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MINISTRY OF HEALTH MALAYSIA

HANDBOOK
OF OBSTETRICS GUIDELINE

MEDICAL DEVELOPMENT DIVISION

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HANDBOOK
OF OBSTETRICS GUIDELINE

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MOH Handbook of Obstetrics Guideline
was developed by the
Obstetrical & Gynaecological and Paediatric Services Unit of the
Medical Development Division,
Ministry of Health Malaysia
in collaboration with
Jawatankuasa Pengurusan dan Perkembangan O&G KKM (JPPOBG)

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DISCLAIMER

The Jawatankuasa Pengurusan dan Perkembangan O&G (JPPOBG) compiled the guidelines as an educational aid to good clinical practice. The information provides general advice for consideration by clinicians and other relevant health professionals, and should not be relied on as a substitute for proper assessment with respect to the particular circumstances of each case and the needs of any patient. The ultimate judgment regarding a particular treatment or clinical procedure must be made by the clinician or other health professionals in light of clinical data presented by the patient and the diagnostic and treatment options available.

The contents of the guidelines are not intended to be prescriptive directions defining a single course of management. This information has been prepared based on the information available at the time of its preparation, and each practitioner should be cognizant of the relevant information, research or material which may have been published or become available subsequently. Whilst the authors endeavour to ensure that information is accurate and current at the time of preparation, they take no responsibility for matters arising from changed circumstances or information or material that may have become subsequently available. The rapid advances in medical science mean that drug dosages, laboratory tests and diagnosis in particular, should be independently verified.

PREFACE

The practice of obstetrics involves decision-making during a major transitional period of a woman's life, which frequently culminates in the most challenging, final 10 centimeter journey through the birth canal. Decision-making which is professionally responsible, empowers women, provides them a sense of autonomy and increases their satisfaction of clinical care received. In order to provide this, the attending clinician has to be able to provide evidenced-based and accepted professional standards of care.

With this in mind, various guidelines have been drawn by different states and hospitals in Malaysia over the years to guide clinicians. The purpose of this handbook is to provide a compendium of these local guidelines with contemporary updates from reputable sources such as the Clinical Practice Guidelines (CPG) and training manuals from the Ministry of Health, publications from the World Health Organization (WHO), International Federation of Gynaecology and Obstetrics (FIGO) and guidelines from other international societies. The catalyst for this endeavor was mooted during the "Bengkel Halatuju Perkhidmatan O&G" in June 2022.

The guideline editorial committee comprised of members of the Jawatankuasa Kecil Garis Panduan dan Amalan Klinikal, subcommittee of the Jawatankuasa Pengurusan dan Perkembangan O&G (JPPOBG) who drafted a scope based on existing local guidelines followed by nomination and amendment of the scope until a consensus was achieved. Various guidelines were compared and literature review was conducted by each member on their assigned topic to ensure that the contents were up to date. Individual topics were then discussed, amended and refined in various stages, first within the guideline editors and sent for internal review by all state consultants and other stakeholders.

This handbook was designed for brevity and usability in mind, meant to aid the trainee or clinician during their daily encounter **with obstetric patients within facilities (hospitals) of the Ministry of Health (MOH)**.

FOREWORD
BY DIRECTOR-GENERAL OF HEALTH MALAYSIA

Pregnancy, childbirth an the puerperium has been the number one cause of hospitalization in hospitals for the past decade. The Obstetrics and Gynaecology (O&G) service is unquestionably one of those with a lot of litigation and workload.

We are combined in our commitment to make sure that O&G services at the Ministry of Health are provided with excellent quality and the highest calibre through the Jawatankuasa Pengurusan and Perkembangan O&G KKM (JPPOBG) under the auspices of the Medical Development Division, Ministry of Health Malaysia (MOH).

The achieve Goal 3 in the 2030 Agenda of Sustainable Development Goals adopted by all the United Nations Members States in 2015, MOH is commited to ensuring that women in Malaysia are provided with consistent, high-quality, evidence-based maternity care. Malaysia has succeded in lowering the Maternal Mortality Rate since the 1960s as a result of ongoing efforts to improve the quality of services, including training for medical professionals an also practising evidence-based medicine.

I would like to convey my gratitude to everyone who contributed, whether directly of indirectly to the creation of this handbook guidelines. All of these efforts should be fruitful for everyone concerned.

DATUK DR. MUHAMMAD RADZI BIN ABU HASSAN
Director-General of Health Malaysia

FOREWORD

BY DIRECTOR OF MEDICAL DEVELOPMENT DIVISON, MEDICAL PROGRAMME, MINISTRY OF HEALTH MALAYSIA

Evidence-based medicine has been given priority in numerous recent guidelines. It is our duty to determine which citeria, principally in terms of availability and case complexity, are appropriate for the current state of affairs in this nation. Regardless of their backround, giving patients the greatest care our priority.

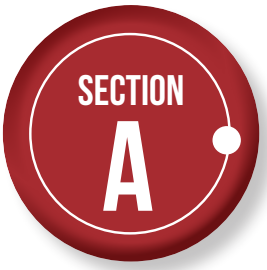
Thus, the creation of the Handbook of Obstetrics Guideline is regarded as a commendable attempt to enhance service quality through standardising and elevating the bar for health care provided by the O&G services. The Medical Development Division remains dedicated to organising plans, putting strategies in action, and carrying out MOH policies in close collaboration with the fraternity.

Given that our contributors can contribute to the realisation of this handbook guidelines while still managing their existing wordload, recognition and gratitude are due for this kind of dedication.

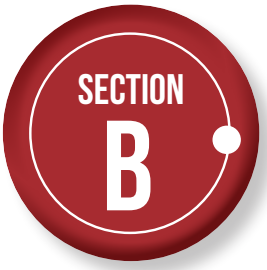
I would like to congratulate and acknowledge the effort of the drafting committee, especially the Jawatankuasa Kecil Garis Panduan dan Amalan Klinikal, Jawatankuasa Pengurusan dan Perkembangan O&G KKM (JPPOBG) and other contributors for this great initiative in preparing this edition. Thank you.

DATO' DR. MOHD AZMAN BIN YACOB
Director of Medical Development Division

TABLE OF CONTENTS



REFERRALS - 1



EARLY PREGNANCY PROBLEMS - 15

SECTION C

ANTENATAL PROBLEMS - 29

SECTION D

SELECTED MEDICAL DISORDERS IN PREGNANCY - 73

SECTION E

INTRAPARTUM CARE (NORMAL AND ABNORMAL LABOUR) - 119

SECTION F

OBSTETRIC EMERGENCIES - 151

SECTION G POSTPARTUM CARE - 225

SECTION H APPENDIX - 243

REFERRALS

REFERRALS (FROM HEALTH CLINICS AND NON-SPECIALIST HOSPITAL)

This chapter covers urgent and non-urgent referrals of obstetrics cases for specialist care. The use of SBAR (situation, background, assessment and recommendation) tool is recommended to facilitate effective communication between referring and referral centres.

A1. ANTENATAL SPECIALIST CLINIC

1. Fetal indications:

   i. Suspected fetal growth restriction (FGR)
   ii. Fetal macrosomia or large for gestational age (LGA)
   iii. Polyhydramnios (AFI > 25 cm or DVP > 8cm)
   iv. Oligohydramnios (AFI < 5 cm or DVP < 2 cm)*
   v. Malpresentation after 36 weeks' gestation
   vi. Antepartum haemorrhage (APH) follow-up
   vii. Suspected placenta praevia
   viii. Intrauterine fetal death (IUFD)
   ix. Multiple pregnancies
   x. Suspected fetal anomaly (if MFM unit not available)

2. Maternal indications:

   i. History of recurrent miscarriages (3 consecutive first trimester miscarriages)
   ii. Previous spontaneous preterm deliveries
   iii. History-indicated cervical cerclage and cases requiring cervical surveillance
   iv. Maternal obesity (BMI > 40 at booking)
   v. History of uterine or cervical surgeries
   vi. Hypertensive disease in pregnancy
   vii. Gestational diabetes and pre-existing diabetes in pregnancy
   viii. Stable maternal medical disorders such as epilepsy, bronchial asthma, hyperthyroidism, hypothyroidism**

ix. Maternal mental health problems in pregnancy or history of postpartum depression/psychosis
x. Active substance abuse in pregnancy
xi. Malignancy in pregnancy
xii. Medico-legal cases in pregnancy e.g. OSCC

This list is not exhaustive and further discussion with referral centres is recommended for cases requiring antenatal specialist clinic review.
**Cases with borderline low AFI or DVP may be referred to antenatal specialist clinic assessment as well for confirmation of diagnosis.*
***Unstable or poorly controlled conditions may require urgent combined clinic appointment or admission.*

Adapted from:
1. Penang State Obstetrics Protocol, 2021.

A2. COMBINED (OBSTETRIC-MEDICAL) CLINIC

1. Maternal cardiac conditions:

   i. Any cardiac cases with modified WHO classification risk classes II, III and IV
   ii. Ischaemic heart disease
   iii. Chronic rheumatic heart disease
   iv. Heart rate abnormalities/arrhythmias
   v. Congenital heart disease

2. Maternal renal conditions:

   i. Chronic kidney disease
   ii. Acute renal disease
   iii. Lupus nephritis

3. Maternal respiratory conditions:

   i. Restrictive lung disease
   ii. Reversible lung disease

4. Maternal neurological conditions:
   i. Myasthenia gravis
   ii. Myotonic dystrophy
   iii. Epilepsy.
   iv. Stroke (ischaemic/haemorrhagic).
   v. Guillain-Barre syndrome
   vi. Multiple sclerosis
   vii. Spinal cord injury
   viii. Migraine

5. Maternal rheumatological conditions:
   i. Systemic lupus erythematosus (SLE)
   ii. Antiphospholipid syndrome (APS)
   iii. Rheumatoid arthritis
   iv. Psoriatic arthritis
   v. Vasculitis

6. Maternal endocrinological conditions:
   i. Poorly controlled diabetes or diabetes with complications (retinopathy, nephropathy, end organ involvement) or Type I diabetes
   ii. Thyroid disease
   iii. Diabetes insipidus
   iv. Prolactinomas
   v. Adrenal disease
   vi. Calcium metabolism and parathyroid disease

7. Maternal gastroenterological conditions
   i. Intrahepatic cholestasis of pregnancy
   ii. Acute fatty liver of pregnancy
   iii. Hepatitis in pregnancy
   iv. Liver cirrhosis +/- portal hypertension
   v. Inflammatory bowel disease

8. Maternal haematological conditions
    i. Immune thrombocytopenia
    ii. Bleeding disorders
    iii. Clotting disorders
    iv. Blood malignancies
9. Maternal infective conditions
    i. Viral hepatitis
    ii. Tuberculosis
    iii. Malaria
    iv. HIV

This list is not exhaustive and further discussion with referral centres is recommended for cases requiring combined clinic review.

Adapted from:
1. Penang State Obstetrics Protocol, 2021.

A3. EARLY PREGNANCY ASSESSMENT UNIT (EPAU)

(Only stable cases should be reviewed in EPAU. Unstable cases should be discussed directly with referral centres for immediate management)

This list is not exhaustive, and further discussion with referral centres is recommended for cases requiring EPAU assessment.

1. Vaginal bleeding and/or pain in early pregnancy
2. Rupture of membranes in early pregnancy
3. Pregnancy of unknown location (PUL)
4. Nausea and vomiting in pregnancy (NVP)

A4. PRENATAL SCREENING/DIAGNOSIS

DESCRIPTION	PRENATAL SCREENING	PRENATAL DIAGNOSIS
What it is	To screen for chances of fetus having aneuploidy or genetic disorder	To diagnose if fetus actually has a certain disorder
TYPE	**NON-INVASIVE**	**INVASIVE**
Methods	Combined test (nuchal translucency, maternal age, +/- nasal bone, tricuspid valve flow, ductus venosus, PAPP-A and free β-hCG) Maternal cell-free DNA (NIPT) Quadruple blood screening test (AFP, hCG, uE3, inhibin A)	Chorionic villous sampling (CVS) Amniocentesis
Timing	Combined test (11 to 13^{+6} weeks, CRL 45-84mm) NIPT (11 weeks onwards) Quadruple blood screening test (14 weeks onwards)	CVS (11 to 14^{+6} weeks) Amniocentesis (15 weeks onwards)
Indication	Advanced maternal age History of inherited genetic disorder Parental wishes Previous aneuploidies	Abnormal morphological scan High-risk from screening test High-risk heritable genetic disorder.

Adapted from:

1. Obstetrics and Gynaecology Protocol, State of Kedah, 2019.

References:

1. Neocleous AC et. al. First Trimester Noninvasive Prenatal Diagnosis: A Computational Intelligence Approach. Journal of Biomedical and Health Informatics.2015.2462744, IEEE.
2. Navaratnam K et. al. Amniocentesis and Chorionic Villus Sampling. BJOG: An International Journal of Obstetrics & Gynaecology. 2021;129(1):e1- e15

A5. MID-TRIMESTER SCREENING/ANOMALY SCAN

Performed between 18-22 weeks, to refer earlier if indication arises. The following list is the indication for mid-trimester screening by MFM, however if the services are not available, scans can be performed by general O&G specialists.

Indications:

1. Pre-existing diabetes mellitus in pregnancy or high HbA1c*
2. Parent with heritable structural anomalies (such as cleft lip, cardiac lesion)
3. Family history of heritable genetic anomalies
4. Exposure to teratogenic drugs just prior to or during early pregnancy
5. Placenta praevia anterior with previous lower segment caesarean section for placenta accreta spectrum assessment.
6. Detection of structural anomaly in current pregnancy
7. Previous pregnancy with structural anomalies*
8. Previous pregnancy with genetic disorders or aneuploidies
9. History of intrauterine death
10. History or risk of fetal anaemia
11. Monochorionic twin pregnancies or higher order multiple pregnancies
12. Positive results for infections (Toxoplasmosis, Chickenpox, Rubella, CMV, HSV, VDRL)
13. Maternal age* ≥40
14. Abnormal/high-risk first trimester screening

**Discussion with referral MFM centres.*

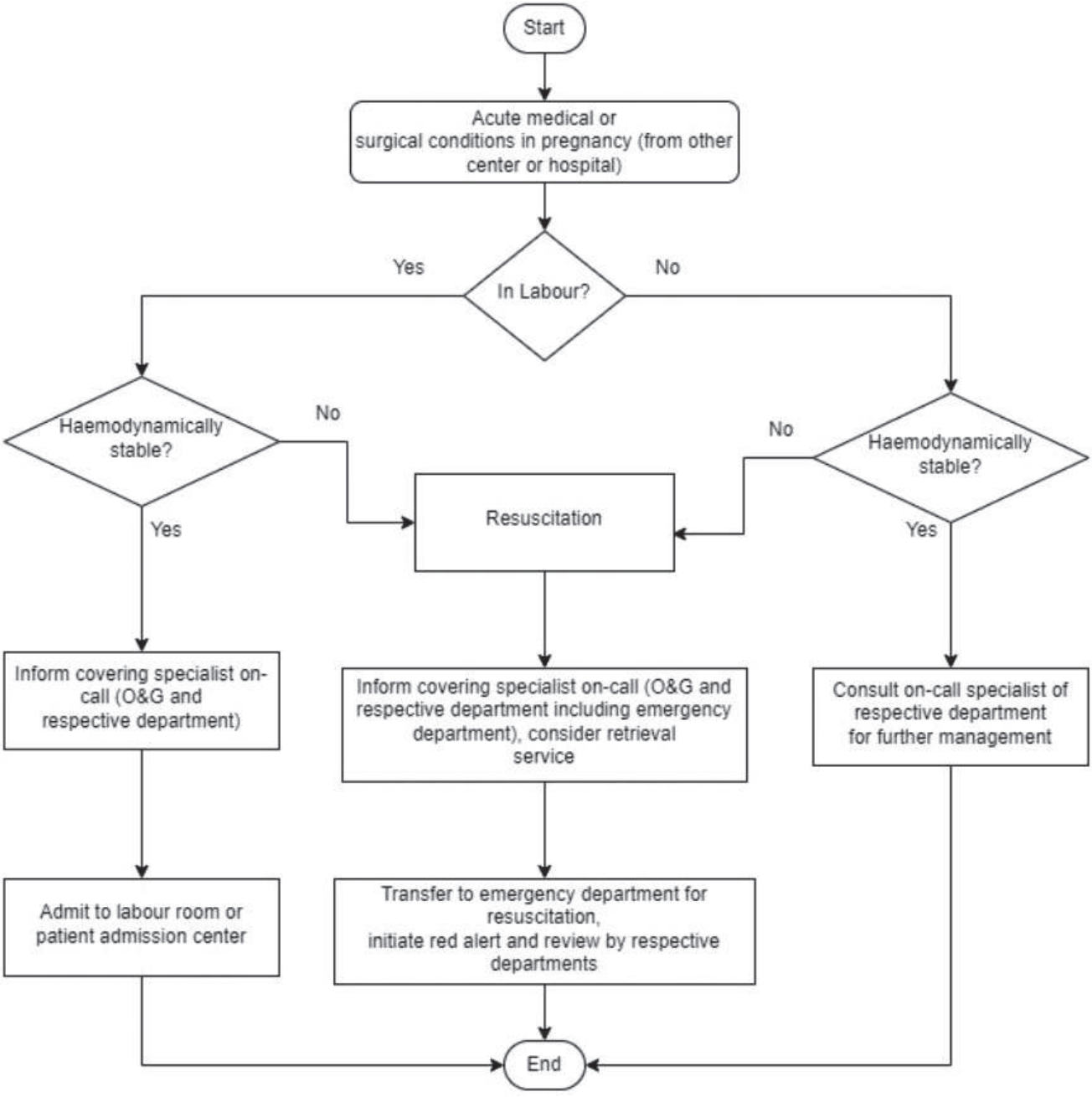
This list is not exhaustive and further discussion with referral centres is recommended for cases requiring anomaly scans.

Adapted from:
1. Penang State Obstetrics Protocol, 2021.
2. Obstetrics and Gynaecology Protocol, State of Kedah, 2019.
3. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.

A6. INTER HOSPITAL MULTIDISCIPLINARY REFERRALS

1. Multidiciplinary referral.

Flowchart 1: Multidisciplinary referral for obstetric cases (medical/surgical conditions)



Adapted from:

1. Obstetrics and Gynaecology Protocol, State of Kedah, 2019.

2. Referral to paediatric team (this list is not exhaustive and to refer to local paediatric guidelines)

   Fetal reasons:

   i. Prematurity < 36 weeks
   ii. Birth Weight < 1.7 kg or > 4 kg
   iii. Any congenital anomalies
   iv. Presumed fetal compromise
   v. Grunting/flat baby
   vi. APGAR score < 7 at 5 minutes
   vii. Multiple pregnancies

   Maternal reasons:

   i. Active chickenpox/recent infection within 7 days of infection
   ii. Active herpes simplex 2 and vaginal delivery
   iii. Pulmonary tuberculosis (untreated or sputum still positive)
   iv. Hepatitis B or C positive
   v. Rhesus negative mother
   vi. Unbooked/unscreened mother
   vii. HIV positive mother
   viii. Congenital heart disease (if no anomaly scan done)
   ix. Maternal SLE
   x. Maternal diabetes on hypoglycaemic agents

Intrapartum events:

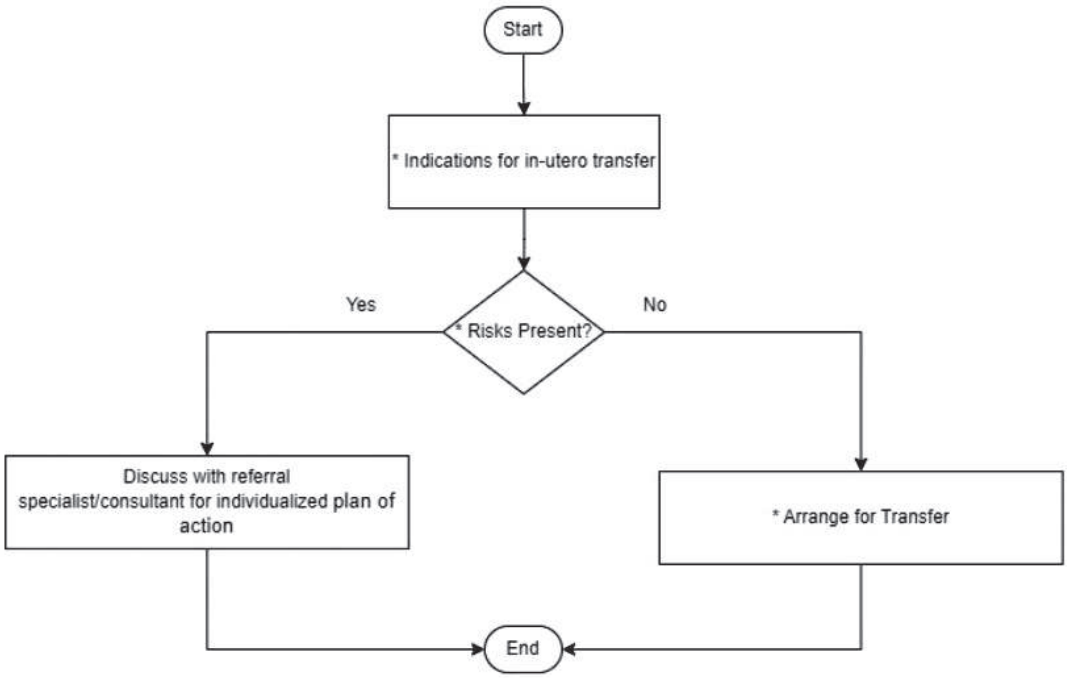
i. Foul-smelling liquor or chorioamnionitis
ii. Prolonged leaking or any leaking with vaginal GBS infection
iii. Instrumental delivery
iv. Cord prolapse
v. Meconium-stained liquor
vi. Severe APH requiring delivery eg bleeding placenta praevia
vii. Maternal pyrexia
viii. Abruptio placenta
ix Any emergency caesarean section with suspected fetal compromise
x. Any caesarean section done under general anaesthesia

Adapted from:

1. Sarawak General Hospital, Labour Ward Manual, 2020.

A7. IN-UTERO TRANSFER

Flowchart 2: In-utero transfer



INDICATIONS FOR IN-UTERO TRANSFER

1. Maternal medical or surgical condition requiring specialist support.
2. Fetal medical or surgical condition requiring iatrogenic delivery at specialist centre with facilities and capacity for neonatal management
3. Antenatally diagnosed potentially lethal fetal conditions.
4. High risk of spontaneous or iatrogenic birth a unit without facility to manage the newborn (usually due ti prematurity).

RISK PRESENT

1. Pregnancy less than 22 weeks gestation for fetal reasons.
2. Antenatally diagnosed potentially lethal fetal conditions.
3. Active labour.
4. Maternal condition which may require intervention during (eg anterpartum haemorrhage or uncontrolled hypertension)
5. Known maternal or fetal compromise requiring immediate delivery, including abnormal cardiotocograph.

ARRANGE FOR TRANSFER

1. Discuss case with referral obstetrician and paediatrician.
2. Recommend antenatal corticosteroids from threshold of viability* to 34^{+6} days of gestation; for 35^{+0} to 36^{+6} weeks of gestation, short term respiratory benefits should be weighed against risk of neonatal hypoglycaemia and long-term Neurodevelopmental concerns.
3. Consider tocolysis to complete antenatal corticosteroids, not recommended in preterm prelabour rupture of membranes.
4. Recommend maternal antibiotics administration in suspected or confirmed clinical chorioamnionitis, preterm prelabour rupture of membranes, and preterm labour with intact membranes with risk of vaginal GBS infection.
5. Discuss maternal magnesium sulphate administration to prevent cerebral palsy based on individual cases from 23^{+0} to 23^{+6} week gestation, offer from 24^{+0} to 29^{+6} week of gestation, and should be considered from 30^{+0} to 33^{+6} week of gestation.

