25mg IM every 15 minutes if required to a maximum of 5 doses ▪ assess clotting status and give blood transfusion ▪ apply bi-manual compression of uterus and/or abdominal compression of aorta ▪ if bleeding does not stop refer to higher centre. Continue compression and resuscitation during transfer.	▪ resuscitate with IV fluids ▪ repair the tear ▪ give blood transfusion if indicated.	▪ resuscitate with IV fluids and blood ▪ catheterise bladder ▪ give oxytocin 10 units IM ▪ try delivery by controlled cord traction ▪ if this fails, attempt manual removal of placenta under anaesthesia ▪ consider placenta accreta if the placenta does not separate easily.	▪ resuscitate with IV fluids and blood ▪ explore and remove the bits ▪ (think about placenta accreta if the placenta does not separate easily).	▪ resuscitate with IV fluids and blood ▪ in case of recent inversion, reposition uterus after giving pethidine 1mg/Kg IM and prophylactic antibiotics ▪ refer to higher centre if easy repositioning is not possible.	▪ resuscitate with IV fluids and blood according to severity ▪ treat infection with appropriate antibiotics ▪ give oxytocin as infusion ▪ explore uterus and remove placental bits if any.	▪ restore blood volume ▪ normal saline or Ringer's lactate. When stable: ▪ laparotomy should be performed immediately provided there are facilities to do a hysterectomy if required ▪ otherwise refer the client to tertiary centre after stabilising her condition.
SPECIAL NOTE	**Practise active management of third stage of labour in ALL CASES.** ▪ on delivery of the baby and after ruling out twins, give oxytocin 10 units IM OR misoprostol 600mcg oral if oxytocin not available ▪ clamp and divide the cord early ▪ deliver placenta by controlled cord traction ▪ massage the uterus after delivery of the placenta to ensure contractions.			**Prevention is better than cure.** ▪ closely observe the client after delivery for at least two hours.			

PUERPERAL SEPSIS

A woman with fever (> 38°C) during the first six weeks after childbirth (excluding the day of delivery) is said to have puerperal sepsis. Infection of the uterus (post-partum metritis) is a common cause of puerperal sepsis and is caused by infection entering the uterus around childbirth. Untreated metritis can lead to serious complications and death. Antibiotics should be given for the treatment of metritis. These antibiotics should be active against aerobic and anaerobic organisms. A combination of parenteral ampicillin (1 to 2g intravenously every six hours, gentamicin (5mg/Kg as an intravenous infusion once in 24 hours and metronidazole (500mg intravenously every eight hours) is active against most organisms associated with puerperal metritis and is hence recommended as the first line of antibiotic treatment.

If placental fragments are retained in the uterine cavity, these should be removed after initiation of antibiotic therapy. Similarly any abscess should be drained for effective treatment.

The woman should also be examined for other causes of fever (such as perineal and abdominal wounds, breast and urinary tract infection, malaria) and treated appropriately.

Once the woman is afebrile for 48 hours, the parenteral antibiotics may be discontinued. There is no advantage in continuing oral antibiotics after cessation of parenteral antibiotics in puerperal metritis.

If the condition does not improve with first line antibiotics, shift the woman to a higher centre for treatment.

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MANAGEMENT OF PUERPERAL SEPSIS		
SUSPECT	Temperature is 38ºC or more on any day after the first post-delivery day.	
ASSESS	■ fever 24 hours or more after delivery ■ foul-smelling vaginal discharge ■ uterine and abdominal tenderness (painful hard abdomen) ■ septic shock.	■ fever 24 hours or more after delivery ■ normal lochia with non tender uterus ■ other focus of infection.
CLASSIFY	**Puerperal metritis**	**Puerperal sepsis due to other infections**
TREAT	■ give antibiotics: ▫ ampicillin 1 to 2g IV every six hours ▫ gentamicin 5mg/Kg IV every 24 hours ▫ metronidazole 500mg IV every 8 hours ■ give IV fluids ■ identify other sites of infection, if any ■ remove retained placental fragments, if any ■ drain pelvic or abdominal abscess, if any ■ stop antibiotics after she is afebrile for 48 hours ■ if fever persists or condition worsens, refer to higher centre for further care.	■ identify cause for fever by examining for: ▫ breast tenderness ▫ loin tenderness ▫ infection of perineal or abdominal wound ▫ respiratory infection ▫ malaria and other infectious diseases ▫ calf tenderness ■ give appropriate treatment for cause of fever.