Adapted from:

1. Penang State Obstetrics Protocol, 2021.
2. Obstetrics and Gynaecology Protocol, State of Kedah, 2019.
3. Department of Obstetrics and Gynaecology, Hospital Tengku Ampuan Afzan, Kuantan. Department of Obstetrics and Gynaecology, Kulliyyah of Medicine, IIUM, Kuantan. A Quick Guide to Labour Ward Management. 2019.

References:

1. Preterm Labour and Birth. NICE guideline {NG25}. Published 20 November 2015.
2. Stock SJ et al. Antenatal Corticosteroids to Reduce Neonatal Morbidity and Mortality. BJOG: An International Journal of Obstetrics & Gynaecology. 2022;129(8):p.e35-e60.
3. Thomson AJ. Care of Women Presenting with Suspected Preterm Prelabour Rupture of Membranes from 24^{+0} Weeks of Gestation. BJOG: An International Journal of Obstetrics & Gynaecology. 2019;126(9):p.e152-e166.
4. Watson H et al. All The Right Moves: Why *in utero* Transfer is Both Important for the Baby and Difficult to Achieve and New Strategies for Change. F1000Research.2020.9(FacultyRev):979.
5. Soe A et al. Perinatal Management of Pregnant Women at the Threshold of Infant Viability (The Obstetric Perspective). RCOG: Scientific Impact Paper No. 41. 2014.

A8. OBSTETRIC RETRIEVAL TEAM

Each hospital should have a clear individualized workflow for the obstetrics retrieval process, taking into consideration the local logistic limitations.

The following is a synopsis of the Obstetric Retrieval Team's operations:

PURPOSE
1. Resuscitation of unstable obstetric patients by retrieval team from specialist centre. 2. Subsequent transfer to specialist centre for further care.
INDICATIONS
Unstable obstetrics patients in district hospital, health clinics and private healthcare facilities, e.g. (not exhaustive): 1. Massive antepartum or postpartum hemorrhage, with ongoing bleeding 2. Maternal collapse 3. Obstetric shock 4. Life-threatening complications during surgery which is not able to be managed by referring centre
INFORMATION REQUIRED FROM REFERRING CENTRE
1. Situation 2. Severity of patient condition 3. Ascertain whether blood is needed for resuscitation and maternal blood group if required 4. Determination of location
PLAN OF ACTIONS
1. Effective communication with referring center for updates 2. Inform consultant on call 3. Activate retrieval team including booking of ambulance/helicopter/boat as required 4. Gather retrieval equipment and tools

TEAM MEMBERS MAY INCLUDE:
1. Obstetric specialist 2. Obstetric medical officer 3. Anaesthetist 4. Anaesthetic medical officer 5. Midwife/staff nurse 6. Ambulance driver +/- PPK or flying squad 7. Assistant Medical Officer if necessary 8. Paediatric medical officer/specialist if necessary
RETRIEVAL EQUIPMENT AND TOOLS
1. Delivery set (O&G team) 2. Obstetric haemorrhage kit (O&G team) – refer to Appendix (PPH Box and Management Checklist) 3. Intubation set, inotropes, oxygen supply, defibrillator (by anaesthetic/ emergency department) 4. Medications, syringes, needles, infusion pumps, fluid expanders, Foley's catheter, nasogastric tube as necessary 5. +/- blood products 6. +/-transport incubator with Neopuff (by paediatric department) 7. +/- portable ultrasound machine
SUBSEQUENT MANAGEMENT
1. Depart to location – to inform referring centre about estimated time of arrival 2. Provide immediate resuscitation 3. Transfer patient to referral centre 4. Update team in referral center including team in Emergency Department about estimated time of arrival

Adapted from:

1. Department of Obstetrics and Gynaecology, Hospital Tengku Ampuan Afzan, Kuantan. Department of Obstetrics and Gynaecology, Kulliyyah of Medicine, IIUM, Kuantan. A Quick Guide to Labour Ward Management. 2019.
2. Obstetrics & Gynaecology Department, Hospital Tuanku Fauziah, Kangar, Perlis. Obstetrics Protocol. 2020-2025.
3. Sabah Obstetric Shared Care Guidelines. 2020.
4. Sarawak General Hospital, Labour Ward Manual, 2020.
5. Penang State Obstetrics Protocol, 2021.

SECTION

B

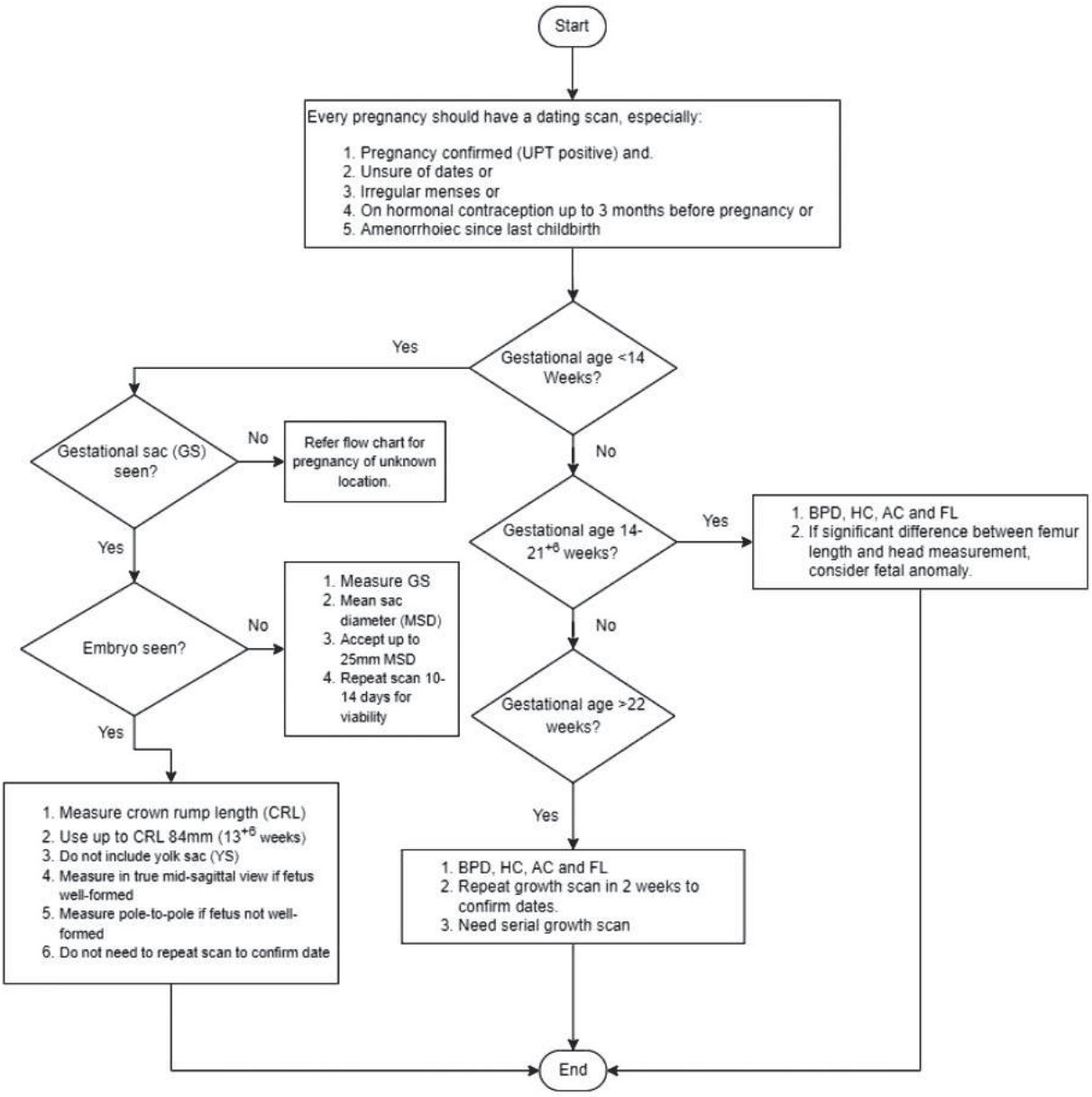
EARLY PREGNANCY PROBLEMS

EARLY PREGNANCY PROBLEMS

This chapter covers common early pregnancy problems encountered by managing doctors, including pregnancy dating issues, bleeding in early pregnancy, pregnancy of unknown location, miscarriages, molar pregnancy, and nausea and vomiting in pregnancy.

B1. PREGNANCY DATING

Flowchart 3: Approach to determine gestational age



Determination of dates based on ultrasonography:

GESTATIONAL AGE	PARAMETERS MEASURED	MANAGEMENT
< 9 weeks	CRL	Use LMP if USG date within +/- 5 days of LMP, otherwise use ultrasound REDD.
9-13^{+6} weeks	CRL	Use LMP if USG date within +/- 7 days of LMP, otherwise use ultrasound REDD.
14^{+0} – 15^{+6}	BPD, HC, AC, FL	Use LMP if USG date within +/- 7 days of LMP, otherwise use ultrasound REDD.
16^{+0} – 21^{+6}	BPD, HC, AC, FL	Use LMP if USG date within +/- 10 days of LMP, otherwise use ultrasound REDD.
22^{+0} – 27^{+6}	BPD, HC, AC, FL	Use LMP if USG date within +/- 14 days of LMP, otherwise use ultrasound REDD.*
≥ 28 weeks	BPD, HC, AC, FL	Use LMP if USG date within +/- 21 days of LMP, otherwise use ultrasound REDD.*

*requires serial growth scans to exclude small/large for gestational age babies

Adapted from:

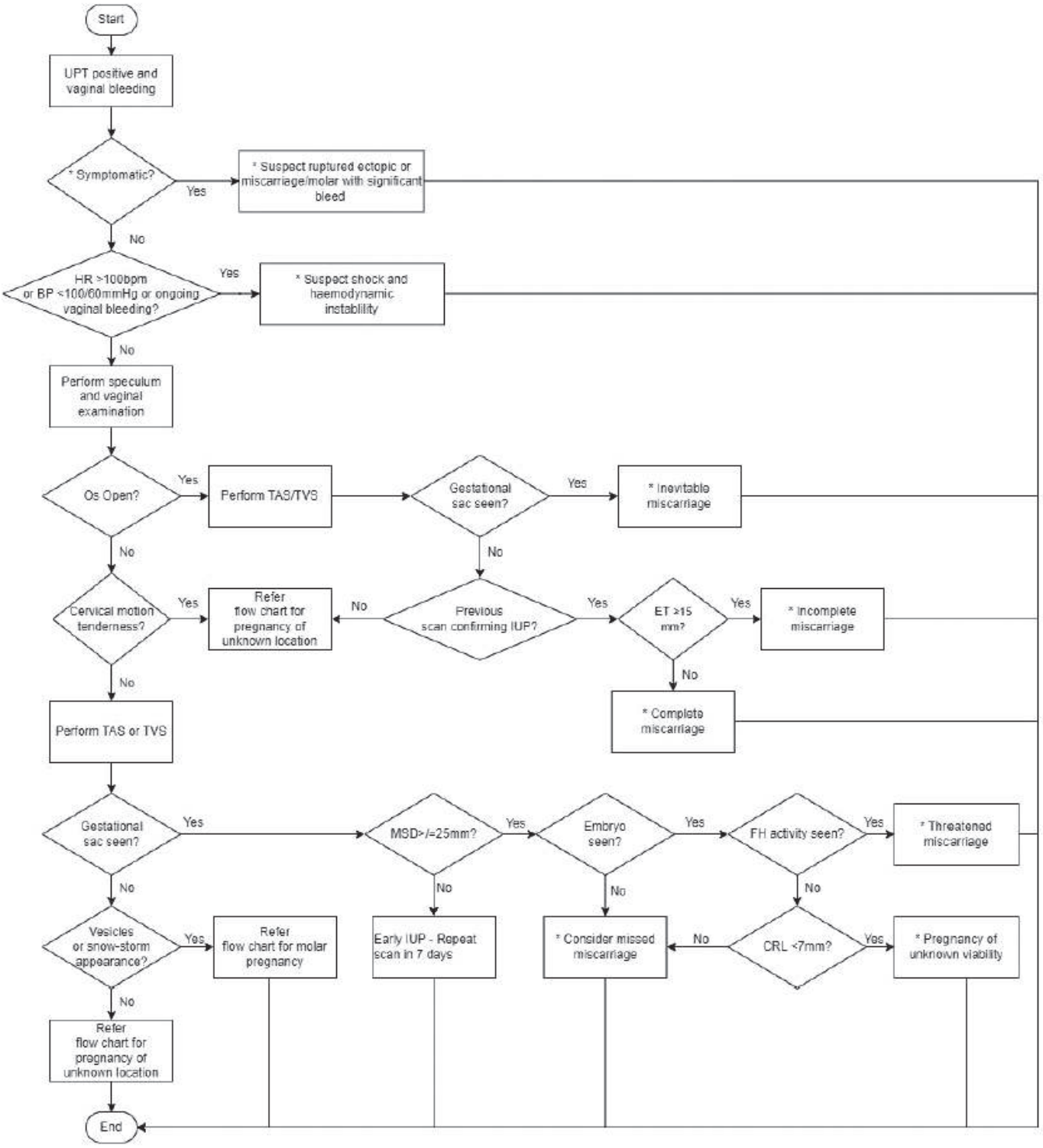
1. Obstetrics and Gynaecology Protocol, State of Kedah, 2019.
2. Sarawak General Hospital, Labour Ward Manual, 2020.
3. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.

Reference:

1. ACOG. Methods for Estimating the Due Date. Committee Opinion, Number 700, May 2017.

B2. BLEEDING IN EARLY PREGNANCY

Flowchart 4: Management of bleeding in early pregnancy



Symptomatic	1. Abdominal or pelvic pain. 2. Ongoing fresh vaginal bleeding with or without clots. 3. Shoulder tip pain. 4. Enlarged uterus. 5. Dizziness, fainting or syncope. 6. Pelvic, abdominal or adnexal tenderness. 7. Pallor. 8. Fever.
Suspect ruptured ectopic or miscarriage/molar with significant bleed	1. Refer to specialist/consultant on call for immediate plan of management. 2. Check BP, HR and GCS, if unstable (heart rate >100bpm or BP <100/60mmHg or GCS <15), provide immediate resuscitation, perform speculum, vaginal examination and ultrasound scan prior to transfer. 3. If patient is stable (heart rate <100bpm, BP>100/60mmHg and GCS 15), perform speculum, vaginal examination and ultrasound scan prior to transfer. 4. Measure temperature, if <36°C or >38°C, suspect septic miscarriage (refer chapter for sepsis in pregnancy).
Suspect shock and haemodynamic instability	1. Refer to specialist or consultant on call for immediate plan of management. 2. Provide resuscitation prior to transfer
Inevitable miscarriage	1. Monitor as inpatient. 2. Monitor vital signs and pad charting.
Incomplete miscarriage	1. Discuss expectant, medical and surgical management taking into consideration social and logistic issues
Complete miscarriage	1. Repeat urine pregnancy test in 3 weeks, if positive for assessment in EPAU. 2. Return if bleeding increases.
Threatened miscarriage	1. Return if bleeding increases or pain develops (refer local guidelines for admission). 2. Dating scan
Consider missed miscarriage	1. Perform a second scan a minimum of 7 days from TVS before making a diagnosis 2. If only TAS is done, perform a second scan a minimum of 14 days after the first before making a diagnosis 3. Consider second opinion on the viability of pregnancy
Pregnancy of unknown viability	1. Repeat scan a minimum of 7 days from TVS or minimum of 14 days from TAS 2. If heartbeat seen, refer flow chart for dating ultrasound scan 3. If heartbeat not seen, consider missed miscarriage (further scans may be needed before a diagnosis can be made)

Adapted from:

1. Obstetrics and Gynaecology Protocol, State of Kedah, 2019.
2. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.
3. Penang State Gynaecology Protocol, 2021.
4. Perak State Gynaecology Protocol, 2021.
5. Sabah Obstetric Shared Care Guidelines, 2020.

Reference:

1. NICE guideline [NG126]. Ectopic Pregnancy and Miscarriage: Diagnosis and Initial Management. April 2019.

B3. MANAGEMENT OF MISCARRIAGE

DIAGNOSIS	CRITERIA	EXPECTANT MANAGEMENT	MEDICAL MANAGEMENT	SURGICAL MANAGEMENT
Threatened miscarriage	Confirmed IUP with embryo / fetal heartbeat and presents with vaginal bleeding. **and** No history of previous miscarriages	1. If bleeding worsens or persists beyond 14 days, return for assessment 2. If bleeding stops, advice to start or continue routine antenatal care	-	-
	IUP confirmed with scan, presents with vaginal bleeding. **and** Has history of miscarriage	1. If bleeding worsens or persists beyond 14 days, return for assessment 2. If bleeding stops, advice to start or continue routine antenatal care	1. Offer vaginal micronized progesterone 400mg BD 2. If fetal heartbeat confirmed, continue progesterone until 16 completed weeks of pregnancy	
Incomplete/ Missed miscarriage	Risks rendering women unsuitable for expectant management: 1. Increased risk of bleeding (e.g., late first trimester) or, 2. Previous adverse and/or traumatic experience with pregnancy or,	Not suitable for expectant management	1. Offer medical management 2. Offer vaginal misoprostol (oral is an acceptable alternative) – refer appendix for regime	1. Offer surgical management where clinically appropriate: - Manual vacuum aspiration under local anesthetic **or**

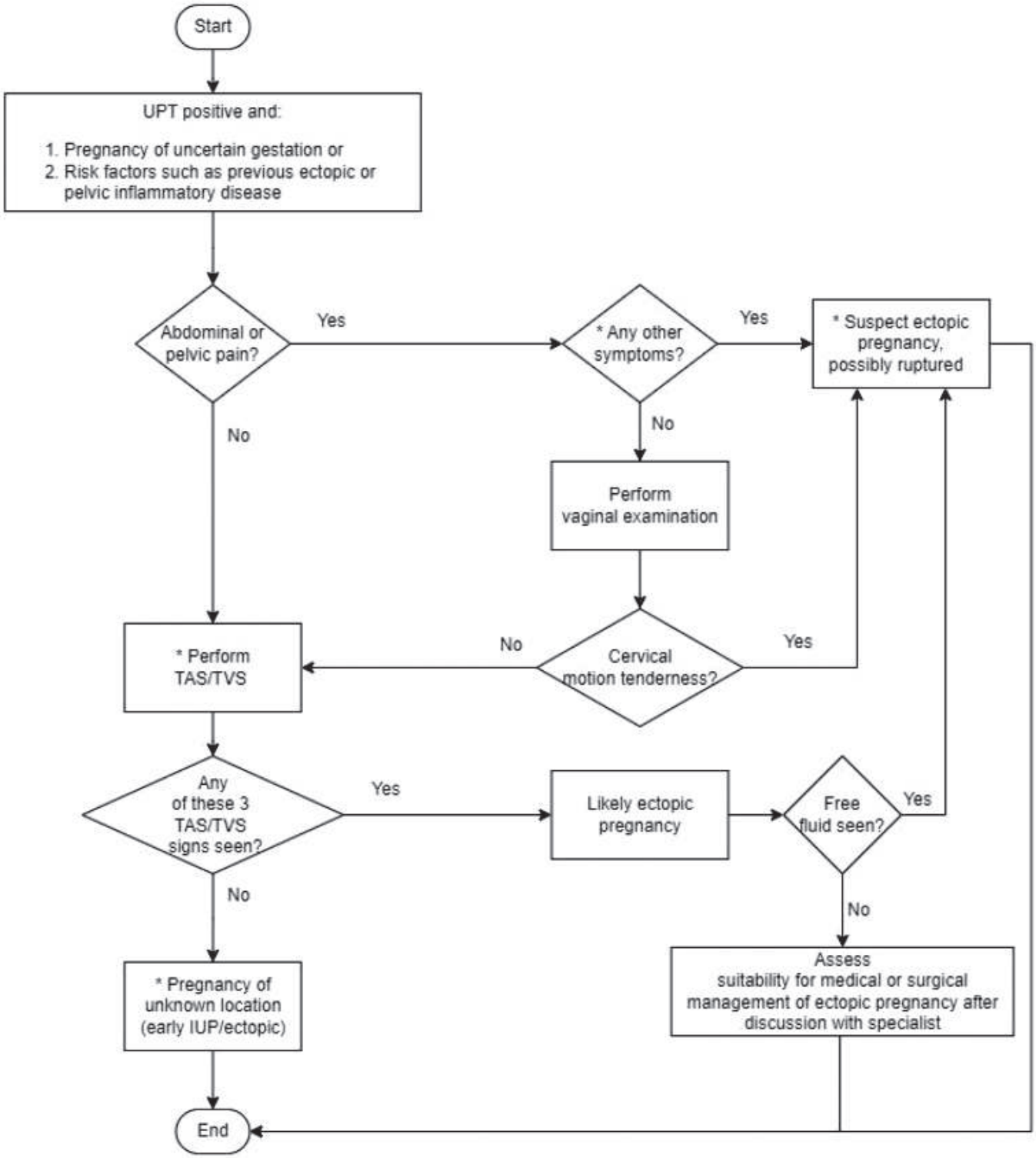
DIAGNOSIS	CRITERIA	EXPECTANT MANAGEMENT	MEDICAL MANAGEMENT	SURGICAL MANAGEMENT
	3. Increased risk from effects of haemorrhage (e.g., coagulopathies or unable to have blood transfusion) ,or 4. Evidence of infection		3. Offer pain relief and anti-emetics. 4. Repeat UPT after 3 weeks and to return if UPT positive.	Surgical management in theater
Incomplete/ Missed miscarriage	Women with miscarriage who do not have risks mentioned above (suitable for expectant management)	1. Expectant management for 7 to 14 days 2. If resolution of bleeding and pain indicate that miscarriage has completed, advise women to take a UPT after 3 weeks and to return if UPT positive 3. Offer a repeat scan after 7 to 14 days and the process of miscarriage has not begun or if there is persisting and/or increasing bleeding and pain (suggesting incomplete miscarriage). Discuss all options (continued expectant, medical and surgical management).	Discuss option to allow women to make informed choice	Discuss option to allow women to make informed choice

Reference:

1. NICE guideline [NG126]. Ectopic Pregnancy and Miscarriage: Diagnosis and Initial Management. April 2019.

B4. PREGNANCY OF UNKNOWN LOCATION

Flowchart 5: Management of pregnancy of unknown location



Any other symptoms	1. Shoulder tip pain 2. Dizziness, fainting or syncope 3. Pelvic, abdominal or adnexal tenderness 4. Pallor
Suspect ectopic pregnancy, possibly ruptured	1. Refer to specialist or consultant on call for immediate plan of management 2. Check BP, HR and GCS, if unstable (heart rate >100bpm or BP <100/60mmHg or GCS <15), provide immediate resuscitation, perform speculum, vaginal examination and ultrasound scan prior to transfer 3. If patient is stable (heart rate <100bpm, BP>100/60mmHg and GCS 15), perform speculum, vaginal examination and ultrasound scan prior to transfer
Perform TAS/TVS	Perform TAS/TVS to look for: 1. Empty uterus with no intrauterine gestation sac (IUGS) (eccentrically located hypoechoic structure with double decidual sign) seen. 2. Collection of fluid within uterine cavity (pseudo-sac). 3. Adnexal mass moving separate to the ovary. 4. Even if IUGS is seen, scan adnexae to screen for heterotopic pregnancy.
Pregnancy of unknown location (early IUP/ectopic)	1. Assess clinical symptoms and review if symptoms change. 2. Consider taking 2 serum hCG measurements as near as possible to 48 hours apart (but no earlier) and discuss with specialist. 3. To correlate hCG with clinical findings, do not use hCG in isolation to determine location of pregnancy. 4. Patient education.

Adapted from:

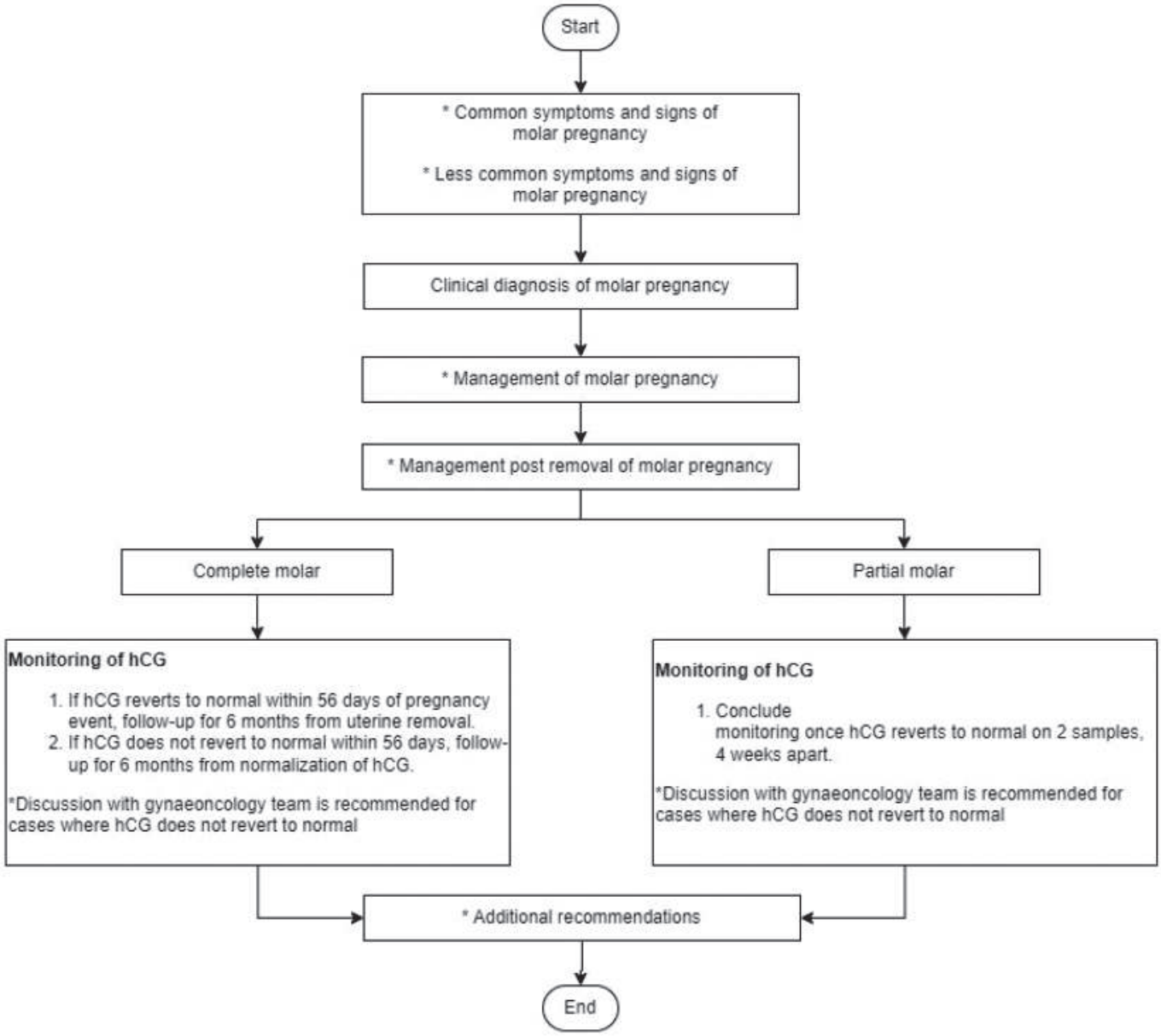
1. Obstetrics and Gynaecology Protocol, State of Kedah, 2019.
2. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.
3. Penang State Gynaecology Protocol, 2021.
4. Perak State Gynaecology Protocol, 2021.

Reference:

1. NICE guideline [NG126]. Ectopic Pregnancy and Miscarriage: Diagnosis and Initial Management. April 2019.

B5. MOLAR PREGNANCY

Flowchart 6 : Approach to Molar Pregnancy



Common symptoms and signs of molar pregnancy	1. Irregular vaginal bleeding 2. Positive UPT 3. Supporting ultrasonographic evidence for complete or partial molar
Less common symptoms and signs of molar pregnancy	1. Hyperemesis 2. Excessive uterine enlargement 3. Hyperthyroidism 4. Early-onset pre-eclampsia 5. Abdominal distension due to theca lutein cysts 6. Haemoptysis or seizures due to metastasis to lung or brain
Management of molar pregnancy	1. FBC, BUSE, Creatinine, LFT, TFT, hCG, Chest X-ray 2. Suction curettage (hCG pre-evacuation) 3. If fetal parts are present and size of fetal parts deters use of suction curettage to consider medical removal
Management post removal of molar pregnancy	1. Send POC for HPE- Definitive diagnosis of molar pregnancy is by histological examination 2. Monitor hCG
Additional recommendations	1. If no chemotherapy received, no further hCG monitoring required for future pregnancy event 2. Advise not to conceive until follow-up completed 3. Advise not to conceive for 1 year after completion of treatment if chemotherapy given

**This guideline does not cover the management of complex molar pregnancies such as ectopic molar or twin pregnancy of a viable fetus with presumptive coexisting molar pregnancy.*

Adapted from:

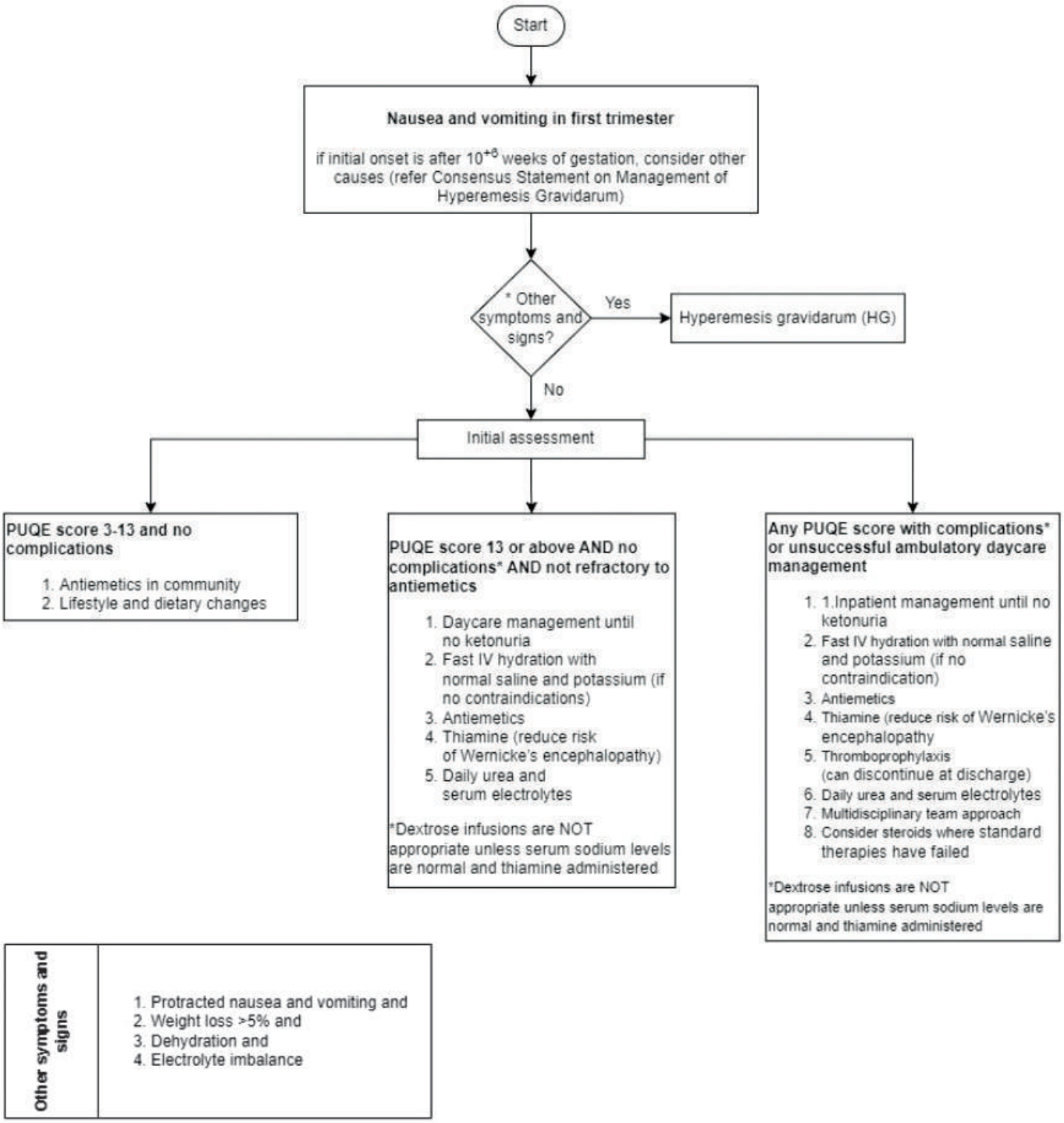
1. Obstetrics and Gynaecology Protocol, State of Kedah, 2019.
2. Penang State Gynaecology Protocol, 2021.

Reference:

1. Tidy J et al. GTG 38: Management of Gestational Trophoblastic Disease. BJOG: An International Journal of Obstetrics & Gynaecology. 2020;128(3): e1-e27.

B6. NAUSEA AND VOMITING IN PREGNANCY

Flowchart 7: Management of nausea and vomiting in pregnancy



***Complications:**

1. Continued nausea and vomiting and inability to keep down oral antiemetics
2. Continued nausea and vomiting associated with ketonuria and/or weight loss (greater than 5% of body weight) despite oral antiemetics
3. Confirmed or suspected comorbidity
4. Abnormal urea and electrolytes
5. Haematemesis
6. Persistent ketonuria after day case hydration
7. Second attendance for day case hydration

MOTHERISK PUQE-24 SCORING SYSTEM

In the last 24 hours, for how long have you felt nauseated or sick to your stomach?	Not at all (1)	1 hour or less (2)	2-3 hours (3)	4-6 hours (4)	More than 6 (5)
In the last 24 hours have you vomited or thrown up?	7 or more times (5)	5-6 times (4)	3-4 times (3)	1-2 times (2)	I did not throw up (1)
In the last 24 hours how many times have you had retching or dry heaves without bringing anything up?	No time (1)	1-2 times (2)	3-4 times (3)	5-6 times (4)	7 or more times (5)

RECOMMENDED ANTIEMETICS

First line	Cyclizine 50mg PO, IM or IV, 8 hourly Prochlorperazine 5-10 mg PO 6-8 hourly; 12.5mg IM/IV 8 hourly, 25mg PR daily Promethazine 12.5-25mg 4-8 hourly PO, IM, IV or PR Chlorpromazine 10-25mg 4-6 hourly PO, IV or IM; or 50-100mg 6-8 hourly PR
Second line	Metoclopramide 5-10mg 8 hourly PO, IV or IM (maximum 5 days' duration) Domperidone 10mg 8 hourly PO; 30-60 mg 8 hourly PR Ondansetron 4-8 mg 6-8 hourly PO; 8mg over 15 minutes 12 hourly IV
Third line	Corticosteroids: hydrocortisone 100mg twice daily IV and once clinical improvement occurs, convert to prednisolone 40-50 mg daily PO, with the dose gradually tapered until the lowest maintenance dose that controls the symptoms is reached

Adapted from:

1. Obstetrics and Gynaecology Protocol, State of Kedah, 2019.
2. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.
3. Penang State Gynaecology Protocol, 2021.
4. Perak State Gynaecology Protocol, 2021.

References:

1. Shehmar M et al. GTG 69: The Management of Nausea and Vomiting of Pregnancy and Hyperemesis Gravidarum. RCOG 2016.
2. Consensus Statement on Management of Hyperemesis Gravidarum. KKM.600-27/7/1jld.6(61), 25 February 2020.

ANTENATAL PROBLEMS

C1. MULTIPLE PREGNANCY

1) Overview

a. Background incidence: 1 in 80 pregnancies.
b. Monozygous twinning rates are relatively constant. Incidence: 4 per 1000 births.
c. Dizygous twinning rates vary enormously depending on age, parity, racial background and assisted conception techniques.
d. Overall, perinatal and maternal morbidity is higher in multiple pregnancies than in singletons.
e. Preterm delivery and complications of prematurity are the main contributors to adverse outcomes.

2) Antenatal Follow-up

a. Ultrasound should be done at the time of diagnosis of twin pregnancy to determine chorionicity.
b. Ultrasound for chorionicity should be done before 13^{+6} weeks of gestation.
c. Referral to O&G team to confirm chorionicity, counseling and outline antenatal follow-up plan.
d. Antenatal care should be shared between Specialist hospitals and the MCH clinic.
e. All monochorionic (MC) twins or higher order pregnancy (≥3) required follow-up with an O & G specialist clinic.
f. Consider inpatient surveillance for higher order pregnancy after 26-28 weeks till delivery.
g. Uncomplicated Monochrionic (MCDA & MCMA): 2 weekly after 16 weeks until delivery.
h. Uncomplicated Dichorionic Diamniotic (DCDA): 4 weekly until 28 weeks then 2 weekly until delivery.

*** Good Practice Points During Ultrasound Scan**

1. Look for separating membrane – lack of separating membrane suggests a monoamniotic twin (MCMA).
2. Determine Chorionicity:
   - Number of placental mass: 2 separate masses suggest dichorionic
   - Lambda or T-sign (1st trimester): Lambda = Dichorionic; T-sign = Monochorionic
   - Thickness of the separating membrane: <2mm in monochorionic twins
   - Gender discrepancy suggests DCDA twins
   - Label the fetuses according to "right and left" or "upper and lower"
   - If unsure of dates, follow the date of the larger twin
   - If unable to determine chorionicity after assessed by O&G specialist, to treat as MCDA twins
3. Calculation of growth discrepancies: EFW (larger fetus) – EFW (smaller fetus) / EFW (larger fetus) x 100%
4. Measurement of DVP: Abnormal if < 2 cm or > 8 cm

3) Risk of Twin Pregnancies

MATERNAL RISK	FETAL RISK
Anaemia	Fetal Growth Restriction
Preterm Delivery	Congenital Anomalies
Hypertension	Twin to Twin transfusion syndrome
Antepartum Haemorrhage	Polyhydramnios
Polyhydramnios	Cord accident
Increased risk of operative delivery	Increased risk of operative delivery
Postpartum Haemorrhage	

The challenges of managing monochorionic pregnancies arise from the vascular placental anastomoses that are almost universal and connect the umbilical circulation of both twins:

a. Twin-to-twin transfusion syndrome (TTTS) – 10-15% of monochorionic pregnancies
b. Twin reversed arterial perfusion (TRAP) sequence – 1%
c. Twin anaemia polycythaemia sequence (TAP) – 1%
d. Selective fetal growth restriction (sFGR), commonly due to unequal placental sharing and velamentous cord insertion – 25-35%
e. Consequence of the co-twin fetal demise – 2.6%
f. Management of discordant malformations
g. Monochorionic, monoamniotic pregnancies with risk of cord entanglement – 1%

4) Twin-to-Twin Transfusion Syndrome

a. Ultrasound examinations between 16-24 weeks focus primarily on detection of TTTS.
b. After 24 weeks, the main purpose is to detect fetal growth restriction, which may be concordant or discordant.
c. The Quintero classification system of TTTS has some prognostic value but the course of condition is unpredictable and may involve improvement or rapid deterioration.
d. Laser ablation of vascular connection is the recommended treatment for the majority of pregnancies with TTTS that requires intervention (stage II-IV), and urgent referral to a laser surgery facility should be considered.
e. Early referral is recommended to allow optimal treatment before the onset of severe disease and cervical shortening.
f. Laser treatment is done between 16-26 weeks and can be considered between 26-28 weeks.

5) The Quintero Classification System

STAGE	CLASSIFICATION
I	There is discrepancy in amniotic fluid volume with oligohydramnios of a maximum vertical pocket (MVP) < 2cm in one sac and polyhydramnios in other sac (MVP > 8cm).
II	The bladder of the donor twin is not visible.
III	Doppler studies are critically abnormal in either twin and are characterised as abnormal or reversed end-diastolic velocities in the umbilical artery, reverse flow in the Ductus venosus or pulsatile umbilical venous flow
IV	Ascites, pericardial or pleural effusion, scalp edema or overt hydrops present.
V	One or both babies are dead.

6) Selective Fetal Growth Restriction

a. More common especially in monochorionic twins – 10% incidence.
b. Estimate fetal weight discordance using 2 or more biometric parameters at each ultrasound scan from 20 weeks.
c. Consider a 25% or greater in size between twins as a clinically important indicator of fetal growth restriction.
d. Doppler velocimetry is used to evaluate the haemodynamic status of the 2 fetuses.
e. Abnormal doppler (umbilical artery) may lead to 40% risk of IUD of affected twin.

7) Death of one of a monochorionic twin pair

a. Death of one twin in a monochorionic pair may result in death or neurological disability in the survivor.
b. Chance that the surviving twin in a monochorionic twin will either die or suffer major morbidity is up to 17%.
c. These events occur around the time of fetal death, postulated due to agonal hypotension as the blood volume of the survivor is 'dumped' precipitously into the corpse of the co-twin through shared vascular communications, or possibly due to the release of thromboplastins from the deceased twin into the shared circulation.
d. One of the advantages of laser therapy (or cord ligation) in TTTS is that it provides some neuroprotection for the surviving twin in the event of co-twin demise.
e. Delivery of survivors at preterm gestation will not prevent further damage unless there is evidence of cardiotocography (CTG) abnormalities or significant fetal anaemia.
f. Ongoing ultrasound or MRI assessment of the brain in the survivor to diagnose neurological damage secondary to hypovolaemia may be appropriate.

8) Delivery

a. Uncomplicated MCMA: by 32-34 weeks
b. Uncomplicated MCDA: by 36-37 weeks
c. Uncomplicated DCDA: by 37-38 weeks
d. Uncomplicated triplet: offer delivery at 35 weeks
e. Complicated twin pregnancies: decision is made on a case by case basis after detailed review by O&G specialist / consultant.
f. Can be vaginal birth or caesarean section.**

****Twin Birth Study**

- No significant benefit of planned caesarean sections for twins vs planned vaginal birth.
- It is reasonable to aim for vaginal delivery if the first twin is cephalic and mother has no previous caesarean sections.

g. Caesarean section is recommended in:
   - Non-cephalic first twin
   - Women with previous LSCS/ uterine scar
   - MCMA twins
   - Any other complicated twin pregnancy.

9) Management of Twin in Labour

LABOUR STAGE	REMARKS
Upon admission of labour ward / 1st stage of labour	• Intravenous line +/- IV Hydration • Blood test: FBC, GSH • Ultrasound assessment to determine: - presentation of each fetus - liquor volume - placental site - viability of each twin, fetal heart location of each twin to ease the CTG fetal cardiac probe placement. - estimated fetal weight (if not recently performed) • Consult specialist before induction of labour or augmentation • Inform specialist when patient admit to labour room • Inform paediatric team to standby for 2nd stage • Continuous CTG monitoring of both fetuses, considering inserting an internal probe for the leading twin. • Always compare both twin tracings to ensure that 2 different heart rates are being traced and the same twin is not being monitored twice. Ideally, both twins should be traced by one machine.

LABOUR STAGE	REMARKS
Second stage of labour	• Medical officer to standby during delivery • Ultrasound machine to standby – to confirm the presentation of 2nd twin after delivery of 1st twin • Delivery of 1st twin as per singleton and medical officer should help to stabilise the 2nd twin in a longitudinal lie. • Clamp the cord using plastic cord clamps and cut in between the clamps, postpone taking any sample for cord blood until the 2nd twin is delivered. • Perform abdominal palpation to confirm the lie and presentation of the 2nd twin. May use the transabdominal ultrasound scan • Continuous CTG monitoring • Consider to commence oxytocin infusion if contraction is inadequate after delivery of 1st twin. • Consider performing ECV or internal podalic version if in non-longitudinal lie. • If it is a longitudinal lie, encourage pushing with each contraction. • Once the 2nd twin delivered, clamped and cut the cord as usual. • Proceed to withdraw any cord blood as necessary. • Cord pH should be taken if the baby is not vigorous.
Third stage of labour	• Give uterotonic agent after delivery of 2nd twin as prophylaxis of postpartum haemorrhage. • Deliver the placenta using controlled cord traction • Check placenta to confirm chorionicity and ensure placenta and membrane are complete • Start oxytocin infusion as there is a risk of uterine atony and PPH following delivery of multiple pregnancies.

Adapted from:

1. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.
2. Sabah Obstetric Shared Care Guidelines 4th Edition, June 2020.
3. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar Perlis.
4. Penang State Obstetrics Protocol, 2021.
5. A Quick Guide to Labour Room Management, Hospital Tengku Ampuan Afzan Kuantan & IIUM, 3rd Edition .
6. Sarawak General Hospital Labour Ward Manual, 2020.
7. Obstetrics & Gynaecology Protocol, State of Kedah, 2019.

References:

1. Royal College of Obstetricians and Gynaecologists. Management of Monochorionic Twin Pregnancy. Green-top Guideline No.51. London: ROCG; 2017.
2. NICE guideline (NG137). Twin and Triplet Pregnancy, 2019

C2. CERVICAL INSUFFICIENCY

1) Overview

a. Cervical insufficiency is the inability of the uterine cervix to retain a pregnancy in the second trimester in the absence of clinical contractions, labour, or both.

b. Presentation:
   - Vaginal discharge, show or sensation of pressure at perineum
   - History of painless dilatation of the cervix
   - History of rupture of membranes before onset of contractions

c. Investigation:
   - Blood: FBC
   - Imaging: Transvaginal ultrasound at 16-24 weeks of gestation for
   - cervical length shortening, of <25mm.
   - Others: HVS C&S

2) Management

a. Pregnant women with a history of previous preterm birth and/or second trimester loss or with risk factors such as history of multiple D&C or history of cervical surgery should be referred to an O & G specialist clinic for further assessment and management.
b. Serial TVS surveillance should be performed for women with a history of spontaneous mid-trimester loss or preterm birth suspected secondary to cervical insufficiency.