BIRTH ASPHYXIA

Birth asphyxia remains a major cause of neonatal morbidity and mortality despite advances in antepartum and intrapartum monitoring techniques developed over the last three decades. According to WHO estimates, 3% of approximately 120 million infants born every year in developing countries suffer birth asphyxia requiring resuscitation, of which 900,000 die each year. Although prompt resuscitation after delivery can prevent many of these deaths and disabilities, it is often not initiated or the procedures used are inadequate or wrong.

Failure to initiate and sustain breathing at birth would result in birth asphyxia. In most circumstances, it is impossible to grade the severity of asphyxia by clinical methods at birth. Resuscitation must be started immediately in all babies who are apnoeic or have only gasping/irregular respiration.

Regardless of the cause of birth asphyxia and its severity, the primary aim of management is to ensure oxygenation and initiate spontaneous breathing. In most instances, this can be achieved by following the initial steps of resuscitation, which constitute **basic resuscitation**. All healthcare providers associated with newborn care must be conversant with the art of basic resuscitation.

Anticipation, adequate preparation, timely recognition and prompt and appropriate action are critical for success of basic resuscitation. Universal precautions should be a part of all resuscitative efforts.

The need for resuscitation cannot be anticipated in approximately 50% of all resuscitated infants. Therefore, one must be prepared to resuscitate at all deliveries. Every birth attendant should be trained in resuscitation and the presence of resuscitation equipment in proper working order should be verified before every delivery.

If a newborn does not cry or breath or is gasping within 30 seconds of birth, the essential steps of basic resuscitation should be initiated immediately. The important steps in basic resuscitation are **prevention of heat loss, opening of airway and ventilation with bag and mask**.

The prevention of heat loss in a newborn is vital because hypothermia increases oxygen consumption and impedes effective resuscitation. Every newborn should be dried first and then covered with a warm dry towel and thereafter he/she should be placed on a firm, warm, flat, clean and dry surface. Drying alone may provide sufficient stimulus for breathing and no further stimulation is necessary.

The newborn must be positioned on his/her back with the neck slightly extended. If mucus present, suctioning must be done quickly but should be gentle and thorough. The negative pressure for suctioning should not exceed 100mm Hg.

Ventilation should be performed with a bag and mask with oxygen if immediately available. If oxygen is not available, room air can be used. The facemask should be placed on the face so as to cover the nose, mouth and chin to obtain a good seal. Adequacy of ventilation is assessed by observing chest movements. The bag should be squeezed with two fingers to obtain a breath rate of 40 breaths per minute. Stop briefly after one minute to establish if newborn is breathing spontaneously.

These are the essential first steps of resuscitation. If required, the arrangements should be made to transfer the newborn to a health facility with neonatal intensive care facilities.

MANAGEMENT OF BIRTH ASPHYXIA

PROBLEM	Baby not crying or breathing at birth OR has gasping respiration.
FINDINGS	▪ gasping or irregular breathing ▪ not breathing (apnoea) ▪ colour blue (tongue and lips are blue) or pale ▪ limp.
MANAGEMENT	▪ place the baby on a warm, clean and firm surface ▪ dry the baby thoroughly with a clean warm towel ▪ remove the wet towel and wrap/cover the baby except for the face ▪ while drying, position the head in a neutral position making sure that the head and upper chest, with a second towel, is not too flexed or extended ▪ clear the airway by suctioning first the mouth and then the nose.

The above steps should be completed within 30 seconds then assess breathing.

▼

Regular breathing or cry.

▼

Give to the mother for warmth and breastfeeding.

▼

Not breathing or has gasping respiration.

▼

Initiate basic resuscitation

- ventilate in room air or oxygen if available
- select appropriate mask: No. 1 for normal weight or No. 0 for small babies
- reposition the neck in neutral or slightly extended position
- place the mask on the baby's face to cover
- squeeze the bag at the rate of 30 to 60/min with appropriate pressure to ensure adequate chest movement.

▼

After one minute assess breathing.

▼

Regular breathing or cry.

▼

Give to the mother for warmth and breastfeeding.

▼

Breathing slowly (<30/min) or gasping or apnoeic.

▼

Continue ventilation.

▼

Assess regularly for breathing.

▼

Regular breathing or cry.

▼

Give to the mother for warmth and breastfeeding. Provide ongoing care.

▼

Breathing slowly (<30/min) or gasping or apnoeic.

▼

- if no breathing after 20 minutes of ventilation
- if only gasping but no spontaneous breathing after 30 minutes of ventilation.

▼

Stop ventilation and provide emotional support to the family.

A small proportion of infants fail to respond to basic resuscitation with bag and mask. In this situation, additional decisions must be made and appropriate action taken. These additional steps constitute advanced resuscitation. **Advanced resuscitation** can only be practised in healthcare centres where (a) trained staff with the necessary equipment and supplies are available; (b) at least two skilled persons are available to carry out the resuscitation; (c) there are sufficient deliveries for the skill to be maintained; and (d) the centre has the capacity to care for or to transfer newborns who suffer severe birth asphyxia since they are expected to have problems after being resuscitated.

Endotracheal intubation is a complicated procedure that requires good training and is useful for prolonged ventilation. It is indicated in resuscitating a baby with diaphragmatic hernia and tracheal suctioning of depressed babies born through meconium-stained amniotic fluid (MSAF).

The presence of MSAF without other signs of asphyxia does not require tracheal suctioning. It does not improve outcome and may even cause complications. Tracheal suctioning of infants breathing normally, with MSAF, does not improve outcome and may cause complications.

Heart rate assessment and chest compression are not recommended for basic resuscitation. **Bradycardia** is usually caused by lack of oxygen and in most situations the heart rate will improve once effective ventilation is established.

However, in newborns with persistent bradycardia (HR<80 and falling) despite adequate ventilation, chest compression may be life saving by ensuring adequate circulation. Two people are needed for effective ventilation and chest compression. Studies have shown better results with chest compression given with the hands encircling the chest compared to the two-finger method. Before the decision to give chest compression is made, heart rate must be assessed correctly.

Drugs are rarely indicated in resuscitation of the newly born infant. Administer epinephrine if, despite adequate ventilation with 100% oxygen and chest compressions, the heart rate remains < 60bpm. Volume expansion and blood transfusion are recommended in situations of hypovolaemia. Sodium bicarbonate is not recommended in resuscitation of neonates and may be potentially hazardous.

If there is no gasping or breathing after 20 minutes of ventilation, stop ventilation. If there is gasping, but no spontaneous breathing after 30 minutes of ventilation, stop ventilation. In these situations, after stopping resuscitation, provide emotional support to the family.

Equipment and supplies must be cleaned and disinfected after each use.

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HYPOTHERMIA

The foetus develops in a thermally protected environment. At birth, the wet and naked infant is dependent on his/her caregivers for maintenance of body temperature. A term newborn infant, by and large, maintains a constant deep body temperature over a narrow range of environmental temperature. However, in pre-term babies the body temperature fluctuates with changes in environmental temperature. Thus, thermal management of the newborn is the cornerstone of neonatology, and hypothermia is an important cause of morbidity and mortality especially in developing countries. Modes of heat loss from the baby to the environment are conduction, convection, radiation and evaporation.