3) Cervical Cerclage

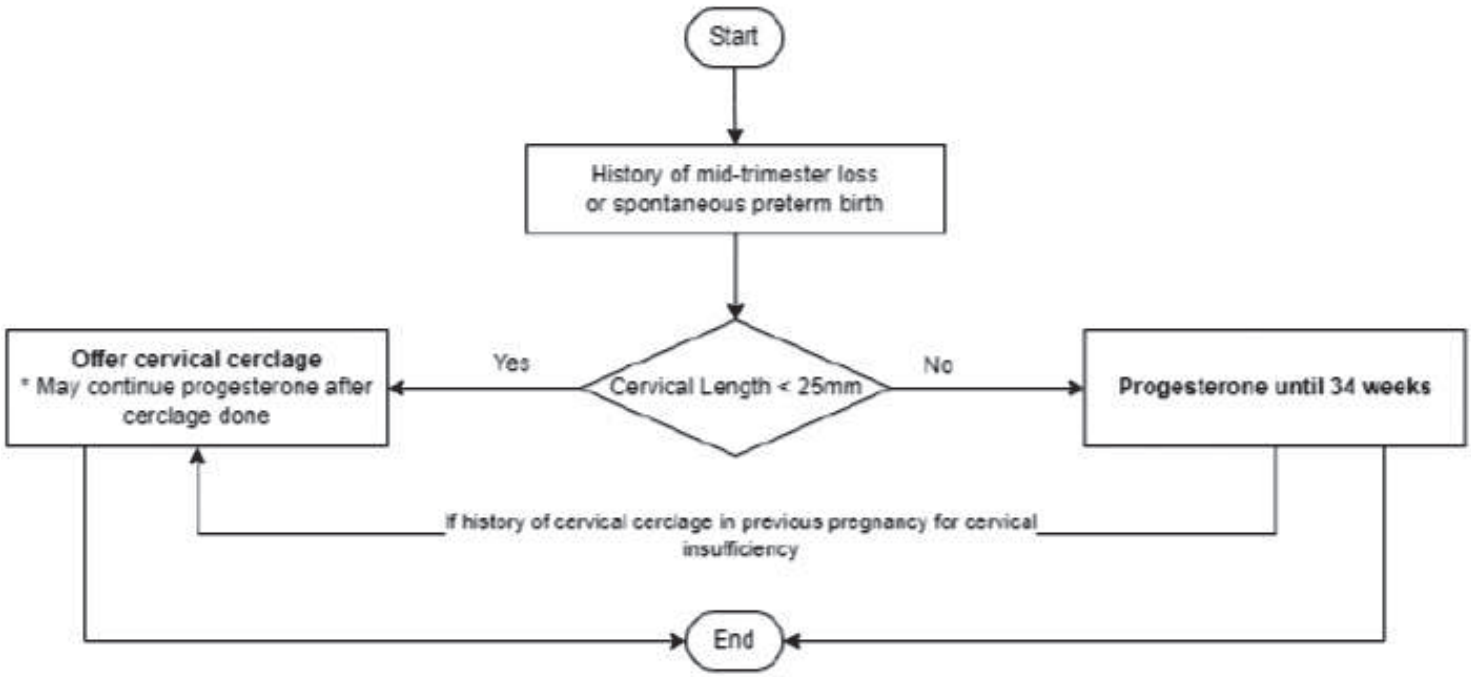
a. Cervical Cerclage may be offered to women with recurrent spontaneous mid trimester loss or preterm birth (history indicated).
b. Cervical cerclage should be offered to women with history of one or more spontaneous mid trimester loss or preterm birth, with TVS surveillance of cervical length of 25mm or less, and before 24 weeks of gestation (ultrasound indicated).
c. Rescue cerclage:
   - In cases with cervical dilatation of 4cm or less without membrane prolapse beyond the external os
   - Decision by senior obstetrician depending on period of gestation
   - Inform couple that even with rescue cerclage in severe preterm delivery, there's risk of neonatal morbidity and mortality
   - Rule out chorioamnionitis before the procedure.
d. Transvaginal cervical cerclage should be removed at 36-37 weeks.
e. If delivered by elective LSCS, suture removal could be done together.
f. In PPROM at 24-34 weeks without infection or preterm labour, can delay removal of cerclage for 48 hours until complete prophylactic steroids.
g. Cervical cerclage is not recommended in women with incidental findings of cervical shortening of 10-25mm and without history of spontaneous mid-trimester loss, preterm birth or other known risk factor, but may be beneficial for women with short cervix less than 10mm.
h. Cervical cerclage is not recommended for funneling of the cervix in the absence of cervical shortening of 25mm or less.
i. Cervical cerclage is not recommended in women with multiple pregnancy since evidence suggests increase in preterm delivery and pregnancy loss.

j. For multiple pregnancy with cervical length of <15mm or those with past history of typical cervical insufficiency, there may be an advantage for cerclage, with limited evidence.
k. Contraindication for cervical cerclage:
   - Advanced preterm labour
   - PPROM / Chorioamnionitis
   - Antepartum Haemorrhage
   - Fetal Distress
   - Fetal Anomalies
   - Intrauterine death

4) Progesterone

a. May offer to women with a history of recurrent spontaneous mid trimester loss or preterm birth.
b. May continue in women who had cervical cerclage done.
c. To be continued until 34 weeks of gestation.
d. Choices of progesterone depend on local availability.

Flowchart 8: Approach to Cervical Insufficiency



Adapted from:
1. Sabah Obstetric Shared Care Guidelines 4th Edition, June 2020
2. Obstetrics & Gynaecology Protocol, State of Kedah, 2019

References:
1. NICE guideline (NG25): Preterm labour and birth, 2015
2. ACOG guideline
3. SOGC guideline (No. 373) : Cervical insufficiency and cervical cerclage,2019

C3. RHESUS NEGATIVE IN PREGNANCY

1) Overview

a. There is a risk of isoimmunization in which Rhesus positive red blood cells enter the circulation of a Rhesus negative woman.
b. The degree of the risk will vary with the amount of Rhesus antigen to which she is exposed.
c. Rhesus isoimmunization against Rhesus antigen may result in hemolytic disease of the fetus and newborn.
d. During pregnancy, a small proportion of women (1.5%) develop Rhesus antibodies during their first pregnancy; most such immunization takes place after 28 weeks of gestation.
e. Incidence of Rhesus isoimmunization can be reduced from 0.2 to 0.06% with the combination of antenatal anti-D immunoglobulin to all unsensitized Rhesus negative women and further dose after such women given birth to a Rhesus positive child.

2) Antenatal Follow-up

a. Check blood group & Rh type in all antenatal cases at first visit.
b. If a woman is rhesus negative, check husband's/partner's blood group & Rh type.
c. Check INDIRECT Coombs test at booking and 28 weeks.
d. Women with a positive INDIRECT Coombs test need further testing to confirm the presence of anti-D antibodies.
e. DO NOT repeat Coombs test/anti-D antibody screening if the woman has already been given anti-D in the current pregnancy.
f. Women with anti-D antibodies (with no history of previous anti-D prophylaxis given) are considered sensitized and require close monitoring of antibody levels (if available) and signs of fetal anaemia.
g. Women who are already sensitized would NOT benefit from anti-D prophylaxis.
h. Ideally, sensitized women should be followed up by maternal-fetal-medicine units in a specialist centre.

3) Potentially Sensitizing Events

a. Miscarriage, which required surgical evacuation regardless gestation
b. Miscarriage, Threatened miscarriage: >12 weeks gestation
c. Ectopic pregnancy
d. Evacuation of molar pregnancy
e. Termination of pregnancy by either surgical or medical methods
f. Amniocentesis, Chorionic villus biopsy and cordocentesis
g. Antepartum haemorrhage
h. External cephalic version
i. Intrauterine death and stillbirth
j. In-utero therapeutic interventions (transfusion, surgery, insertion of shunts, laser)
k. Abdominal trauma (sharp/blunt, open/closed)
l. Delivery – Normal, Instrumental or Caesarean section
m. Intraoperative cell salvage

4) Anti-D Prophylaxis

Routine antenatal anti-D prophylaxis (RAADP)	➢ All Rh D negative pregnant women who have not been previously sensitized should be given RAADP either with a single dose regimen or two dose regimen ➢ Single dose regimen: 1500 IU given at 28 – 30 weeks ➢ Double dose regimen: 1250 IU given at 28 and 34 weeks
POTENTIALLY SENSITIZING EVENTS	
Less than 12 weeks of gestation	➢ Feta-maternal haemorrhage (FMH) test not required ➢ Minimum dose: 250 IU within 72 hours of event
12 to 20 weeks of gestation	➢ FMH test not required ➢ Minimum dose: 250 IU within 72 hours of event ➢ If continue bleeding: RhoGAM® minimum 6 weekly interval

12 to 20 weeks of gestation	➢ FMH test not required ➢ Minimum dose: 250 IU within 72 hours of event ➢ If continue bleeding: RhoGAM® minimum 6 weekly interval
20 weeks gestation to term	➢ FMH test (Kleihauer-Betke test) required to allow calculation of additional RhoGAM®doses ➢ If FMH > 4mL is detected, follow-up samples are required at 48 hrs following an intravenous dose of anti-D or 72 hrs following an Intramuscular dose to check for clearance of fetal cells ➢ For any potentially sensitising events, minimum dose of 500 IU RhoGAM® should be administered within 72 hrs regardless of whether the woman has already received RAADP at 28 weeks ➢ In the event of continual uterine bleeding (clinically judged to represent the same sensitising event), minimum of 500 IU RhoGAM® should be given at 6 weekly interval. ➢ If further intermittent uterine bleeding, estimation of FMH should be done at 2 weekly interval. ➢ If the 2 weekly FMH test shows the presence of fetal cells, additional RhoGAM® should be administered ➢ The additional dose should be calculated: IM 125 IU or IV 100 IU for each mL of fetal red cells detected (minimum 500 IU)
Following delivery of Rhesus D positive child	➢ Give RhoGAM® 500 IU within 72 hrs following delivery if: o Baby is confirmed to be Rh D positive o Cord blood sample cannot be obtain o If there's an intrauterine fetal death (IUFD) and hence no sample can be obtained from the baby

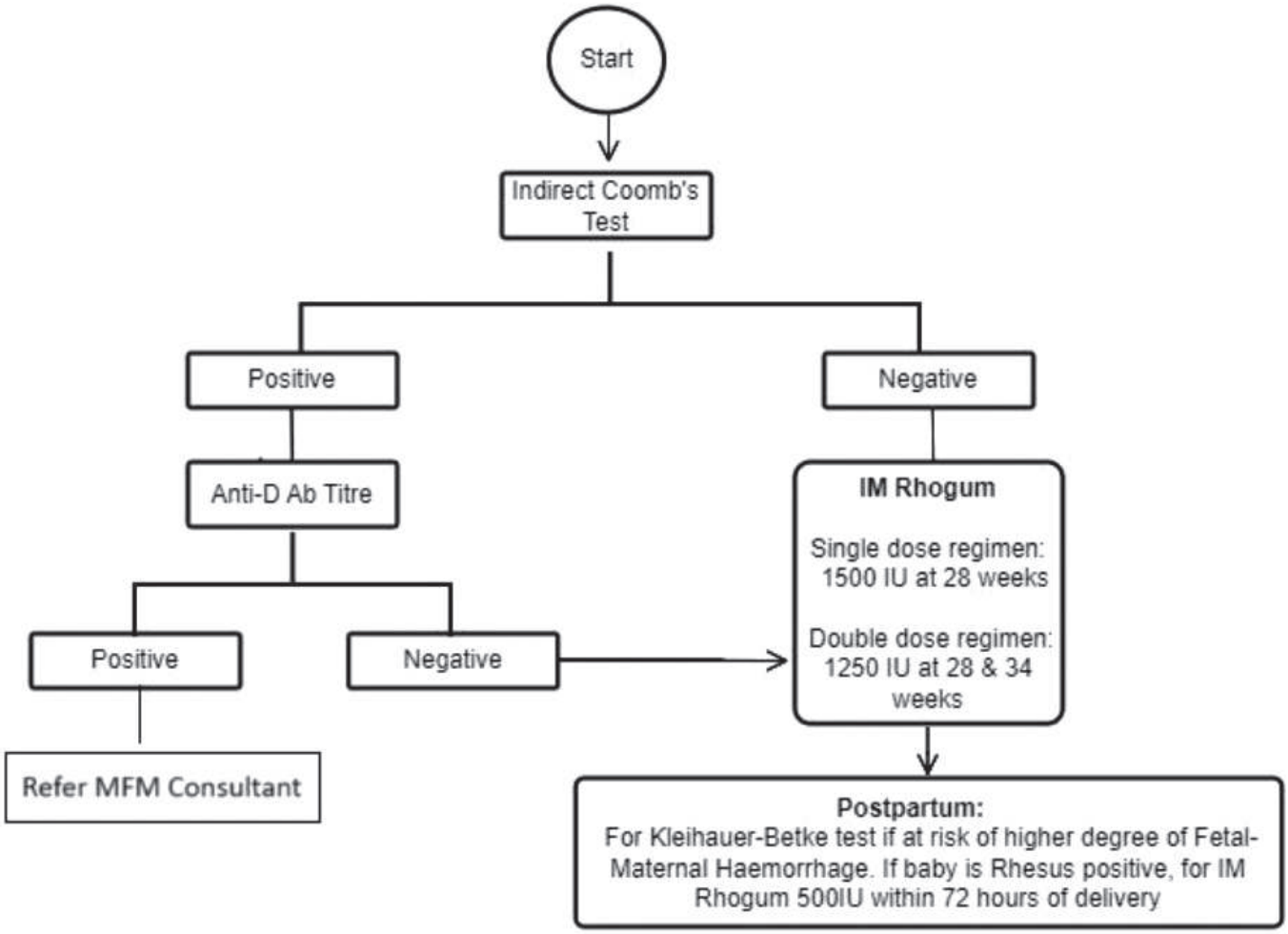
5) Delivery

a. Timing of delivery: follows obstetric indication.
b. Check the antenatal history of RAADP.
c. Ensure the availability of 1-2 units of packed cells before induction, vaginal delivery or caesarean section.
d. Fetal monitoring / labour augmentation as in normal cases.
e. If LSCS, intra-operatively: remove placenta by CCT, avoid MRP to minimize the risk of feto-maternal haemorrhage.
f. At delivery, remember to send cord blood for ABO and Rhesus grouping.
g. If suspected hemolytic disease of newborn or in the presence of maternal antibodies (sensitised mother), to send cord blood for haemoglobin level, Direct coomb's test, serum bilirubin.

6) Kleihauer-Betke Testing

a. To quantify the amount of FMH.
b. Ideally should be done in all rhesus negative women post-delivery.
c. Kleihauer-Betke test should be done if a higher degree of fetal-maternal haemorrhage is suspected (i.e LSCS, MRP etc).
d. Maternal blood should be taken within 1-2 hours of delivery to allow sufficient time for dispersal of fetal cells in the maternal circulation.
e. If the amount of FMH exceeds the dose of RAADP, give additional RhoGAM® based on the calculation of 125 IU/mL of FMH.
f. Repeat Kleihauer testing after 72 hours to ensure that fetal cells have been cleared.
g. Repeat RhoGAM® if fetal cells are still present in the repeat Kleihauer testing.
h. When large doses of RhoGAM® (> 15,000 IU), be wary of hemolytic reaction due to intended destruction of foreign RhD +ve red cells.

Flowchart 9: Management of Rhesus Negative in Pregnancy



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2. Sabah Obstetric Shared Care Guidelines 4th Edition, June 2020
3. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar Perlis
4. Sarawak General Hospital Labour Ward Manual, 2020

References:

1. Royal College of Obstetricians and Gynaecologists. The Management of Women with Red Cell Antibodies during Pregnancy. Green-top Guideline No.65. London: ROCG; 2014
2. British Committee for Standards in Haematology (BCSH) Guideline for the Use of Anti-D Immunoglobulin for the Prevention of Hemolytic Disease of the Fetus and Newborn; 2014

C4. PLACENTA PRAEVIA

1) Overview

a. Majority of women who were told to have a low-lying placenta during the 2nd trimester will "resolve", with only 1 in 200 having this condition at delivery.
b. At 18-24 weeks, if the placenta extends beyond the internal cervical os by 15-25mm, the probability of placenta praevia at delivery is 20%.
c. If it extends by >25mm, this likelihood is increased to 40-100%.
d. Transvaginal ultrasound is safe in the presence of placenta praevia and is more accurate than transabdominal ultrasound in locating the placenta.
e. In the absence of transvaginal ultrasound, ensure transabdominal ultrasound is done with a FULL BLADDER to increase accuracy.
f. For pregnancies beyond 16 weeks of gestation, the placenta is:
   - Normal: if placental edge is ≥ 20mm from the internal os
   - Low-lying: if the placental edge is <20mm from the internal os
   - Praevia: if the placenta is overlying the internal os.

2) Management

a. Women with placenta praevia who remain asymptomatic, no history of antepartum haemorrhage, required careful counseling and specialist input before contemplating outpatient care. This may vary depending on local settings.
b. Any home-based care requires close proximity to the hospital, constant presence of companions and full informed consent from the woman.
c. Women with placenta praevia with history of antepartum haemorrhage should be admitted and managed as inpatients.
d. Women must be educated to come to hospital immediately if they experience any bleeding, contractions or period-like abdominal pain.
e. In women with an underlying caesarean section or uterine scar, MUST rule out placenta accreta spectrum (PAS).
f. Suspected placenta accreta preferably be confirmed by ultrasound by a Maternal-Fetal specialist. MRI is not routinely required to confirm the diagnosis.

g. Mode of delivery: via caesarean section
h. Timing of delivery: 36-37 weeks for uncomplicated placenta previa. Earlier delivery may be considered depending on history of antepartum haemorrhage, fetal growth and other obstetric problems/indication.
i. In low-lying placenta (between 10 to 20mm from the internal os):
   - Success rate of vaginal delivery varies from 56-93% and may depend on the thickness of the placental edge and other ultrasound findings.
   - Option for vaginal delivery can be discussed if the woman is very keen for vaginal delivery and has no previous history of APH.
   - Scan must be repeated by a specialist.
   - Woman and her partner must be counseled.
   - Delivery must be in a specialist centre that can perform emergency caesarean section for placenta praevia in the event of excessive bleeding.

GESTATION	ULTRASOUND FINDINGS	ACTION
16 – 32 weeks	Placenta edge overlapping os / < 20 mm from internal os.	Use LMP if USG date within +/- 5 days of LMP, otherwise use ultrasound REDD.
32 – 36 weeks	Placenta edge overlapping os / < 20 mm from internal os. Placenta edge ≥ 20 mm from internal os	Rescan at 36 weeks. Manage as normal pregnancy.
36 weeks (No history of bleeding)	Placenta edge overlapping os / < 20 mm from internal os (TVS confirmed by Specialist)	Admit and book for elective LSCS between 36-37 weeks. For placenta within 10 mm to 20 mm from internal os, vaginal delivery can be considered in women who are keen after assessment and counseling by a specialist.

GESTATION	ULTRASOUND FINDINGS	ACTION
APH – one episode at any gestation	Placenta edge overlapping os / < 20 mm from internal os	Admit for observation. Ensure blood is available at all times. Repeat scan at 32 – 36 weeks to recheck placenta edge using TVS. Specialist to decide if considering discharge. The risk of requiring emergency delivery correlates with the number of episodes of APH : • One episode (OR 7.5) • Two episodes (OR 14) • Three episodes (OR 27)

Adapted from:

1. Sabah Obstetric Shared Care Guidelines 4th Edition, June 2020
2. Sarawak General Hospital Labour Ward Manual, 2020

Reference:

1. Royal College of Obstetricians and Gynaecologists. Placenta Praevia and Placenta Accreta: Diagnosis and Management. Green-top Guideline No.27a. London: ROCG; 2018

C5. PLACENTA ACCRETA SPECTRUM (PAS)

1) Overview

a. A morbidly adherent placenta includes placenta accreta, increta and percreta as it penetrates through the decidua basalis into and then through the myometrium and is associated with maternal and fetal morbidity and mortality.
b. Women at increased risk are those with placenta praevia WITH a previous uterine scar (lower segment caesarean section, myomectomy or repeat D&C).
c. All women with placenta praevia and a previous uterine scar must have at least an ultrasound performed by 28 weeks gestation by a skilled and experienced operator to determine if she has placenta accreta spectrum.
d. Ultrasound doppler has a sensitivity of 82.4% and specificity of 96.8% to diagnose accrete.
e. MRI is a useful adjunct in evaluation of placenta accreta spectrum.
f. Counseling with couples and appropriate preoperative preparation should be made.

2) Clinical Assessment

a. Ultrasound features for diagnosis were as follows:
   - Loss of the "clear zone": loss or irregularity of the hypoechoic plane in the myometrium underneath the placental bed.
   - Bladder wall interruption: Loss or interruption of the bright bladder wall (the hyperechoic band between the uterine serosa and the bladder lumen).
   - Myometrial thinning: thinning of the myometrium overlying the placenta to <1mm or undetectable.
   - Placental bulge: deviation of the uterine serosa away from the expected plane, caused by an abnormal bulge of placental tissue into the neighbouring organ.
   - Abnormal placental lacunae: presence of numerous lacunae including some that are large and irregular.
   - Focal exophytic mass: placental tissue seen breaking through the uterine serosa and extending beyond it. Most often seen inside a filled urinary bladder.

b. Colour doppler:
   - Uterovesical hypervascularity : Striking amount of colour Doppler signal between the myometrium and posterior wall of bladder.
   - Subplacental hypervascularity: Striking amount of colour Doppler signal seen in the placental bed.
   - Bridging vessels: Vessels appearing to extend from the placenta across the myometrium and beyond the serosa in the bladder or other organs.
   - Placental lacunae feeder vessels: Vessels with high velocity blood flow leading from the myometrium into the placental lacunae.
   - 3D intraplacental hypervascularity: Complex, irregular arrangement of numerous placental vessels, exhibiting tortuous courses and varying calibers.

3) Management

a. In women with no history of antepartum haemorrhage, delivery should be planned between 35-37 weeks.
b. Woman's haemoglobin level must be optimized to above 10g/L before surgery.
c. Couples should be counseled thoroughly regarding the possible risk and complications including the need for hysterectomy. Consent should be obtained.
d. The anaesthetist must be informed regarding the risk of PPH and need for hysterectomy.
e. The blood bank specialist must be informed regarding the possible need for activation of massive transfusion protocol (MTP).

4) During Surgery

a. Surgery must be carried out by a senior O&G surgeon, where possible, 2 competent surgeons should perform the surgery as speed is of essence.
b. Prophylactic bilateral internal iliac artery balloon occlusion by interventional radiologist may be considered if service is available.
c. Bilateral ureteric stenting may be considered if service is available.
d. Surgical approach (abdomen): midline skin incision.
e. Any adhesions must be dissected and the bladder must be dissected down carefully in anticipation of hysterectomy.

f. Uterine incision should be done at a site distant from the placenta, and delivering the baby without disturbing the placenta.
g. After delivery of the baby, await spontaneous separation of the placenta.
h. If the placenta does not separate, do not try and perform MRP, but proceed with hysterectomy instead.
i. Blood products should be transfused early rather than late. Anticipate DIVC.
j. Double ligation in all vascular pedicles is a good practice.
k. In massive haemorrhage, internal iliac artery ligation/occlusion may be considered if expertise is available.
l. Consider abdominal drain insertion at the end of surgery if there is a massive haemorrhage.

Adapted from:

1. Sabah Obstetric Shared Care Guidelines 4th Edition, June 2020
2. A Quick Guide to Labour Room Management, Hospital Tengku Ampuan Afzan Kuantan & IIUM, 3rd Edition
3. Sarawak General Hospital Labour Ward Manual, 2020

Reference:

1. Royal College of Obstetricians and Gynaecologists. Placenta Praevia and Placenta Accreta: Diagnosis and Management. Green-top Guideline No.27a. London: ROCG; 2018

C6. UTERUS LARGER THAN DATES

1) Overview

a. Diagnosed when the symphysio-fundal height (SFH) is more than the gestational age.
b. Clinical fundal height (CFH) is an alternative to SFH and it is more practical to be use. There are some opinion that clinical fundal height is based on landmarks and less affected by height and weight.
c. Need to determine the patient's date accurately.
d. Identify women with risk factors: diabetes mellitus, obesity, previous history of macrosomia etc.
e. Possible causes:
   - Wrong date
   - Multiple pregnancy
   - Polyhydramnios
   - Macrosomia / Large for gestational age
   - Congenital anomalies
   - Pelvic tumour: fibroids, ovarian cysts

2) Management

a. Measure the clinical fundal height using measuring tape.
b. Abdomen palpation to estimate liquor volume and estimated fetal weight.
c. Ultrasound examination: to exclude multiple pregnancies, polyhydramnios or pelvic tumour.
d. Measurement of fetal biometry and plot growth chart : to look for macrosomia / large for gestational age.
e. Further management depends on underlying causes.

3) Macrosomia / Large for gestational age (LGA)

a. Refer O&G specialist by 36 weeks for assessment and plan of delivery.
b. Discuss regarding possible pregnancy outcomes.
c. For hospital delivery with the team that are trained for shoulder dystocia management and with caesarean section facility.
d. Risk of prolonged labour / obstructed labour in vaginal delivery.
e. Risk of shoulder dystocia in vaginal delivery.
f. Decision for mode of delivery: vaginal delivery vs caesarean section should be discussed with the woman.
g. Other risk factors should be taken into account during discussion and decision making on mode of delivery:
   - Previous shoulder dystocia
   - Presence of diabetes mellitus in index pregnancy
   - Clinical estimated fetal weight (EFW)
   - Ultrasound parameters of abdominal circumference and EFW
   - Previous pregnancy outcomes

Adapted from:

1. Sabah Obstetric Shared Care Guidelines 4th Edition, June 2020
2. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah,, Kangar Perlis
3. Penang State Obstetrics Protocol, 2021

C7. UTERUS SMALLER THAN DATES

1) Overview

a. Diagnosed when symphysio-fundal height (SFH) is less than gestational age.
b. Clinical fundal height (CFH) is an alternative to SFH and it is more practical to be use. There are some opinion that clinical fundal height is based on landmarks and less affected by height and weight.
c. Need to determine the patient's date accurately.
d. Identify women with risk factors.
e. Possible causes:
   - Wrong date
   - Oligohydramnios/ Anhydramnios
   - Small for gestational age/ fetal growth restriction
f. Optimize modifiable preconception risk factors: eg stop smoking / substance abuse, aim for good control of hypertension/DM.

2) Management

a. Abdomen palpation to estimate liquor volume and estimated fetal weight.
b. Ultrasound examination to measure fetal biometry, liquor volume.
c. Plot growth chart with the serial scan findings.
d. Further management depends on underlying causes

3) Small for Gestational Age (SGA)

a. Defined as fetal abdominal circumference (AC) or estimated fetal weight (EFW) <10th centile.
b. Heterogeneous group comprising fetuses that have failed to achieve the growth potential and fetuses that are constitutionally small.
c. Can be categorised according to:
   - Normal SGA: No structural anomalies, with normal liquor, normal umbilical artery doppler waveform and normal growth velocity.
   - Fetal growth restriction (FGR): majority are due to placental insufficiency. (other causes: Structural anomalies, chromosomal & other genetic anomalies; intrauterine infections).
d. Risk factors and possible causes are shown in next table.

MATERNAL RISK FACTORS	FETAL CAUSES	PLACENTAL CAUSES
i. Nutrition - anorexic mothers, low booking BMI. ii. Smoking iii. Alcohol and drugs abuse iv. Maternal therapeutic drug administration - beta blockers, anticonvulsants v. Maternal diseases – cardiorespiratory compromised, sickle cell diseases, diabetic complicated with microvascular diseases, chronic hypertension with renal impairment vi. Advanced maternal age vii. VF pregnancy	i. Chromosomal / other genetic anomaly i.e. trisomy 18 i. Structural anomalies i.e. Major cardiac defects i. Intrauterine fetal infections	i. Placenta mosaicism – chromosomes 16 and 22 (reduced placenta bulk and placenta dysfunction ii. Placental insufficiency i.e. pre-eclampsia, connective tissue disease

e. Detection: by abdominal palpation and measurement of clinical fundal height that showed uterus smaller than date.
f. Ultrasound biometry:
   - Abdominal circumference (AC) and estimated fetal weight (EFW) are the most accurate diagnostic measurements to predict SGA.
   - Comparison of the head and abdominal circumference will indicate whether the fetus is symmetrically or asymmetrically small.
g. Ultrasound doppler (to detect placental insufficiency):
   - Umbilical artery doppler studies correlate well with the risk of fetal hypoxia.
   - In high risk pregnancies with absent end diastolic flow (AEDF), 80% of fetuses will be hypoxic and 46% will be acidaemic.
h. Management:
   - Ultrasound anatomical assessment of small fetuses to look for structural anomalies.
   - For chromosomal study if indicated.
   - Blood investigation: e.g. TORCHES if suspected intrauterine infections.
i. Normal SGA fetus:
   - Conservative management by fetal surveillance with fortnightly monitoring.
   - Fetal assessment includes biometry, umbilical artery doppler waveform and liquor volume.
   - Role of CTG: unclear
   - For delivery if there's evidence of fetal compromise.
   - Consider labour induction by 39 to 40 weeks.

j. Growth-restricted fetus:
   - Between 28-32 weeks: with reverse end diastolic flow or absent end diastolic flow to admit for CTG, +/- BPP, +/- venous doppler (frequency will depend on severity of fetal growth restriction), antenatal steroids, neuroprotection with magnesium sulfate. Consider delivery if pathological CTG or abnormal BPP.
   - In most cases, this will require in-patient management.
   - If > 32 weeks with absent or reverse end diastolic flow, for delivery.
   - If normal end diastolic flow, consider delaying delivery until at least 37 weeks, provided other surveillance findings are normal.
   - Timing of delivery: balancing the risk of continuing pregnancy against risk of prematurity.
   - Delivery timing to be decided by senior O&G specialist / MFM specialist.
   - Delivery in hospital with neonatal expertise and facilities.

Adapted from:

1. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.
2. Sabah Obstetric Shared Care Guidelines 4th Edition, June 2020
3. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar Perlis
4. Penang State Obstetrics Protocol, 2021
5. Obstetrics & Gynaecology Protocol, State of Kedah, 2019

Reference:

1. Royal College of Obstetricians and Gynaecologists. The Investigation and Management of the Small-for-Gestational-Age Fetus. Green-top Guideline No.31. London: ROCG; 2014

C8. ABNORMAL AND UNSTABLE LIE AT TERM

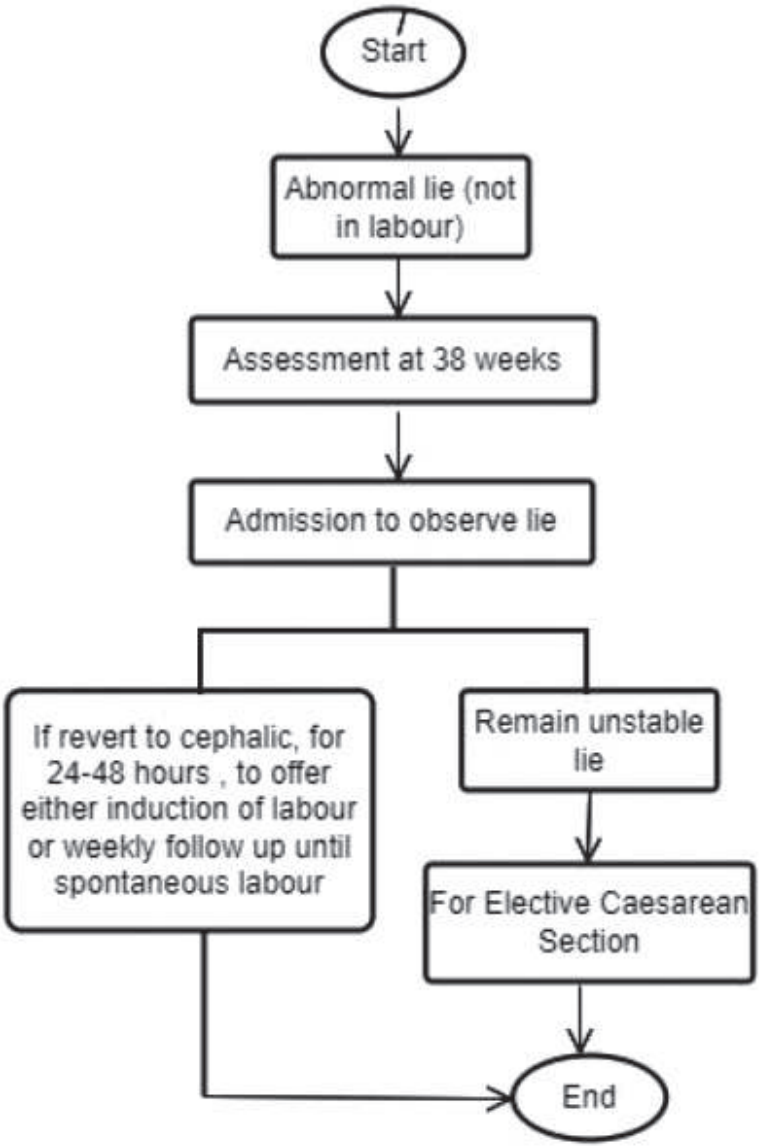
1) Overview

a. Lie: Relationship between long axis of fetus and long axis of uterus / in relation to maternal spine.
b. Abnormal Lie: Transverse, Oblique or Unstable
c. Spontaneous version to longitudinal lie occurs in 80-85% of women.
d. Underlying causes:
   - High parity
   - Pendulous abdomen
   - Uterine abnormalities (eg. bicornuate uterus or fibroids)
   - Pelvic inlet contracture and/or fetal macrosomia
   - Polyhydramnios
   - Placenta praevia
   - Fetal anomaly (eg hydrocephalus)
   - Wrong date / prematurity
   - Multiple pregnancy
e. Complications:
   - Cord presentation or prolapse if membrane ruptures at labour onset leading to fetal hypoxia
   - Obstructed labour leading to uterine rupture

2) Management

a. Confirm that the gestational age and dates are correct.
b. Look for underlying causes or associated contributing factors mentioned.
c. Abdominal palpation to confirm the lie and assess for polyhydramnios.
d. Ultrasonography to confirm the lie, fetal back direction, liquor volume, estimated fetal weight and to exclude causes.
e. Inform women of need for prompt admission to hospital if membranes rupture or when labour symptoms present.
f. Hospital admission from 37-38 weeks to observe lie if logistic issues.
g. If unstable lie, for elective caesarean section at 39-40 weeks of gestation.
h. If reverts to longitudinal lie with cephalic presentation, option of induction or discharge and weekly follow-up.
i. Immediate clinical assessment if membranes rupture or signs of labour.
j. May consider attempting an external version to cephalic presentation for immediate delivery/stabilizing induction if indicated.

Flowchart 10: Management of abnormal lie at term



Adapted from:

1. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar Perlis
2. Penang State Obstetrics Protocol, 2021
3. Obstetrics & Gynaecology Protocol, State of Kedah, 2019

C9. BREECH PRESENTATION

1) Overview

a. Breech presentation occurs when the fetal buttocks or lower extremities present into the maternal pelvis.
b. The incidence of breech presentation decreases with gestational age, from about 20% at 28 weeks to 3-4% at term.
c. It is imperative to exclude prematurity and wrong dates before attempting ECV or elective caesarean section.
d. There are 3 types of breech presentation: frank/extended, flexed/complete and footling.

2) Management

a. Evaluate for the associated factors:
   - Prematurity
   - Placenta Praevia
   - Cephalopelvic disproportion
   - Multiple pregnancy
   - Polyhydramnios
   - Fetal anomalies (eg hydrocephalus, anencephaly, cystic hygroma)
   - Uterine anomalies
   - Pelvic tumour
b. Ultrasound assessment:
   - To confirm date
   - Exclude fetal and uterine anomalies
   - Placental localization
   - Type of breech
   - Exclude hyperextension of neck
   - Fetal weight assessment
   - Liquor volume
c. Discuss with the patient on the options of management after evaluation and ultrasound assessment.

3) Management Options

3.1 Option 1: External Cephalic Version (ECV)

a. ECV is the transabdominal manipulation of a breech-presenting fetus into a cephalic presentation.
b. Can be performed any time after 36-37 weeks gestation.
c. It is safe if performed by trained doctors, and the risk of an emergency caesarean section within 24 hours is approximately 0.5%.
d. Success rates of ECV are 30-80%.
e. Spontaneous reversion to breech presentation after successful ECV occurs in less than 2-5%.
f. Absolute contraindication:
   - Placenta praevia
   - Major uterine abnormality
   - Ruptured membranes
   - Recent antepartum haemorrhage (within 7 days)
   - Multiple pregnancy (except for 2nd twin)
   - Abnormal CTG
g. Relative contraindication:
   - Uterine scar
   - Oligohydramnios
   - Fetal growth restriction
   - Major fetal anomalies
   - Unstable lie
   - Severe hypertensive or other medical disorders
h. Before the procedure:
   - Obtain written consent
   - Documentation of ultrasound findings
   - Empty bladder
   - Baseline CTG
   - IV access – consider IV salbutamol 100µg prior to procedure
i. CTG should be done post-procedure
j. In non-sensitised rhesus negative women, to give IM anti-D prophylaxis (within 72 hours) and consider a test for fetomaternal haemorrhage.
k. Possible complications:
   - Placental abruption
   - Uterine rupture
   - Fetomaternal haemorrhage
   - Fetal bradycardia
   - Non-reactive CTG
   - Rupture membrane and cord prolapse
   - Preterm labour

3.2 Option 2: Assisted Vaginal Breech Delivery

a. Careful woman selection and availability of skilled birth attendants are essential.
b. The decision to offer assisted breech delivery should be made by a specialist.
c. Pre-requisites:
   - Appropriate case selection; criteria must be met.
   - Birth in a specialist hospital with facilities for immediate caesarean section.
   - Availability of trained/skilled attendants.
   - Spontaneous onset of labour (induction of labour in breech must be specialist/consultant decision).
d. Women and partners should be fully counseled on the risks and benefits.
e. Contraindications:
   - High-risk pregnancy
   - Contraindications for vaginal delivery e.g Footling breech
   - Hyperextended neck on ultrasound
   - Estimated fetal weight <2.5kg or >3.5kg
   - Previous uterine scar
   - Fetal abnormalities
   - Evidence or/suspected fetal compromise eg: FGR
   - Cord around neck
   - Fetopelvic disproportion e.g hydrocephalus
f. Augmentation is discouraged and if required, only with specialist approval.
g. Intrapartum monitoring as per usual and progress of labour should be similar to cephalic presentation.
h. Possible complications:
   - Head entrapment after delivery of the body
   - Birth asphyxia (due to cord compression and head entrapment)
   - Cervical spine and basal skull injuries
   - Dislocation and bone fractures (eg humerus, clavicle, femur)
   - Intracranial haemorrhage (secondary to sudden decompression of fetal head)
   - Nerve injuries (brachial and cervical plexus injury)
   - Intra abdominal injury (liver and spleen injury)
i. Refer to "Section E: Breech Delivery" for methods of Assisted Breech Vaginal Delivery

3.3 Option 3: Elective Caesarean Section

a. This option is considered if ECV is contraindicated, failed or declined by the woman, and vaginal breech delivery is not an option.
b. Elective caesarean section appointment should be between 38-39 weeks if no other obstetric indication.

Adapted from:

1. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.
2. Sabah Obstetric Shared Care Guidelines 4th Edition, June 2020
3. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar Perlis
4. Penang State Obstetrics Protocol, 2021
5. Sarawak General Hospital Labour Ward Manual, 2020
6. Obstetrics & Gynaecology Protocol, State of Kedah, 2019

Reference:

1. External Cephalic Version and Reducing the Incidence of Term Breech Presentation. BJOG, 2017.
2. Royal College of Obstetricians and Gynaecologists. Management of Breech Presentation. Green-top Guideline No.20b. London: ROCG; 2017

C10. POSTDATE PREGNANCY

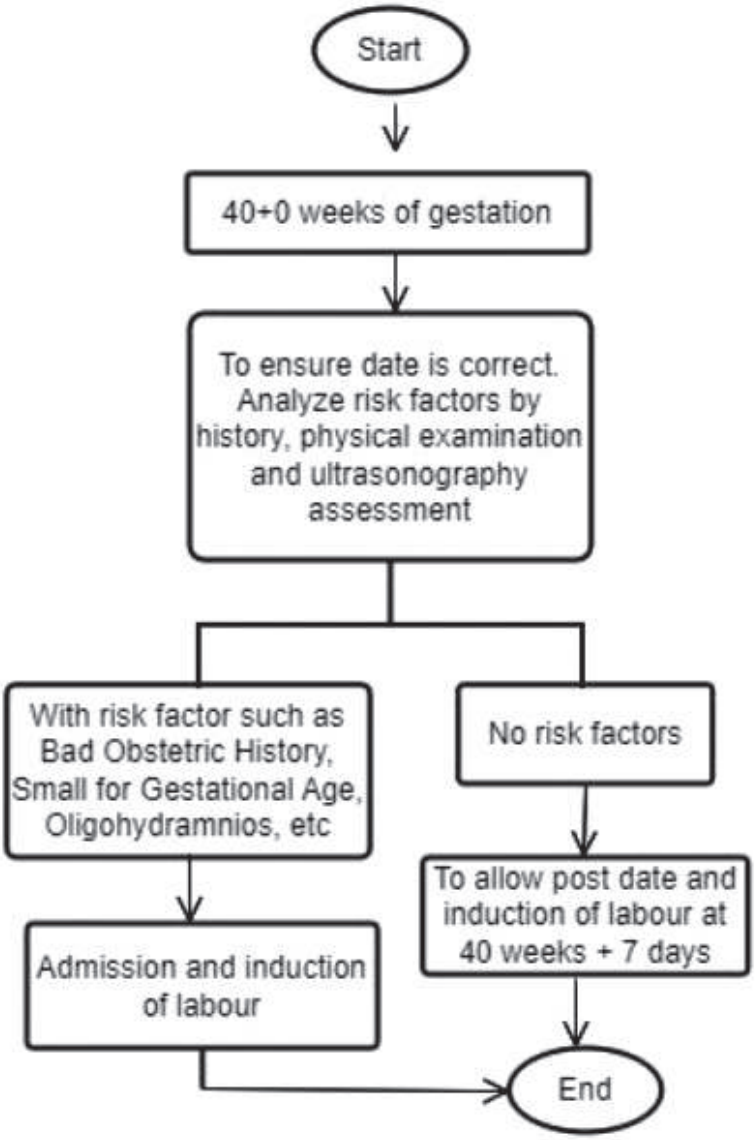
1) Overview

a. Post-date pregnancy is defined as pregnancy beyond 40 completed weeks.
b. Stillbirth rate steadily rises with gestational age and postdate pregnancy are associated with higher perinatal morbidity & mortality.
c. Physiological changes in a post-date pregnancy:
   - Placental changes: Senescence/aging, infarct and calcification
   - Amniotic fluid changes: Oligohydramnios (linked to diminished fetal urination), presence of meconium
   - Fetal changes: Intrauterine malnutrition, macrosomia / LGA

2) Management

a. Ensure the patient's dates are correct.
b. Determine patient's last normal menstrual pattern, last childbirth, contraceptive usage, date of urinary pregnancy test and date of early scan.
c. Determine patient's uterine size, liquor volume clinically.
d. Consider ultrasound for liquor volume assessment where possible.
e. If sure of dates and no risk factors or acute fetal/maternal compromise, offer induction of labour at EDD + 7 days.
f. If risk factors present (eg bad obstetric history, SGA, reduce liquor, subfertility etc), for labour induction.

Flowchart 11: Management of post date



Refer Section E for Induction of Labour

Adapted from:

1. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar Perlis
2. Penang State Obstetrics Protocol, 2021
3. Obstetrics & Gynaecology Protocol, State of Kedah, 2019

C11. VAGINAL BIRTH AFTER CAESAREAN SECTION (VBAC)

1) Overview

a. Planned VBAC is appropriate and may be offered to the majority of women with a singleton pregnancy of cephalic presentation at 37 completed weeks or beyond who have had a single previous lower segment caesarean delivery, with or without history of vaginal birth.
b. Success rate of planned VBAC is 72-75%.
c. Women with one or more previous vaginal birth, particularly previous VBAC, is associated with a planned VBAC success rate of 85-90%.
d. Planned VBAC is contraindicated in women with previous uterine rupture or classical caesarean scar and in women who have other absolute contraindications to vaginal birth.
e. Trial of scar should only be carried out in hospitals with O&G specialists.
f. Planned VBAC is associated with an approximately 1 in 200 (0.5%) risk of uterine rupture.

2) Management

a. All women with a previous caesarean section should be assessed thoroughly during the antenatal period.
b. Previous caesarean section operative notes should be reviewed and documented.
c. Determine as accurately as possible the indication and any complications of the previous caesarean section.
d. In women with complicated uterine scars, caution should be exercised and decisions should be made on a case-by-case basis by a specialist with access to the details of previous surgery.
e. Be certain of gestation age. Routine dating scan is recommended.
f. Counseling checklist should be used during decision of VBAC / repeat caesarean section. A patient information leaflet should be provided with the consultation.
g. Assess the risk in current pregnancy before counseling.
h. Counsel and decide mode of delivery around 34-36 weeks depending on risk factors as well as woman's preference.
i. Antenatal counseling of women with a previous caesarean birth should be documented in the notes.

j. Absolute/Relative contraindications for VBAC:
   - 2 or more previous caesarean section
   - Previous classical or upper segment uterine incision
   - Previous cornual pregnancy
   - Previous extensive tear in or extended uterine incision involving upper segment (eg J incision, T-inversion etc)
   - Previous myomectomy with uterine cavity breached
   - History of Uterine rupture
   - Patient refused trial of scars
   - Non-cephalic presentation
   - Multiple pregnancies
   - Macrosomia / LGA
   - Interdelivery interval of < 12 months
   - With absolute contraindication for vaginal delivery eg placenta previa

3) Induction of labour

a. Women should be counseled regarding risk of scar rupture with different methods of labour induction.
b. Decision of labour induction should be made by an O & G specialist.
c. Mechanical methods of induction have been found to be effective and associated with lower risk of scar rupture as compared to medical induction.
d. Use of prostaglandins is still acceptable but it can increase the risk of uterine rupture by 2 fold.
e. Selection of cases for prostaglandin induction should be decided only by an O & G specialist / consultant.
f. Suggest for more frequent CTG monitoring for induction with prostaglandin in women with previous scar.

4) Intrapartum management (in active phase of labour)

a. Keep Nil by mouth with intravenous hydration.
b. Hourly vital signs monitoring (half hourly pulse rate monitoring)
c. Functioning large bore cannula in-situ
d. Send blood for FBC + GSH/GXM
e. Continuous CTG monitoring
f. Epidural analgesia if available
g. Increasing requirement for pain relief in labour should raise awareness of possibility of scar dehiscence or impending uterine rupture
h. Judicious use of oxytocin augmentation if indicated and discussion with specialist is required
i. Oxytocin augmentation preferably be given via infusion pump
j. Early consideration of caesarean section if no significant progress after 6-8 hours of labour
k. Monitor for signs of uterine rupture / dehiscence:
   - Maternal pulse > 100 bpm
   - Maternal BP < 100/60 mmHg
   - Abnormal CTG
   - Persistent suprapubic pain/abdominal pain even in between contractions
   - Haematuria
   - Increase PV bleeding
   - Loss of station of presenting part

Adapted from:

1. Obstetrics & Gynaecology Protocol, State of Kedah, 2019.
2. Penang State Obstetrics Protocol, 2021.
3. Sarawak General Hospital Labour Ward Manual, 2020.
4. Sabah Obstetric Shared Care Guidelines 4th Edition, June 2020.