The ideal technique for **measuring temperature** is a rapid, painless and reproducible method that accurately reflects core body temperature. Axillary temperature is as good as rectal and probably safer. A mercury thermometer is placed in the roof of axilla with the infant's upper arm held tightly against the chest wall. The temperature is recorded after three minutes.

Definitions based on axillary temperature:

- cold stress: between 36°C and 36.4°C
- moderate hypothermia: between 32°C and 35.9°C
- severe hypothermia: <32°C
- prevention of hypothermia.

During the first days of life, preventing heat loss is an issue of central importance in newborn care. This can be achieved by maintaining the "warm chain".

- maintain nursery temperature at 30°C ± 2°C
- regularly monitor temperature
- place cribs away from cold walls/windows
- protect from draughts
- perform routine medical care as rapidly as possible with warm hands. If the infant is in an incubator, the temperature should be increased or supplemental heat provided prior to procedures
- if oxygen is required, warm and humidify prior to administration.

Factors responsible for hypothermia should be identified and corrected promptly (for example, remove wet/cold clothing). A hypothermic newborn has to be re-warmed as quickly as possible. The methods to use include **skin-to-skin contact**, a warm room or warm cot and a radiant heater or an incubator. Infection should always be suspected because signs of infection are similar to those of hypothermia. Thus any baby with severe hypothermia or hypothermia not responding to re-warming should be evaluated and treated for sepsis.

Kangaroo care

Skin to skin contact has been promoted for nurturing low birth weight babies and babies with cold stress. Infants are held prone and naked between the mother's breasts with the head turned to one side. Some of its advantages are:

a) assists in maintaining temperature of infant
b) facilitates breastfeeding
c) minimises complications such as apnoea, bradycardia, hypoglycaemia and infections
d) improves mother-infant bonding.

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MANAGEMENT OF HYPOTHERMIA

PROBLEM	▪ baby feels cold to touch ▪ lethargic or poor suck or weak cry.		▪ axillary temperature less than 36.5°C ▪ poor weight gain.
FINDINGS	▪ axillary temperature is between 36°C and 36.4°C ▪ cold peripheries BUT warm abdomen.	▪ axillary temperature is between 32°C and 35.9°C ▪ cold peripheries AND warm abdomen.	▪ axillary temperature is <32°C ▪ whole body feels cold.
	Cold stress	**Moderate hypothermia**	**Severe hypothermia**
MANAGEMENT	▪ baby should be re-warmed by skin-to-skin contact, in a warm room.	The baby should be clothed and re-warmed using any of the following devices: ▪ skin-to-skin contact with mother, in a warm room ▪ in a warm room: the temperature of the room should be between 32°C and 34°C ▪ in a warm cot. If it is heated with a hot water bottle or hot stone, these should be removed before the baby is put in ▪ under a 200watt bulb ▪ under a radiant heater ▪ in an air-heated incubator, with the air temperature set between 35°C and 36°C ▪ on a heated water-filled mattress.	Rapid re-warming should be done over a few hours using: ▪ a thermostatically-controlled heated mattress set at 37°C to 38°C ▪ an air-heated incubator, with the air temperature set between 35°C and 36°C. If no equipment is available, skin-to-skin contact or a warm room or cot can be used. Once the baby's temperature reaches 34°C, the re-warming process should be slowed down to avoid overheating. The temperature of the incubator and the baby's body temperature should be checked every hour.

▪ continue breastfeeding to provide calories and fluid in order to prevent a drop in the blood glucose level
▪ if unable to breastfeed, commence feeding by cup and spoon or gastric tube
▪ if baby is sick, unstable and cannot tolerate feeds, start IV fluids with 10% dextrose solution
▪ hypothermia can be a sign of infection; therefore, assess every hypothermic newborn for infection.