Reference:

1. Royal College of Obstetricians and Gynaecologists. Birth After Previous Caesarean Birth. Green-top Guideline No.45. London: ROCG; 2015.

C12. REDUCED FETAL MOVEMENT

1) Overview

a. Perceived fetal movements are defined as the maternal sensation of any discrete kick, flutter, swish or roll.
b. Most women are aware of fetal movements by 18-20 weeks of gestation (Quickening).
c. In primiparity, quickening is perceived around 20 weeks; in multiparity, as early as 16 weeks.
d. It is important to educate women to record fetal movement in daily fetal movement charts.
e. Women should be advised to be aware of their baby's individual pattern of movements.
f. Consider reduce fetal movement if:
   - <10 fetal movement / day
   - Progressively longer in a day to reach 10 kicks
   - No movement in 2 hours
   - Any subjective feeling of reduced fetal movement including strength and frequency of fetal movement

**No clear consensus on what constitutes a definition of reduced fetal movement, criteria above may be use.*

2) Management

a. Review history of patients.
b. Check for current obstetric risk factor eg. fetal growth restriction, fetal anomaly, Hypertensive disorder, Gestational Diabetes or other complications.
c. Review past obstetric history particularly in regards to previous intrauterine death/stillbirth or medical disorders.
d. Perform physical examination. Check vital signs, symphysio-fundal height, clinical liquor volume and estimated fetal weight.
e. Check and document fetal heartbeat by daptone or ultrasound.

f. Fetal heart assessment using Daptone after 24 weeks of gestation (over 1 minute):
   - Normal: FHR 110-160 bpm
   - Abnormal: Absent, Irregular, Bradycardia (FHR <110 bpm), Tachycardia (FHR >160 bpm).

g. Perform ultrasound to check biometry measurement, locate and show to mother the fetal heart activity, liquor volume and UA doppler (if indicated).

h. CTG should be done if pregnancy is over 28 weeks of gestation.

i. If CTG normal, to admit for CTG monitoring and further evaluation if risk factors are present.

j. If CTG is suspicious/pathological with the presence of any risk factor, consult a specialist for decision of delivery.

k. Delivery timing as per obstetric indication. Refer to section E: Induction & Augmentation of labour.

Adapted from:

1. Sabah Obstetric Shared Care Guidelines 4th Edition, June 2020
2. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar Perlis
3. Penang State Obstetrics Protocol, 2021

Reference:

1. Royal College of Obstetricians and Gynaecologists. Reduced Fetal Movement. Green-top Guideline No.57. London: ROCG; 2011

C13. INTRAUTERINE FETAL DEATH (IUFD)

1) Overview

a. Intrauterine fetal death refers to fetuses with no signs of life in-utero after 22 weeks of pregnancy or weight of > 500gm if uncertain gestational age.
b. It is known to occur in 1 in 200 babies.
c. Intrauterine death is often a traumatic and emotional event for the parents and family.
d. The diagnosis of intrauterine death should be confirmed by 2 doctors independently before informing the woman in a sensitive manner.
e. Events leading to or related to IUFD must be documented clearly.
f. Possible causes:
   - Maternal: Diabetes Mellitus, Hypertension, Septicaemia
   - Fetal malformation
   - Infections
   - Immune disorders eg. Rh incompatibility, connective tissue disorder
   - Cord accident
   - Placental insufficiency, abruption
   - Twin-to twin transfusion
   - Fetal maternal haemorrhage etc

2) Investigations

a. Ultrasound features in intrauterine death:
   - Absence of fetal heart activity
   - Non-pulsatile aorta
   - Spalding sign – irregular overlapping of skull bones
   - Robert's sign – appearance of gas shadow in heart chambers and great vessels
   - Absence of fetal movement

b. Maternal blood investigations:
   - FBC/ BUSE/Creatinine/ LFT/ Coagulation profile
   - Blood & Rhesus group (if unknown)
   - VDRL
   - TORCHES (if hydrops)
   - Kleihauer-Betke test (to detect possibility of large feto-maternal
   - haemorrhage)
   - Lupus anticoagulant and anticardiolipin antibodies (6 weeks post delivery)
   - HbA1c

c. Tests should be directed to identify scientifically proven causes of intrauterine fetal death.
d. Offer surgical post-mortem examination of the fetus. (Counseling should only be done by specialist/consultant as this is a sensitive issue in our community)
e. Consider photographic documentation of all fetuses with dysmorphism. This should be done after obtaining parental consent
f. "Babygram" only in the presence of structural/skeletal deformities
g. Karyotype when indicated
h. Fetal intracardiac blood can be taken if needed for further investigations i.e. viral serology, karyotyping, Full blood picture
i. Placental Swab C&S
j. Placental tissue for histopathological examination
k. Parental consent must be obtained before taking any samples or performing any invasive procedure on the fetus and documented clearly in the case notes

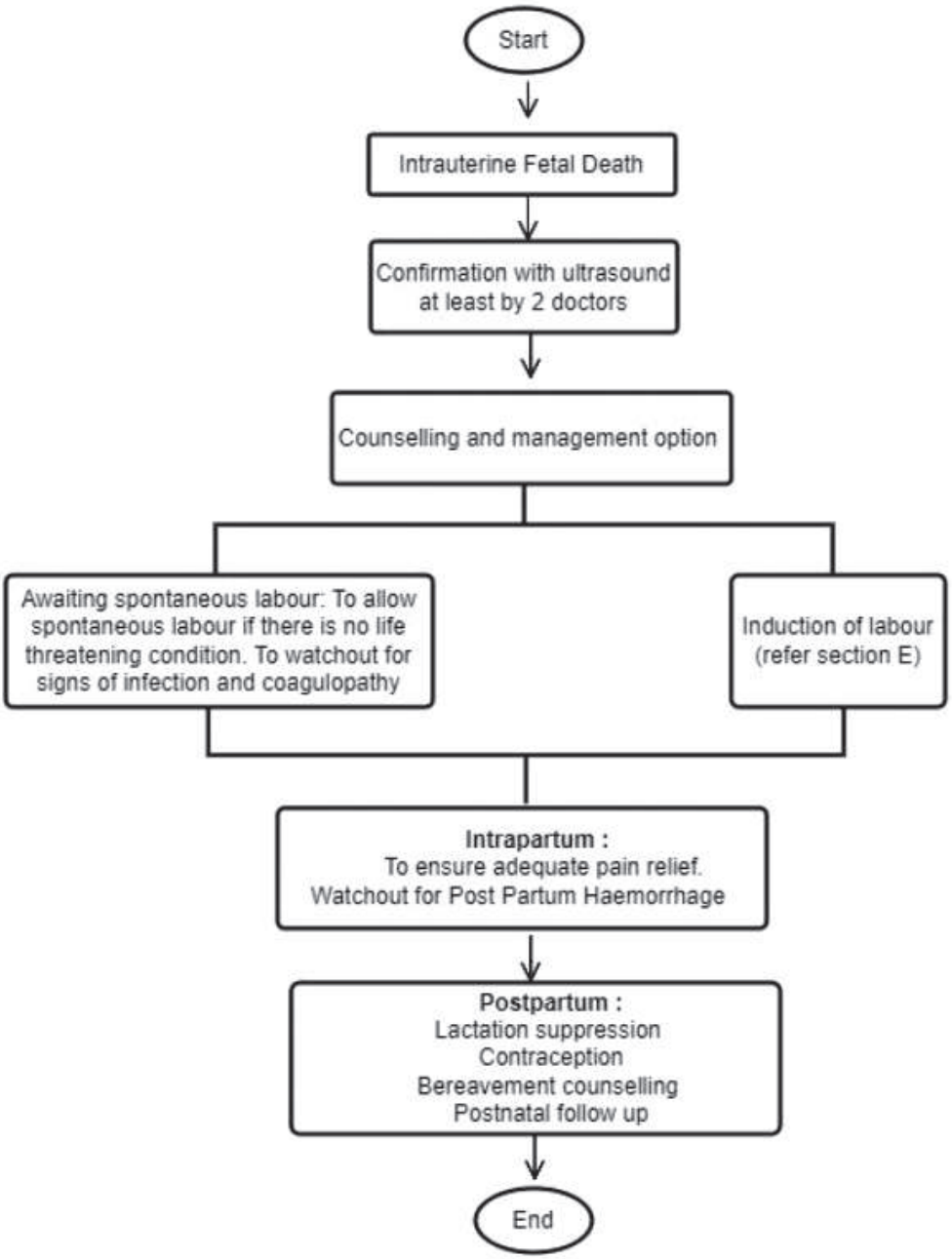
3) Management

a. Need to exclude life threatening condition such as placenta abruption, chorioamnionitis, scar dehiscence and severe pre-eclampsia
b. Mode of delivery: aim for vaginal delivery
c. Screen for DIVC before induction of labour
d. Induction of labour as for viable pregnancy
e. Send investigations as mentioned
f. Third stage of labour – to watchout for PPH
g. Consider antibiotic, eg if suspected infection
h. Detailed examination of fetus should be performed and documented clearly by the managing medical officer/specialist
i. Detailed examination of placental and umbilical cord should be performed and documented clearly too
j. Offer woman the option of isolation room/single room after delivery if available, consider transfer to gynecology ward instead of usual postnatal ward
k. Suppression of lactation with Tab Cabergoline 1mg on the first day after delivery
l. Offer bereavement counseling prior to discharge

4) Follow-up

a. During follow-up, all investigation results should be available.
b. Patients should be informed of the findings and subsequent plan in her next pregnancy and prevent measures if any.
c. If chromosomal or structural abnormality, need to counsel regarding risk of recurrence.

Flowchart 12: Management of Intrauterine Fetal Death



Adapted from:

1. Sabah Obstetric Shared Care Guidelines 4th Edition, June 2020.
2. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar Perlis.
3. Penang State Obstetrics Protocol, 2021.
4. Sarawak General Hospital Labour Ward Manual, 2020.
5. Obstetrics & Gynaecology Protocol, State of Kedah, 2019.

Reference:

1. Royal College of Obstetricians and Gynaecologists. Late Intrauterine Fetal Death and Stillbirth. Green-top Guideline No.55. London: ROCG; 2010.

SECTION

D

SELECTED MEDICAL DISORDERS IN PREGNANCY

D1. ANEMIA IN PREGNANCY

1) Overview

a. About a 1/3 of pregnant Malaysian women have anemia in pregnancy, of which the majority are due to iron deficiency anemia (IDA).

DEFINITION OF ANEMIA BY TRIMESTER	DEFINITION OF ANEMIA BY SEVERITY
1st trimester <11.0 g/dL	Mild 9-11 g/dL
2nd & 3rd trimester <10.5 g/dL	Moderate 7-9 g/dL
Postpartum <10.0 g/dL	Severe <7 g/dL

b. Presumptive diagnosis of IDA is therefore reasonable and iron supplementation can be started, with an expected rise of Hb of >1g/dL in two weeks.
c. Conventionally, 30-100mg/day of elemental iron has been suggested as prophylaxis and 100-200mg/day for treatment. However, recent data suggests lower doses of 40-80 mg/day have a similar effect to higher doses.
d. Iron supplement should be taken on an empty stomach and in the morning, where hepcidin levels are lowest.

FORMS OF ORAL IRON PREPARATION (MG/TABLET)	ELEMENTAL IRON CONTENT	
	(MG)	(%)
Ferrous fumarate 90 mg (Obimin)	30	33
Ferrous fumarate 350 mg (Zincofer)	115	33
Ferrous sulfate 525 mg (Iberet)	105	20
Ferrous gluconate 250 mg (Sangobion)	30	12
Iron polymaltose 370 mg (Maltofer)	100	27

2) Indications for parenteral iron therapy

a. Unable to tolerate oral iron or non-compliance (ex. complex patient factors).
b. Approaching term with insufficient time for oral iron to be effective (ex. moderate IDA beyond 34 weeks gestation.
c. IDA should be confirmed by a serum ferritin < 15 ng/ml prior to parenteral use.
d. Total iron deficit can be estimated via the Ganzoni formula or using the simplified method (Dignass 2015).

3) Ganzoni formula

a. Total iron deficit (mg)= {body weight (kg) x [target-actual Hb (g/L)]} x 0.24+iron depot (500mg)

Simplified method for calculation of iron deficit

Hb	BODY WEIGHT 35-<70 KG	≥ 70KG
< 10g/dL	1500mg	2000mg
10g/dL or more	1000mg	1500mg

Source: UK guidelines on the management of iron deficiency anemia in pregnancy 2019

b. Recombinant human erythropoietin (rhEPO) should not be routinely used beyond the context of anemia associated with end-stage renal disease.
c. When indicated, mothers can be reassured that (rhEPO) has a high molecular weight and does not cross the placenta.

4) Other causes of anemia other than IDA

a. Thalassemia is one of the most common causes of anemia in pregnancy. An estimated 6.8% of Malaysians are carriers, with HbE/beta Thalassemia and beta thalassemia major the most common forms reported in the registry.

LOW MCV (<80fL)	NORMAL MCV (80-100fL)	HIGH MCV (>100fL)
Thalassemia Hookworm infection Anemia of chronic ds Sideroblastic anemia Lead poisoning	Acute haemorrhage Autoimmune haemolytic Thyroid diseases Marrow suppression Hereditary spherocytosis Paroxysmal nocturnal haemoglobinuria Anemia of chronic disease	Folate deficiency B12 deficiency Drug-induced (Zidovudine) Acute myelodysplastic syndrome

b. Hb Electrophoresis to exclude beta Thalassemia if MCH<27 pg/cell or Mentzer index (MCV/RBC) <13.
c. Hb DNA analysis is required to confirm suspicion of alpha Thalassemia
d. Stool for ova/cyst to exclude hookworm infection.
e. Peripheral blood film to exclude red cell membrane disorders such as Southeast Asian Ovalocytosis (SAO) which is inherited in an autosomal dominant manner. It is also helpful where there is suspicion of haemolytic conditions or where there is coexistent bicytopenia or pancytopenia.
f. The patient's partner should be screened if thalassemia or SAO is diagnosed.

5) Intrapartum considerations

a. Delivery in tertiary centres with adequate blood bank support
b. Group, screen and hold
c. Ensuring IV access available
d. Active management of third stage

6) Postpartum considerations

a. In selected cases where there is no active bleeding, cardiac compromise or significant symptoms, parenteral iron may be considered in place of transfusion.
b. Women with IDA require 40-80 mg/day of elemental iron for 3 months.

Adapted from:

1. Sabah Obstetric Shared Care Guidelines 4th Edition, 2020.

Reference:

1. UK guidelines on the management of anemia in pregnancy 2019.

D2. HYPERTENSIVE DISORDERS IN PREGNANCY

1) Overview

a. The definition and classification of hypertensive disorders in pregnancy (HDP) can be found elsewhere and will not be repeated. However, two conditions, white-coat hypertension and masked hypertension may be worth mentioning.
b. White-coat HPT does not require treatment unless BP in the clinic exceeds 160/110 mmHg. Women are at higher risk of developing gestational HPT and preeclampsia than normotensive women.
c. Masked HPT occurs when clinic BP is normal but raised when measured at home. This should be sought when women present with unexplained end organ damage such as retinopathy or left ventricular hypertrophy.

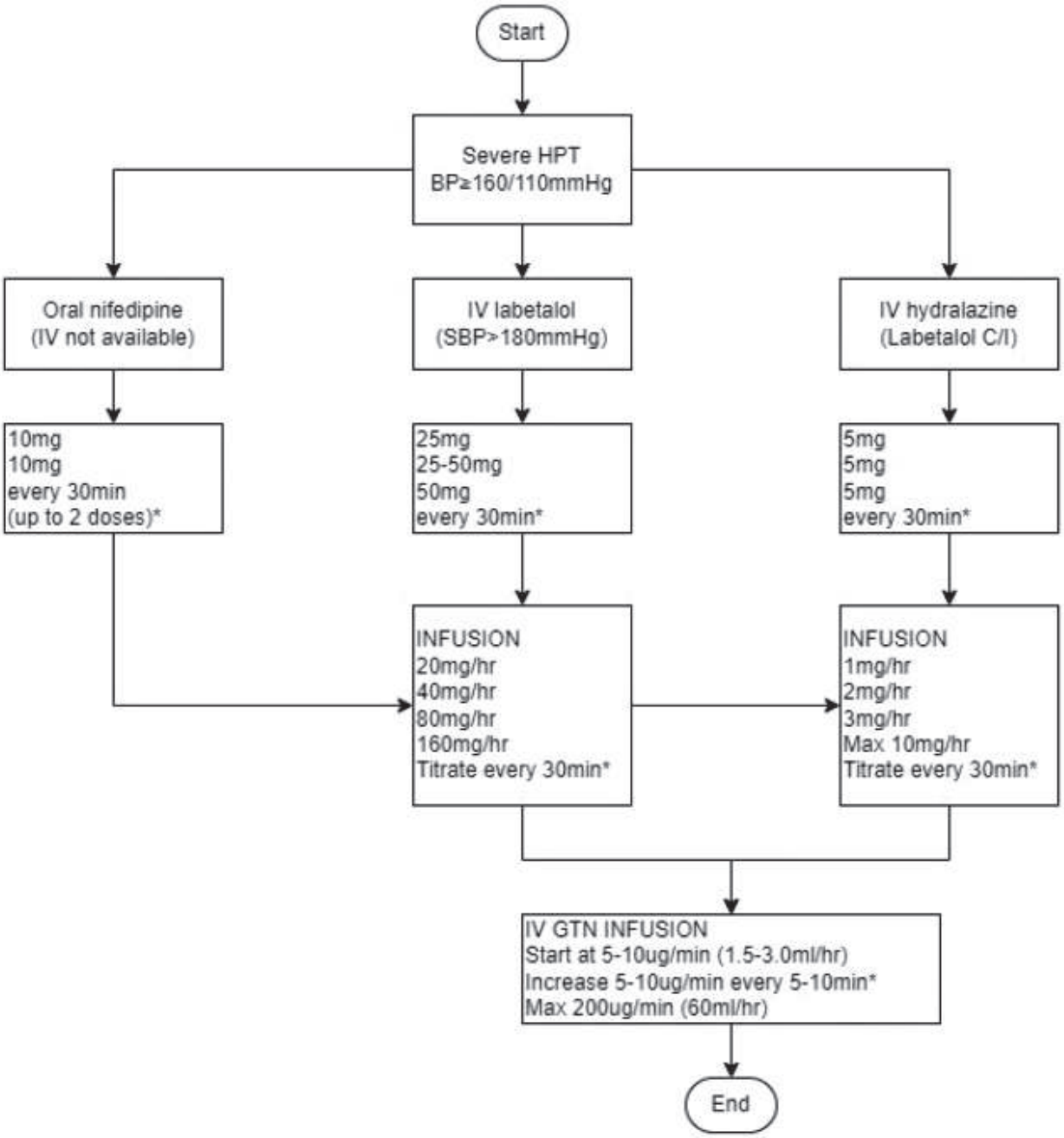
2) Management of non-severe hypertension

a. WHO recommends either labetalol or methyldopa as first line agents.
b. Maintain BP control between 110-140/80-85mmHg (ISSHP suggests to focus on the diastolic BP, keeping it below 85mmHg). A tighter BP control has been shown to reduce the risk of severe HPT and possibly, preterm birth.

SEVERITY	MANAGEMENT
Mild 140-149/ 90-99mmhg	➢ Consider starting anti-HPT if persistent ➢ Outpatient management with BP monitoring 2x/week ➢ Serial fetal growth monitoring 4-6 weekly ➢ -onsider delivery at 37-40 weeks
Moderate 150-159/ 100-110mmhg	➢ Start anti-HPT ➢ Inpatient stabilization of BP may be required ➢ Shared care between hospital and health clinics ➢ Serial fetal growth monitoring 4-6 weekly ➢ Consider delivery at 37 weeks if preeclampsia develops

3) Management of severe hypertension

Flowchart 13: Management of severe hypertension



a. Inpatient stabilization of BP is recommended.
b. Initial BP goal is to achieve systolic BP<150mmHg and diastolic 80-100mmHg rather than rapid normalization of BP to avoid placental hypoperfusion.
c. Consider $MgSO_4$ if severe HPT with concomitant preeclampsia.
d. Continuous fetal monitoring.
e. Delivery should be considered in the term fetus once BP stabilizes.
f. If BP normalizes, fetal growth should be monitored 2-4 weekly.

4) Preeclampsia (PET)

a. Can arise de novo or in 25% of women with underlying chronic HPT
b. Diagnosed when there is gestational hypertension with new-onset of one or more of the following features, after 20 weeks of gestation:

NEW ONSET OF	DESCRIPTION
Significant proteinuria	24-hour urine protein of ≥ 300 mg/day or urine protein/ creatinine ratio of ≥ 30 mg/mmol
End organ dysfunction	***Maternal*** -acute kidney injury (creatinine > 90 umol/L) -liver involvement (AST/ALT > 40 IU/L) -neurological complications (eclampsia, altered mental status, blindness, stroke, clonus, severe headaches, persistent visual scotomata) -haematological complications (thrombocytopenia, DIC, hemolysis) ***Uteroplacental*** -Fetal growth restriction, abnormal umbilical artery waveform analysis or stillbirth
*PET is diagnosed even in the absence of proteinuria, once **new-onset** end organ dysfunction is present	

c. Admit at the point of diagnosis and perform FBC, LFT, renal profile. Coagulation profile and LDH are not routine unless there is concomitant thrombocytopenia or if haemolysis is suspected.
d. $MgS0_4$ is indicated in the event of PET with severe hypertension and either:
   - difficult BP control, or
   - biochemical derangement, or
   - complication of PET such as pulmonary oedema, HELLP or abruption
e. $MgS0_4$ is also indicated for fetal neuroprotection if delivery is expedited prior to 30 weeks of gestation.
f. There is no rationale to "run dry" a preeclamptic woman as she is already at risk of acute kidney injury (AKI).
g. On the other hand, excessive use of intravenous fluids can lead to acute pulmonary oedema.

h. To ensure euvolemia, insensible losses should be replaced (30 mL/h) along with anticipated urinary losses (0.5–1 mL/kg per hour). In averaged sized women, this is approximately 60–80 mL/h.
i. Diuretics should not be used in oliguric women unless there is evidence of pulmonary oedema.

Total fluid replacement in fasting patients = Urine output + insensible losses (30ml/hr)

j. Time of delivery:

Delivery in women with PET should be considered if she develops either one of below:

- Recurrent episodes of severe hypertension despite maintenance with 3 anti-HPT
- Progressive thrombocytopenia, abnormal renal profile or AST/ALT
- Acute pulmonary oedema
- Neurological complications such as severe intractable headache, repeated scotoma or convulsions *
- Non-reassuring fetal status

≥37^{+0} weeks	Delivery indicated regardless of symptoms.
34 to 36^{+6} weeks	Delivery may be indicated as decided by the specialist. Antenatal corticosteroids **may be considered** in the event of pre labour caesarean section.
<34 weeks	Delivery may be indicated as decided by the specialist. Antenatal corticosteroids **should be given**.

**Management of eclampsia will be covered under Section E: Obstetric emergencies and $MgS0_4$ regimen can be found in the Appendix*

5) Postpartum considerations

a. Labetalol, nifedipine, hydralazine, amlodipine, atenolol, metoprolol, captopril and enalapril can be used in breastfeeding.
b. Methyldopa should be avoided due to risks of postpartum depression.
c. VTE assessment and contraception advice.
d. Women should be educated on the role of PET prophylaxis in subsequent pregnancies and the long- term cardiovascular risk.