Effective management demands both prevention of heat loss and promotion of heat gain.
Warm chain is a set of 10 interlinked procedures, carried out at birth and later, to manage hypothermia.

Warm chain			
a) warm delivery room > 25°C b) immediate drying	c) warm resuscitation d) breastfeeding e) skin to skin contact	f) bathing postponed g) appropriate clothing h) mother and baby together	i) warm transport j) professional alert.

NEONATAL SEPSIS

Neonatal sepsis continues to be the most common cause of neonatal mortality accounting for more than 50% of all neonatal deaths. Newborn babies can acquire infection from the mother that usually presents in the first 72 hours of life (early onset sepsis), or from the surrounding environment that presents beyond 72 hours (late onset sepsis). Infection in newborn babies, whether pneumonia, septicaemia or meningitis, all present with similar clinical features. If facilities are available, one must obtain a blood culture and perform a lumbar puncture, which would help the clinician arrive at a precise diagnosis and optimise management. However, treatment must be started immediately even before a specific diagnosis can be established.

The course of the illness may be fulminant and lead to death rapidly. Therefore, it is very important for healthcare providers to recognise septic newborns and refer them immediately to a healthcare centre, if necessary. If immediate referral is not possible, management at community health level with administration of parenteral antibiotics and provision of supportive care has been shown to reduce mortality considerably. In addition, a sick septic baby in a healthcare facility may also require IV fluids, oxygen administration and blood transfusion.

The common bacteria seen in neonatal sepsis include gram-positive organisms such as streptococci and staphylococci, and gram-negative pathogens such as E.coli, Klebsiella and Enterobacter. Combination therapy with ampicillin and gentamicin would cover most of these organisms. When infection with staphylococcus is suspected (such as pustules, umbilical cord infection) ampicillin may be substituted with cloxacillin. The total duration of therapy should be at least 10 to 14 days (21 days in case of meningitis).

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MANAGEMENT OF NEONATAL SEPSIS

PROBLEM	■ poor feeding or sucking after having fed normally ■ lethargy ■ breathing difficulty or apnoea	■ excessive crying ■ vomiting/abdominal distension ■ convulsions.
FINDINGS	■ maternal history of uterine infection or pre-labour rupture of membranes ■ inactive baby with sluggish or absent neonatal reflexes ■ temperature instability (less than 36°C or more than 37.5°C) ■ rapid breathing (respiratory rate consistently more than 60/minute), grunting and chest in-drawing ■ slow (respiratory rate less than 30) or absent breathing ■ pallor, cyanosis or jaundice ■ bulging anterior fontanelle ■ poor peripheral pulses and low blood pressure ■ local signs of infection-like pustules, redness or purulent discharge from umbilicus.	
MANAGEMENT	■ maintain body temperature ■ establish IV line and administer maintenance fluid ■ perform diagnostic procedures including blood culture and lumbar puncture if facilities are available ■ administer antibiotics (see table) IV. If IV access cannot be obtained, give IM ■ as soon as the baby shows signs of improvement, allow breastfeeding if able to suckle or give expressed breast milk by cup/spoon or gastric tube.	

Special situations	Antibiotic therapy		
■ administer oxygen by nasal catheter if baby is cyanosed or has severe respiratory distress ■ transfuse blood if haemoglobin is less than 8g/dL ■ administer a bolus of 10ml/Kg of normal saline or Ringer's lactate rapidly in presence of poor peripheral pulses or hypotension ■ place under phototherapy in presence of moderate jaundice ■ resuscitate with bag and mask if breathing slow (respiratory rate <30/ minute) or apnoeic ■ administer anti-convulsants in presence of convulsions.	Presumed diagnosis	Antibiotics	Length of therapy
	Septicaemia +/- pneumonia	Inj ampicillin 50mg/Kg/dose every 12 hours from day 1 to 7, then every 8 hours PLUS inj gentamicin as above every 12 hours from day 1 to day 7 every 8 hours if > 7 days	10 to 14 days 10 to 14 days
	Meningitis	Inj ampicillin 100mg/Kg/dose then every 8 hours PLUS inj gentamicin 2.5mg/Kg/dose every 12 hours from day 1 to day 7, then every 8 hours	
	Septicaemia with umbilical cord signs/pustules	Inj cloxacillin 50mg/Kg/dose every 12 hours from day 1 to day 7, then every 8 hours PLUS gentamicin as above	10 to 14 days

NEONATAL CONVULSIONS

The immature brain is particularly susceptible to convulsions that are more common in the newborn period than at any other time of life. Convulsions occur in 6 to 13% of very low birth weight infants and in 1 to 3/1000 term babies. In developing countries, common causes of neonatal convulsions include perinatal asphyxia, infections. Convulsions can also be a sign of metabolic disorders such as hypoglycaemia and intracranial haemorrhage. Early recognition and prompt treatment are vital, as delayed recognition of a treatable cause can have a significant impact on the child's future neurological development.

The usual well organised tonic-clonic seizures seen in older children and adults are not a feature in neonates because of the immaturity of the newborn brain. Subtle seizures constitute 50% of seizure activity in newborns. These seizures manifest as staring or eye deviation, repeated blinking, fluttering of the eyelids, drooling, sucking, yawning and recurrent apnoeic spells.

Generalised seizures may also occur and may appear as sustained extension or flexion of limbs, or as complex, purposeless movements as if swimming or bicycling. Generalised convulsions may also include apnoea.

One should make an attempt to determine the possible cause of convulsion from the history and physical findings. It is important to differentiate convulsions from spasms of neonatal tetanus, as specific therapy is needed to treat tetanus neonatorum. Simple investigative facilities such as blood sugar estimation should be done to rule out treatable causes such as hypoglycaemia.

The mainstay in the control of seizures is anti-convulsants of which phenobarbitone and phenytoin are the preferred drugs. Diazepam is best avoided in treatment of neonatal convulsions because of its many adverse effects in this age group.

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MANAGEMENT OF NEONATAL CONVULSIONS

PROBLEM	Baby having abnormal shaking, jerking or twitching movements.	
FINDINGS	▪ repetitive jerky movements of limbs, face, eyes, mouth or tongue ▪ movement of the legs as if swimming or bicycling	▪ tonic extension or flexion of arms and legs ▪ altered sense of consciousness, movements of the arms ▪ periodic apnoea.
MANAGEMENT	▪ keep the baby warm ▪ clear the airway ▪ give oxygen by nasal catheter if there are repeated convulsions, cyanosis or apnoea ▪ establish an IV line and measure blood glucose level if possible ▪ if blood glucose is <45mg/dL or if no facilities are available for blood glucose measurement, give 10% dextrose bolus 2ml/Kg IV ▪ start maintenance IV fluids ▪ give phenobarbitone 20mg/Kg IV slowly over 5 to 10 minutes. If IV line cannot be established give phenobarbitone as a single IM injection ▪ if convulsions are not controlled in 30 minutes, give another dose of phenobarbitone 10mg/Kg IV or IM. Similarly a third dose of phenobarbitone 10mg/Kg IV or IM may be given after yet another 30 minutes if convulsions continue ▪ if convulsions are still not controlled or recur, give phenytoin 20mg/Kg IV over 20 to 30 minutes. Phenytoin should be diluted with only normal saline. Do not give phenytoin IM ▪ be prepared to resuscitate a baby with repeated convulsions or unconsciousness if necessary ▪ check for history or signs of possible severe infection and treat if present ▪ if the baby has repeated convulsions that are not due to hypocglycaemia, continue phenobarbitone 5mg/Kg per day IV/IM/ by mouth until no convulsion has occurred for 7 days ▪ once stabilised, baby should be offered breastfeeding. If not able to suck, expressed breast milk may be given by cup and spoon or by gastric tube ▪ if convulsions are not controlled with phenobarbitone and phenytoin, refer the baby to a tertiary centre for further management if possible.	