6) Prevention of preeclampsia

a. Use of low-dose aspirin can reduce the risk of preterm preeclampsia by over 62% when started prior to 16 weeks of gestation.
b. Women with risk factors should be started on 150mg aspirin/night (wt >40kg) or 100mg/night (wt<40kg) at 11-14 weeks until 36 weeks or when PET develops.
c. Calcium carbonate 1g BD can also be started by 20 weeks of gestation as our population has a presumptively low calcium intake. Calcium supplementation reduces the risk of both preterm and term preeclampsia.

START ASPIRIN AND CALCIUM CARBONATE IF ≥1 MAJOR OR ≥2 MINOR RISK FACTOR (NICE)	
Major - HPT ds in previous pregnancies - Chronic HPT - Chronic renal ds - Autoimmune ds like SLE or APS - Type 1 or 2 diabetes	**Minor** - Primigravida - Birth interval > 10 years - Multiple pregnancies - Family history of PET - Age ≥ 40 years - BMI ≥30kg/m2
**First trimester PET screening using maternal characteristics, mean uterine artery PI & PAPP-A/PlGF has a higher detection rate than NICE (82% vs 41%). First trimester PET screening can be offered, where available*	

Adapted from:

1. Sarawak General Hospital Labour Ward Manual, 2020.

Reference:

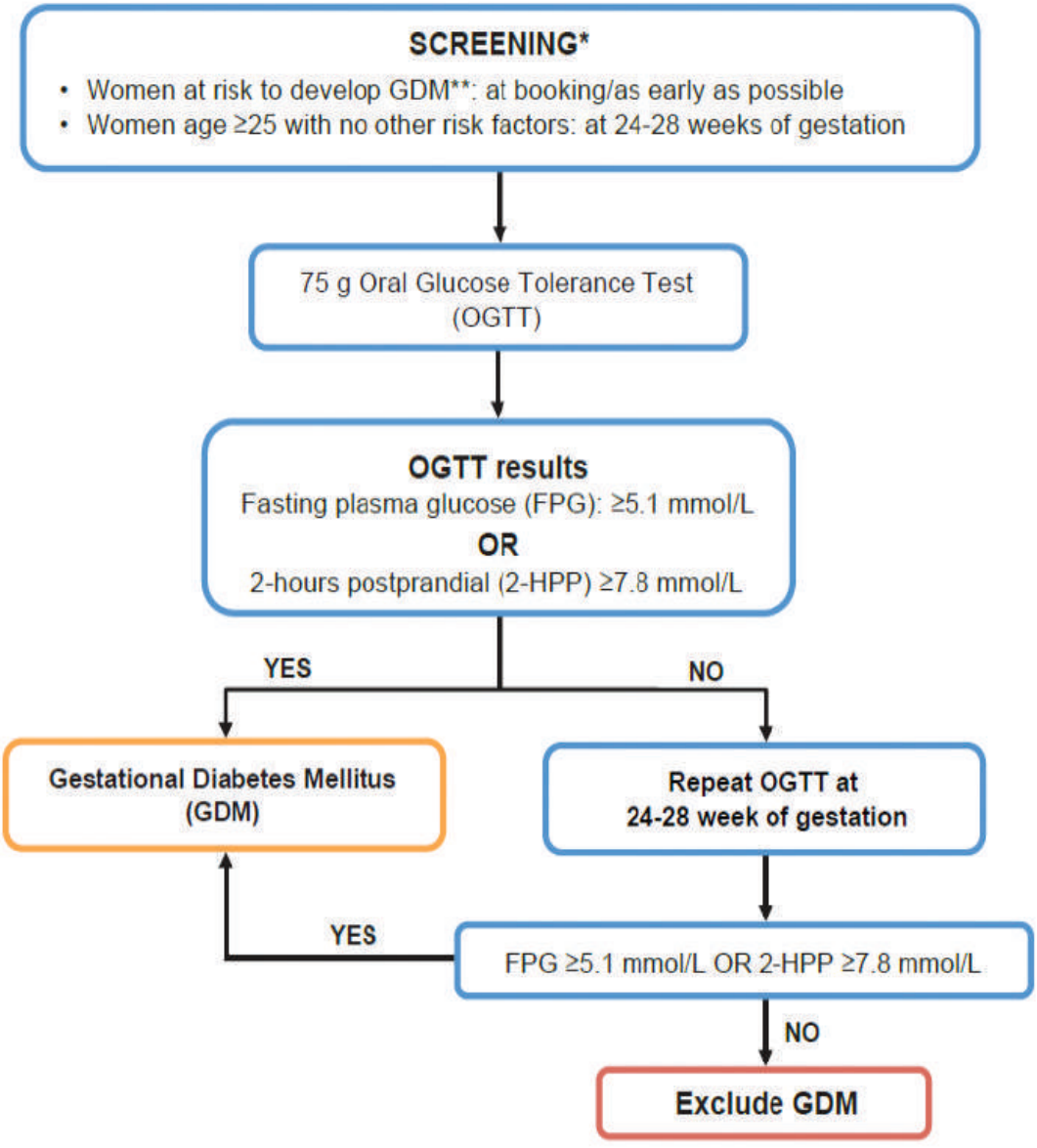
1. Garovic et al. Hypertension in pregnancy: a scientific statement from the American Heart Association. Hypertension. 2022;79:e21–e41.
2. ISSHP classification, diagnosis & management recommendations for international practice 2018.
3. Magee LA, von Dadelszen P et al. Management of Hypertension in Preg.4. Maternal-Fetal Medicine 3(2):p 124-135, April 2021.

D3. DIABETES MELLITUS IN PREGNANCY

1) Overview

a. Universal screening for gestational diabetes mellitus (GDM) is recommended in the Malaysian Clinical Practice Guideline 2017 (CPG) as shown below:

Flowchart 14: Screening for GDM



**RISK FACTORS	
- body mass index >27 kg/m^2 - previous history of GDM - first degree relative with DM - history of macrosomia > 4kg - bad obstetric history	- glycosuria ≥ 2+ on two occasions - current obstetric risk factors (essential HPT, pregnancy-induced HPT, polyhydramnios, current use of corticosteroids)

b. Overt DM is diagnosed when the FPG is ≥ 7.0mmol/L or 2-HPP ≥11.0 mmol/L.
c. Further screening for GDM beyond the 24-28 week period is not recommended. Women diagnosed "late" do not have higher diabetes-related adverse outcomes but have increased elective caesarean rates (Shindo 2021).
d. Target for blood sugar profile are: fasting 4.0-5.3mmol/L and 2-HPP 4.0-6.7mmol/L.
e. If blood glucose targets are not met with diet and exercise changes within 1 to 2 weeks, offer metformin or insulin.
f. The Malaysian CPG (2017) recommends metformin as the first line treatment, although ADA (2022) recommends insulin instead, due to long-term childhood metabolic concerns from more recent studies.
g. 50% of women on metformin may still require insulin to optimize blood sugar.
h. Fetal growth should be monitored in women on metformin due to risks of small for gestational age (SGA).
i. Metformin should not be used to prevent gestational DM, even in high risk women (ex. Obesity, PCOS)

2) Frequency of blood sugar monitoring

Diet/OHA/Single dose insulin	Fasting glucose & postprandial glucose till target achieved. Repeat at intervals 1-2 weeks thereafter.
Multiple dose insulin	GDM: 2-3X/day, 2-3 days a week
	Pregestational: 3x/day, daily

**Refer CPG Management of Diabetes in Pregnancy 2017 for more details.*

3) Overview of management

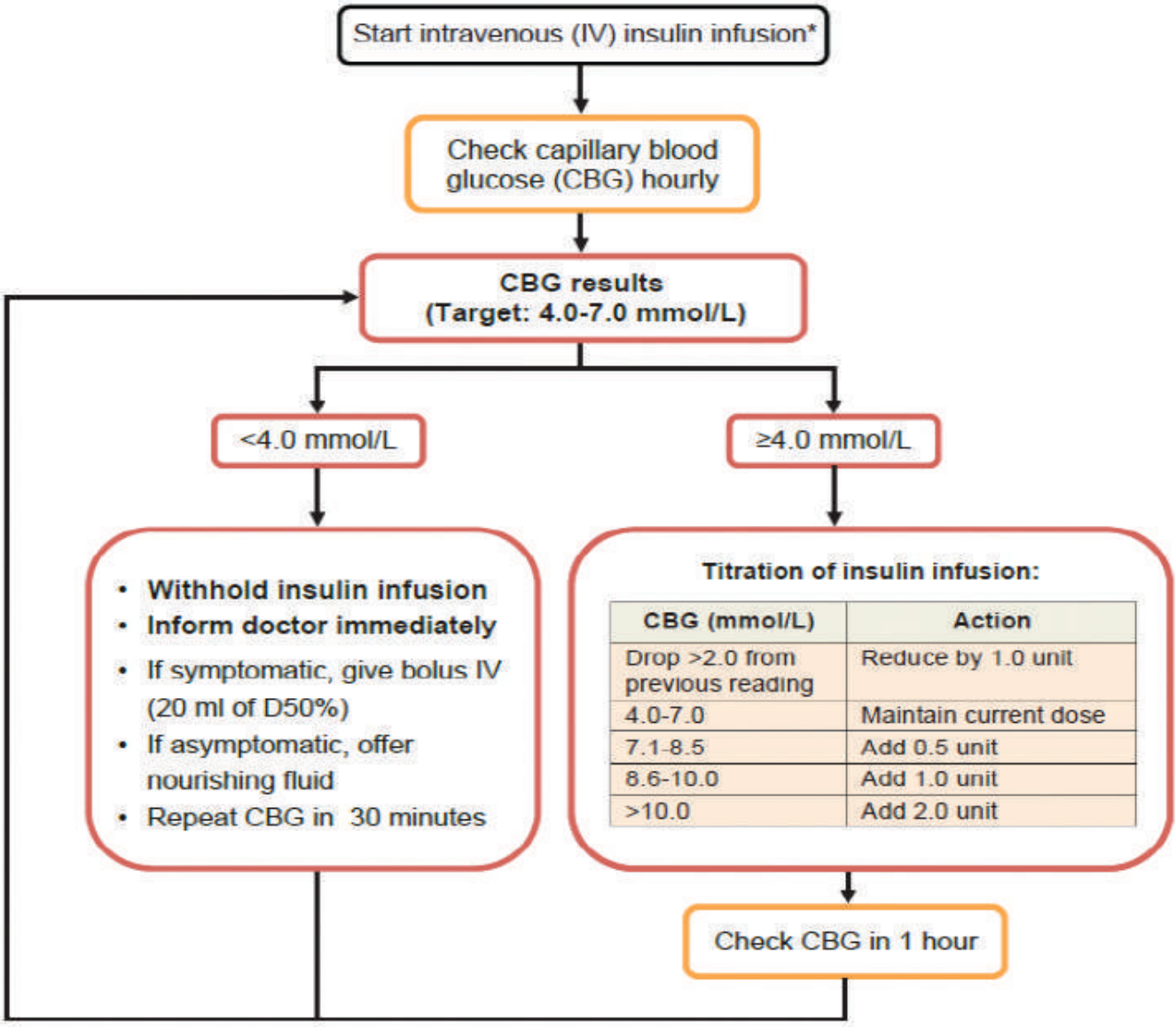
TRIMESTER	GESTATIONAL DM	PREGESTATIONAL OR OVERT DM
1st Trimester OR at booking	• Dietary advice +/- diabetic educator • Confirm viability and EDD	• Refer dietician, diabetic educator • Review blood sugar profile, medications, including anti-HPT and statins • Start insulin therapy if indicated • HbA1c, retinopathy screening, serum creatinine • Consider VTE prophylaxis if proteinuria in nephrotic range • Aspirin 150 mg ON • Shared care with FMS • First trimester screening where available.
2nd-3rd trimester	• Repeat mOGTT 24-28 weeks in women with risk factors (and previously normal mOGTT)	• Refer antenatal diabetic clinic if poor control • Start calcium carbonate 1g BD • Repeat retinopathy screening each trimester • Anomaly screening 18-22weeks.
	• Monthly growth scans from 26-28 weeks onwards • Discuss mode and timing of delivery • Refer anaesthetist if necessary.	

TRIMESTER	GESTATIONAL DM	PREGESTATIONAL OR OVERT DM
Timing of delivery	• GDM good control • GDM/Pre-existing DM on treatment • Poorly-controlled GDM/pre-existing DM with maternal or fetal complications	• 40^{+0} to 40^{+6} weeks • 37^{+0} to 38^{+6} weeks • Consider delivery even prior to 37^{+0} weeks
	Where antenatal corticosteroids are indicated, IM Dexamethasone 6 mg twice daily x 4 doses with close monitoring of blood sugar is suggested. Temporary use of metformin and insulin may be considered during the hypergylcaemic effect. Sliding scale while receiving dexamethasone is also acceptable.	

4) Intrapartum insulin monitoring

a. Blood sugar should be monitored 4 hourly in women with GDM on diet control, 1-2 hourly in women with Type 2 DM/GDM on treatment. The aim is to keep blood sugar 4.0-7.0mmol/L.
b. Women with Type 1 diabetes or when blood glucose is >7.0mmol/L should be started on insulin infusion as below and monitored hourly.

Flowchart 15: Insulin infusion



* ***IV insulin infusion initiation rate***

- Type 1 diabetes mellitus: 0.01-0.02 unit/kg/hour
- Type 2 diabetes mellitus/gestational diabetes mellitus: 0.05-0.07 unit/kg/hour
- If requirement exceed 0.1 unit/kg/hour, refer the endocrinologist/physician

Although tight intrapartum glucose control (4.0-7.0 mmol/L) is recommended by the CPG and NICE guidelines, the authors are aware of the recent recommendations suggesting that a "less tight" or pragmatic glycaemic targets (5.0-8.0 mmol/L) be used. The advantage of a pragmatic target includes less use of IV insulin infusions and staffing burden, more maternal mobility and less risk of maternal hypoglycaemia.

5) Postpartum

a. Women with GDM on insulin should discontinue insulin immediately after delivery. Fasting, premeal and pre-bed blood glucose should be monitored.
b. Women with overt or preexisting DM should reduce their insulin by 1/2 to 2/3 and monitor blood sugar to establish optimal dose (may refer to endocrinologist if service is available).
c. Breastfeeding further reduces the insulin requirement and lowers the risk of developing diabetes.
d. OGTT should be repeated 6 weeks postpartum in women with GDM.

Reference:

1. CPG Management of Diabetes in Pregnancy 2017.
2. American Diabetes Association. Management of Diabetes in Pregnancy: Standards of Medical Care in Diabetes 2022.
3. Shindo R, et al. Impact of gestational diabetes mellitus diagnosed during the third trimester on pregnancy outcomes: a case-control study. BMC Pregnancy Childbirth. 2021 Mar 24;21(1):246.
4. Joint British Diabetes Societies for inpatient care. Managing diabetes and hyperglycaemia during labour and birth February 2023.

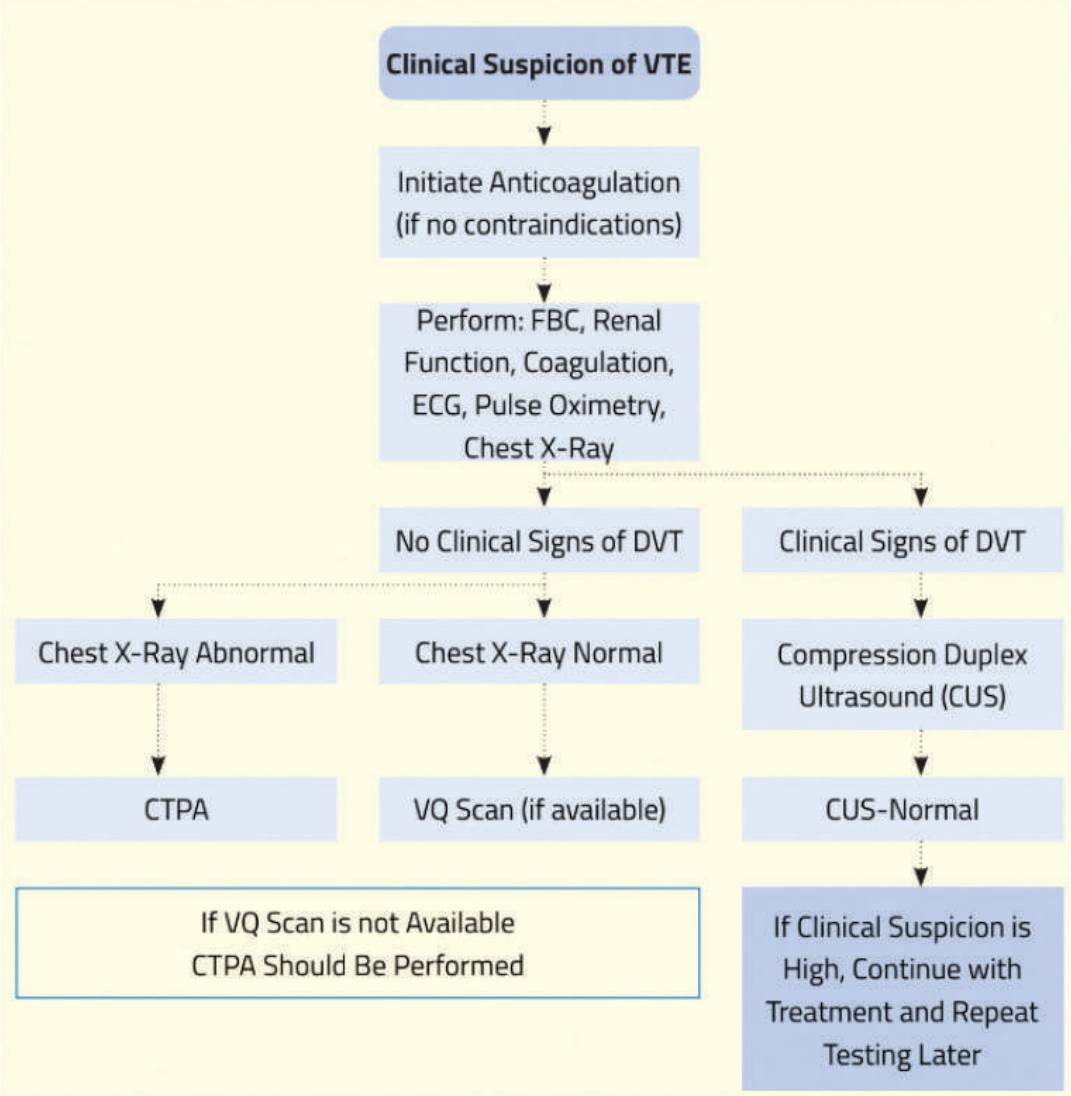
D4. VENOUS THROMBOEMBOLISM

1) Overview

a. Obstetric venous thromboembolism (VTE) is one of the major causes of maternal deaths. The cause-specific maternal mortality ratio due to VTE ranged from 2.5 to 4.7 per 100,000 live births between 2012-2016.
b. Prevention of VTE is one of the key pillars in reducing deaths due to VTE and further details can be found in the National CEMD Training Manual.

2) Diagnosis of venous thromboembolism

Flowchart 16: Approach to VTE.



Source: VTE Training Manual 2018

a. Less than 3% of women with pulmonary embolism (PE) would have a pulse oximetry reading of <90%.
b. ECG may show T-inversion (20%), S1Q3T3 pattern (15%) or right bundle branch block (18%) in a minority of women with PE.
c. The use of echocardiogram remains undefined in PE, but may show right ventricular changes (RV) such as RV dysfunction, dilatation or free wall hypokinesia if performed.
d. D-dimer is not routinely performed. D-dimer levels increase progressively by 2 to 6-fold in pregnancy, and vary based on different laboratory assays and analyzers. No useful cut-off values have been found to discriminate against women with or without VTE in pregnancy.
e. Recommended imaging:

CTPA	V/Q scan
Advantages	
▪ More readily available. ▪ Low radiation to fetus. ▪ May diagnose other pathology such as pneumonia, pulmonary oedema and aortic dissections.	▪ Higher negative predictive value. ▪ Low radiation to maternal breast.
Disadvantages	
▪ May not detect small periphery embolism. ▪ Slight increases risk of maternal breast cancer. ▪ Neonatal hypothyroidism.	▪ Very small increased risk of childhood cancer.

3) Treatment options in acute thromboembolism

<table>
<tr><th>HEMODYNAMICALLY STABLE</th><th>HEMODYNAMICALLY UNSTABLE</th></tr>
<tr><td rowspan="3">Treatment dose of subcutaneous LMWH.
(eg; Enoxaparin 1mg/kg BD or

Tinzaparin 175u/kg daily)

No routine monitoring of anti-Xa activity unless:
1. Extreme of weight
2. Develops new thrombus
3. Renal impairment

(Aim peak anti-Xa levels, 3 hours post injection of 0.5-1.2u/ml)</td><td>1. Heparin infusion
• Loading Dose – 80 units/kg*
• Maintenance – 18 units/kg/hour
• and maintain aPTT 1.5 to 2.5

*Omit loading dose if given thrombolysis earlier</td></tr>
<tr><td>2. Thrombolysis</td></tr>
<tr><td>3. Thoracotomy / surgical embolectomy</td></tr>
</table>

a. In women with high index of suspicion VTE, LMWH should be started pending confirmatory testing.
b. Thrombolysis has been associated with a reduction in death and recurrent PE compared to heparin but its use should be restricted to cases of hemodynamically unstable women with massive PE due to the fetal and maternal risks of bleeding.
c. Treatment dose of LMWH should be continued throughout the rest of the pregnancy and up to 6 weeks postpartum, and until at least 3 months of treatment has been given in total. This is to reduce the risk of recurrent VTE.
d. Inferior vena cava (IVC) filters may be considered in women with iliac vein VTE and recurrent pulmonary embolism despite adequate anticoagulation.

4) Intrapartum

a. Treatment dose of LMWH should be discontinued 24 hours prior to induction or elective caesarean and IV heparin infusion discontinued 6 hours prior, to reduce the risk of regional anaesthesia and bleeding.
b. Women should be advised to stop LMWH if they have per vaginal bleeding or signs and symptoms of labour and seek immediate medical attention.

c. Vaginal delivery is not contraindicated in women who present in spontaneous labour while on LMWH but regional anaesthesia should be avoided if this occurs within 24 hours of the last dose of LMWH.
d. Protamine sulfate is usually not required unless women are on subcutaneous heparin with markedly deranged aPTT.
e. Surgical drains (subrectus or subcutaneous) should be considered intraoperatively.
f. Interrupted skin closure may facilitate drainage of any haematoma later.

5) Postpartum

a. Women who had a VTE event within 3 months of delivery should be started on prophylactic dose of LMWH 4-6 hours post delivery. Treatment dose can be given 12 hours later.
b. Women who had developed VTE late in pregnancy should receive treatment dose of LMWH postpartum up to 6 weeks and no less than 3 months duration in total.
c. Intermittent pneumatic compression (IPC) devices should not be used in women with a recently diagnosed DVT due to the uncertain risk of causing PE.
d. Based on the SOX-trial, graduated compression stockings or thromboembolic deterrent (TED) stockings are no longer routinely recommended after DVT to prevent post-thrombotic syndrome. However, they may be useful in women who are symptomatic.
e. Breastfeeding is not contraindicated in women receiving LMWH or unfractionated heparin.
f. Combined oral hormonal contraceptives should be avoided.
g. Traditionally depot medroxyprogesterone acetate (DMPA) is considered safe, but recent data have shown an association between DMPA and norethindrone use with thromboembolism, patients need to be counseled about this risk (Cockrum RH 2022)

Reference:

1. National Technical Committee, Confidential Enquiries into Maternal Deaths. Prevention & Treatment of Thromboembolism in Pregnancy & Puerperium: A Training Manual 2018.
2. Royal College of Obstetricians & Gynaecologists. Green-top Guideline 37b. Thromboembolic disease in Pregnancy and Puerperium: Acute Management. 2015.