Convulsions should be differentiated from spasms seen in neonatal tetanus which has the following features:

- involuntary contraction of muscles that last a few seconds to several minutes
- triggered by touch, light or sound
- baby conscious throughout, often crying with pains.

JAUNDICE

Many babies may have jaundice in the first week of life, especially small babies weighing <2500grams or born before 37 weeks of gestation. In most babies, however, the level of bilirubin that causes jaundice is not harmful and does not require treatment. In the majority of these cases, jaundice appears after the first 24 hours of life and disappears by the end of the first week. In a few babies, jaundice levels may rise critically and cause significant damage to the central nervous system. Healthcare personnel involved in newborn care should be able to recognise babies with significant jaundice and initiate treatment promptly with the goal of prevention of bilirubin encephalopathy.

Phototherapy is the most widely used treatment for jaundice and it is both safe and effective. It acts by converting bilirubin into photoproducts that are more soluble than bilirubin. Commonly used phototherapy units contain a number of daylight, cool white, blue, or "special blue" fluorescent tubes. Regardless of the type of light used, its maximum irradiance should be employed. Standard fluorescent lamps accomplish this by bringing the light as close to the baby as possible. This is most easily achieved by lowering the lamps to within 15 to 20cm of the infant. If this treatment causes slight warming of the infant, the lamps need to be elevated slightly.

The severity of jaundice can be reliably assessed by blanching the skin over different parts of the body. Those babies with moderate to severe jaundice can be effectively treated with intensive phototherapy and adequate hydration. A very small subset of these babies would need exchange transfusion mandating referral to a tertiary centre.

Any jaundice during the first 24 hours of life or severe jaundice in the early neonatal age is usually haemolytic in nature. Haemolytic jaundice in a newborn baby is most commonly caused by Rh factor or ABO blood group incompatibility between the baby and the mother, or G6PD deficiency in the baby.

REFERENCES

WHO. *Managing Newborn Problems: A Guide for Doctors, Nurses, and Midwives.* World Health Organization. Geneva, 2003.

MANAGEMENT OF JAUNDICE				
PROBLEM	Yellowness of skin			
FINDINGS	Jaundice anywhere within 24 hours of delivery	Jaundice anywhere (except soles of feet and palms of hand) on days 2 to 4	Jaundice on palms and soles of feet, in addition to jaundice anywhere on the body, more than 24 hours after delivery	Jaundice on whole body, with lethargy and convulsions
MANAGEMENT	Severe: ■ phototherapy ■ frequent breastfeeds ■ prevent hypothermia ■ if available, test serum bilirubin levels ■ refer for exchange transfusion if necessary.	Mild/Moderate: ■ observe for progress ■ frequent breastfeeds ■ prevent hypothermia	Severe: ■ phototherapy ■ frequent breastfeeds ■ prevent hypothermia ■ if available, test serum bilirubin levels ■ refer for exchange transfusion if necessary	Bilirubin encephalopathy ■ phototherapy ■ give anti-convulsants ■ give IV fluids ■ give oxygen if available ■ refer for exchange transfusion
	Managing the infant during phototherapy: ■ cover the eyes; do not block baby's nose ■ prevent temperature instability ■ change the position of the baby frequently (every two hours) ■ remove the baby from phototherapy during feeding and remove the eye patches to allow the infant and mother to see each other ■ place the infant as close to the light source as possible without overheating.		**Special situations:** ■ onset of jaundice in the first 24 hours ■ presence of pallor ■ small baby (< 2.5Kg at birth or born before 37 weeks of gestation) with moderate jaundice ■ moderately jaundiced baby with history of previous sibling requiring exchange transfusion for neonatal jaundice ■ sick baby with jaundice. For special situations, manage as severe jaundice.	

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