D5. HEART DISEASE IN PREGNANCY

1) Overview

a. Most common cause of indirect maternal deaths in Malaysia.
b. Comprises a heterogenous group of disease ranging from congenital structural, valvular, ischaemic to arrhythmias. Readers are referred to the MOH CPG on Cardiac disease in pregnancy 2016 and the European Society of Cardiology (ESC) Guideline on Cardiac disease in pregnancy 2018 for details of specific diseases. The general principles will be discussed in this section.

2) Preconception counseling

a. Essential in all women with cardiac diseases. Contraception should be discussed in women of reproductive age who are not ready to start a family.
b. Review of cardiac medications is imperative and alternatives to medications which are contraindicated in pregnancy such as ACE inhibitors, Angiotensin receptor blockers (ARB) and ivabradine should be sought.
c. Maternal risks, fetal outcomes and plans for pregnancy care should be discussed.
d. Up to date with vaccination, including rubella vaccination and receive pre pregnancy folic acid and dental review.

3) Cardiac interventions prior to conception

a. Catheter ablation should be considered in women with symptomatic supraventricular tachycardia (SVT) or ventricular tachycardia (VT).
b. Implantable cardiac devices (ICD) should be considered in women with arrhythmias and high risk of sudden cardiac death.
c. Prepregnancy intervention is recommended in women with severe mitral stenosis (MS) or symptomatic severe aortic stenosis (AS).

4) Risk stratification

a. The most important predictors of maternal outcomes are the modified World Health Organization (mWHO) class and functional status of women, based on the New York Heart Association (NYHA) Classification.
b. Presence of cyanosis, obstructive left heart lesions, mechanical valve prosthesis use and need for anticoagulation in pregnancy increases the risk of pregnancy.
c. Non-cardiac risk factors such as obesity , hypertension and diabetes and obstetric risk factors such as multiple pregnancy also increase the risk of poor outcomes.
d. Termination of pregnancy may be appropriate in some women and this should be discussed in a multidisciplinary team (MDT) setting.

5) Modified World Health Organization classification of maternal cardiovascular risk (adapted from ESC 2018)

mWHO CLASS	RISK	CARDIAC CONDITIONS
I	• No detectable increased risk of maternal mortality and no/ mild increase in morbidity. • 2.5-5% maternal cardiac event rate	• Pulmonary stenosis, patent ductus arteriosus (PDA), mitral valve prolapse (uncomplicated, small or mild). • Successfully repaired atrial septal defect (ASD), ventricular septal defect (VSD), PDA, anomalous pulmonary venous drainage. • Isolated atrial or ventricular ectopic beats.
II	• Small increased risk of maternal mortality or moderate increase in morbidity. • 5.7-10.5% maternal cardiac event rate	• Unoperated ASD/VSD • Repaired Tetralogy of Fallot • Most arrhythmias

mWHO CLASS	RISK	CARDIAC CONDITIONS
II-III	• Between classes II–III, depending on the individual. • 10-19% maternal cardiac event rate	• Mild left ventricular impairment (EF >45%) • Hypertrophic cardiomyopathy • Native or tissue valvular heart disease not considered Class I or II
III	• Significantly increased risk of maternal mortality or severe morbidity. • Expert counseling required. • 19-27% maternal cardiac event rate	• Moderate LV impairment (EF 30-45%) • Previous peripartum cardiomyopathy without LV residual impairment • Mechanical valve • Systemic right ventricle • Fontan circulation • Unrepaired cyanotic heart lesion • Moderate mitral stenosis (MS) • Severe asymptomatic aortic stenosis (AS) • Other complex congenital heart disease • Aortic dilatation 40–45 mm in Marfan syndrome or 45–50 mm in bicuspid aortic valve. • Ventricular tachycardia
IV	• Pregnancy is contraindicated • 40-100% maternal cardiac event rate	• Pulmonary arterial hypertension of any cause. • Severe LV dysfunction (EF<30%, NYHA III–IV). • Previous peripartum cardiomyopathy with any residual impairment of LV function. • Severe MS, severe symptomatic AS • Aortic dilatation >45mm in Marfan syndrome or >50mm in bicuspid aortic valve. • Native severe coarctation of the aorta. • Fontan circulation with any complication.

6) Genetic counseling and fetal assessment

Risk of inheriting cardiac defects increases in the offspring and counseling by a maternal fetal specialist and geneticist may be useful.

a. Marfan syndrome, hypertrophic cardiomyopathy (HCM) and long QT syndrome and Holt-Oram are some examples of autosomal dominant (AD) conditions.
b. 22q.11 deletion and Noonan syndrome are also inherited in an AD manner but the majority of cases are due to de novo mutation.
c. Genetic counseling is also essential in women with known carrier status of hereditary pulmonary arterial hypertension (PAH) or pulmonary veno-occlusive disease.
d. Women with congenital cardiac disease should have detailed anomaly screening, fetal echocardiography and serial growth scans.
e. First trimester screening, where available, can also increase the index of suspicion of underlying cardiac disease if the nuchal is thickened.
f. Lesion specific risk of cardiac disease in the offspring is shown in the following table.

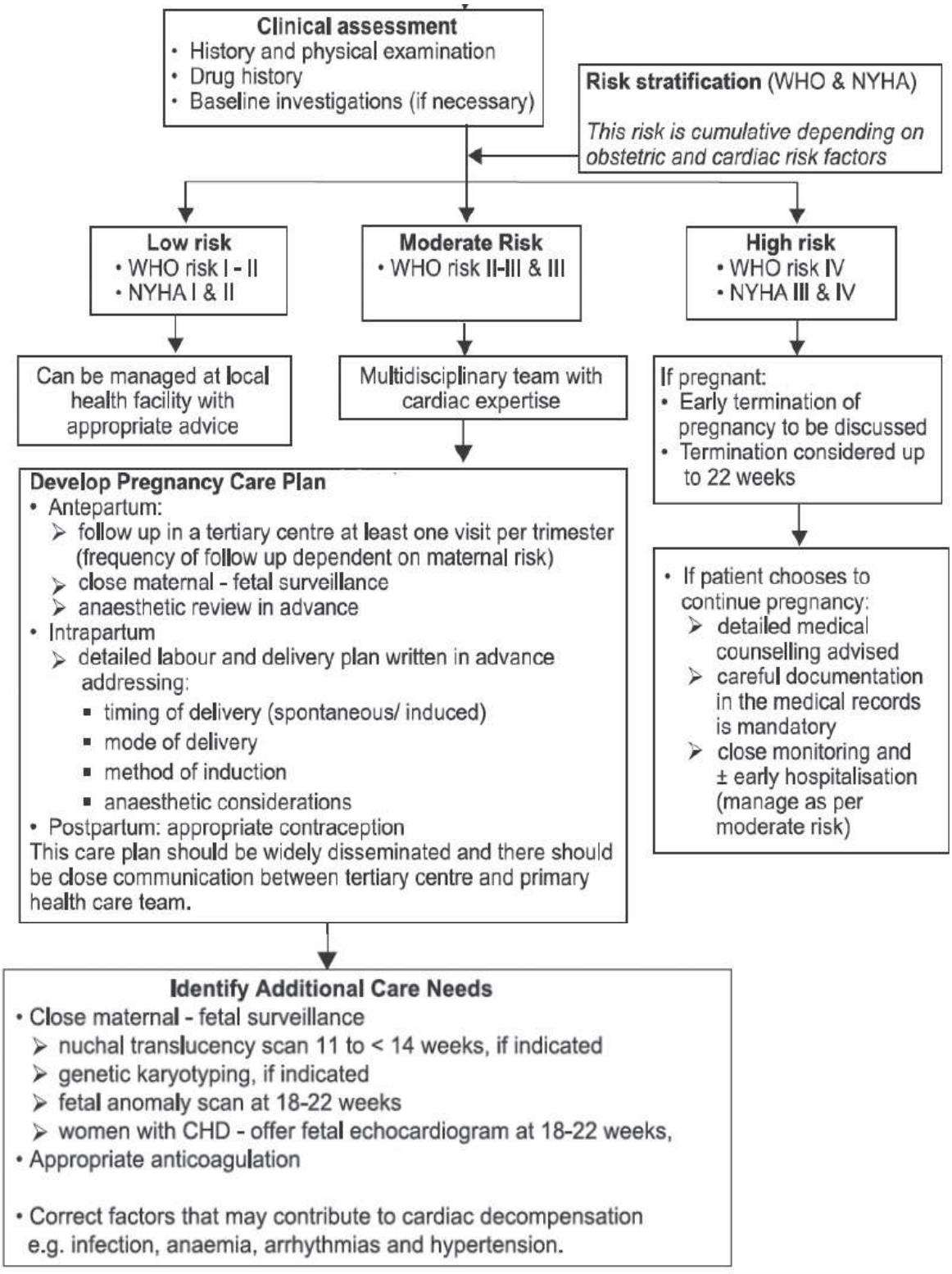
7) Lesion specific risk of cardiac disease in the fetus:

Lesion	Mother affected	Father affected	Siblings in unaffected parents	
	Risk of transmission (%)	Risk of transmission (%)	1 sibling (%)	≥ 2 siblings (%)
Atrioventricular septal defect	7-11.6	4.3-7	3-4	NA
Aortic stenosis	8.0	3.8	2	6
Coarctation	6.3	3.0	2	6
Atrial septal defect	6.1	3.5	2-3	8
Ventricular septal defect	6.0	3.6	3	10
Pulmonary stenosis	5.3	3.5	2	6
Persistent ductus arteriosus	4.1	2.0	NA	NA
Tetralogy of Fallot	2-5	1-6	2-3	8
All heart defects	5-7	2.2	NA	NA

Source: MOH CPG Cardiac disease in pregnancy 2016

8) Antenatal care pathway for women with cardiac disease

Flowchart 17: Approach to women with cardiac disease



Modified from MOH CPG Cardiac disease in pregnancy 2016

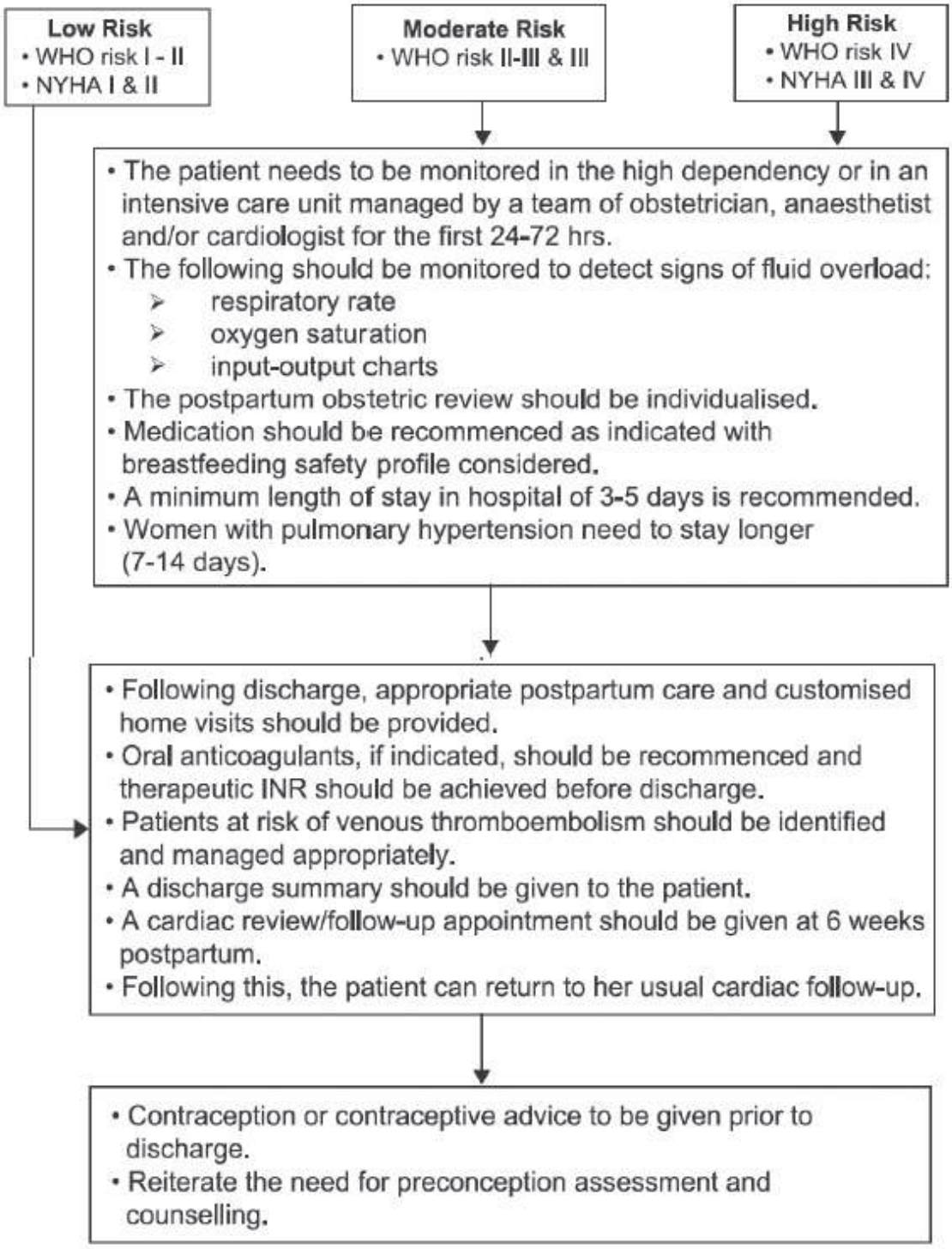
9) Intrapartum considerations

a. Timing of delivery is individualized and depends on the women's cardiac status, co-morbidities and fetal well-being.
b. Caesarean section is not routine in all women with cardiac disease but can be considered in the following conditions:

- NYHA Class III or IV
- LVEF <30%
- Severe obstructive cardiac lesions
- Severe pulmonary hypertension or Eisenmenger syndrome
- Obstetric indications
- Marfan's syndrome Ao root > 45mm
- Acute or chronic aortic dissection
- On oral anticoagulation within last 7 days

c. Women with mechanical heart valves who are on warfarin should have a clear plan of bridging therapy.
d. Antibiotic prophylaxis for endocarditis is not routine and should be reserved for women with previous infective endocarditis, prosthetic heart valves and complex congenital cardiac disease (operated or unoperated).
e. Prolonged and difficult labours should be avoided.
f. Epidural anaesthesia is the anaesthesia of choice in labour and should be titrated carefully to avoid hypotension.
g. Prostaglandin F2α should be avoided.
h. Resuscitative hysterotomy may be required to facilitate resuscitation in the event of maternal collapse.

10) Postpartum care



Source: MOH CPG Cardiac disease in pregnancy 2016

Reference:

1. Ministry of Health Malaysia. Clinical Practice Guidelines: Cardiac disease in pregnancy. 2016.
2. European Society of Cardiology (ESC) Guideline: Cardiac disease in pregnancy 2018.

D6. THYROID DISEASE

1) Overview

MATERNAL THYROID STATUS	FREE T4	TSH
Overt hyperthyroidism	Increased	Decreased
Subclinical hyperthyroidism	Normal limits	Decreased
Suspect TSH resistance/assay interference	Increased	Increased
Overt hypothyroidism	Decreased	Increased
Subclinical hypothyroidism	Normal limits	Increased
Secondary hypothyroidism	Decreased	Decreased

2) Hyperthyroidism

a. Gestational transient thyrotoxicosis (GTT) and Graves' disease are the most common causes. New onset thyroid disease is rare in pregnancy.
b. GTT usually only requires supportive treatment for hyperemesis and usually serum T4 normalizes by 14-18w of gestation. Symptoms may overlap with Graves'; neither hCG or ultrasound helpful to distinguish the conditions.
c. Presence of thyrotropin receptor antibody (TRAb) is highly suggestive of Graves'. Anti-thyroid peroxidase antibody (anti-TPO) can be present in both.

CARBIMAZOLE (CBZ)	PROPYLTHIOURACIL (PTU)
Cutis aplasia, abdominal wall defects, atresia of digestive, urinary and respiratory (choanal atresia) tract, ventricular septal defect.	Less severe face and neck malformation such as preauricular sinus/cysts, urinary tract defects in boys.
Avoid use in first trimester	Recommended in first trimester if treatment needed
*Off medications if euthyroid & on low dose (≤10 mg Cbz/day or ≤100 mg PTU/day). Monitor monthly clinically and TFT.	
**Use 1:10 ratio as a guide when switching (ex. 20mg Cbz=200 mg PTU) but divide PTU into 2-3 doses a day due to shorter half-life*	

d. Joint management by O&G and physician/endocrinologist, aiming to keep fT4 at the upper limits of normal.
e. Propranolol can be used safely for symptomatic patients and can also reduce the peripheral effects of thyroid hormone, including conversion of inactive T4 to T3.
f. TRAb can cross the placenta and cause fetal hyperthyroidism. Women with raised TRAb >3X upper limit require close fetal monitoring.
g. Retrosternal extension of goiter warrants referral to the anaesthetist +/-otorhinolaryngologist.
h. Intrapartum obstetric management is generally unchanged.
i. Postpartum antithyroid therapy is continued in doses similar to preceding pregnancy (may refer to endocrinologist for further management). Breastfeeding is not contraindicated.

3) Hypothyroidism

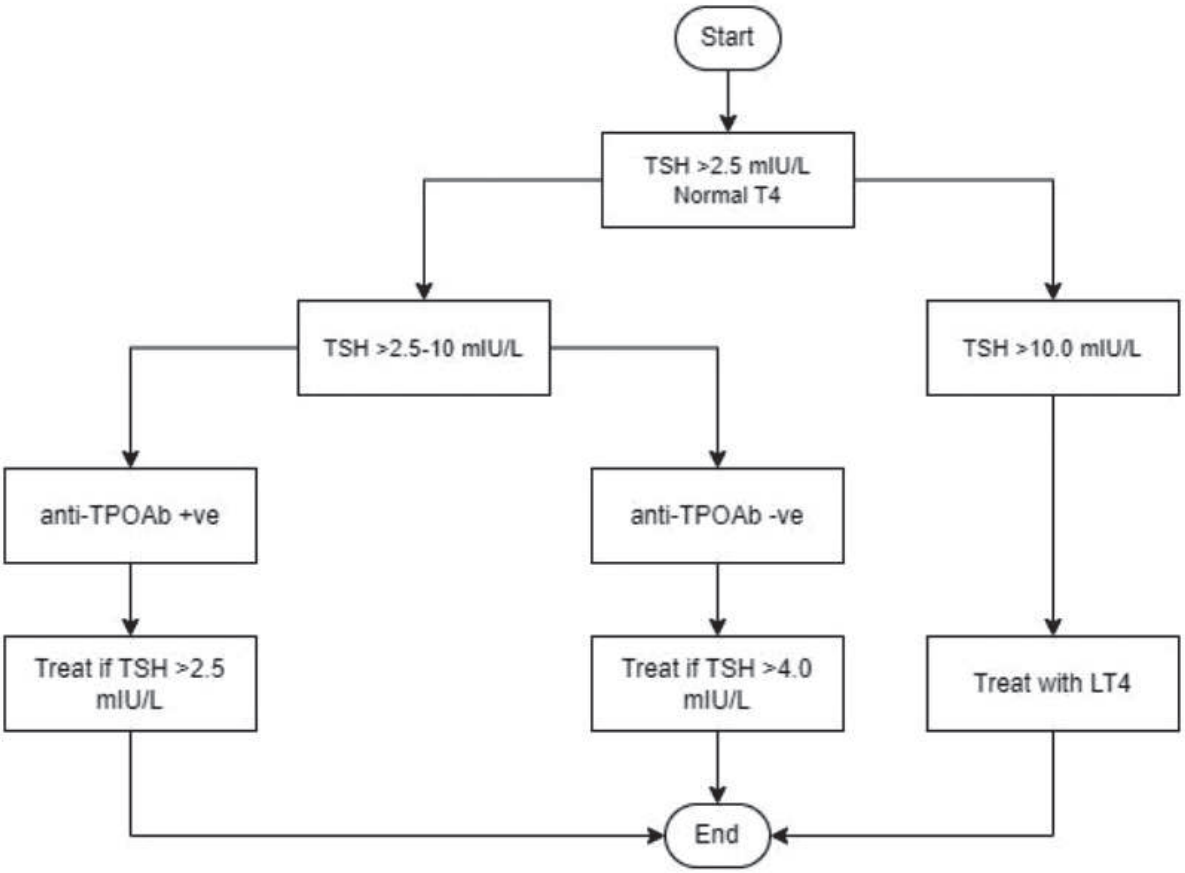
a. Hashimoto's thyroiditis and Graves' disease are the most common causes in pregnancy. Post-thyroidectomy /radioactive iodine ablation (RAI) are next.
b. Levothyroxine (LT4) is the treatment of choice and should be taken prior to breakfast, on an empty stomach to optimize compliance.
c. By 4-6 weeks of gestation, there is progressive increase in LT4 requirement till about 16-20 weeks. This usually plateaus in the 3rd trimester.
d. Dose increments of 30-50% are expected during pregnancy, esp in post-RAI.
e. Trimester-specific TSH representative of the Malaysian pregnant population is the ideal reference range but is currently unavailable.
f. Therefore, the following targets of treatment are recommended:

TRIMESTER	TSH TARGET
Hypothyroidism & planning to conceive	<2.5 mIU/L
1st trimester	<2.5 mIU/L
2nd and 3rd trimester	< 3.0 mIU/L
Postpartum	<4.2 mIU/L (as per non-pregnant adults)

g. Women with subclinical hypothyroidism (SCH) can be managed as shown in the chart below. Untreated SCH has been associated with miscarriage, preterm birth, small for gestational age, preeclampsia and abruption.

h. Untreated hypothyroidism may lead to neurological cretinism
i. There is a high rate of progression to overt hypothyroidism in untreated women, with a 10-year incidence of 42% in women with TSH > 6 mIU/L.

Flowchart 18: Approach to hypothyroidism in pregnancy



j. Only very small amounts of LT4 cross the placenta and women should be reassured that there is no risk of fetal thyrotoxicosis.
k. Breastfeeding is not contraindicated in women on LT4 replacement.

4) Postpartum thyroiditis

a. Occurs in 1-17% of women but up to 50% of women with antimicrosomal antibodies (ex. Anti-TPO).
b. Most cases are asymptomatic and presents 3-4 month postpartum
c. Both hypo and hyperthyroidism can occur
d. Most patients recover spontaneously

Reference:

1. CPG Management of thyroid diseases 2019.
2. Handbook of Obstetric Medicine,5th ed 2015.

D7. BRONCHIAL ASTHMA

1) Overview

a. Bronchial asthma is the most common respiratory disorder in pregnancy, affecting 3-12% of women. Around 6% of women require hospitalization for exacerbations.
b. Antenatally, women should be advised on smoking cessation, avoidance of triggers and have their technique of using metered-dose inhalers (MDI) reassessed.
c. Inhaled corticosteroids should not be stopped and women reassured of their safety.
d. Down-titration of asthma medications is a low-priority in pregnancy.
e. Closer follow up 4-6 weekly may be required and any exacerbations treated aggressively.
f. The Asthma Control Test (ACT) is a patient self-administered tool, which is useful for identifying those with poorly controlled asthma (see below).
g. The scores range from 5 (poor control of asthma) to 25 (complete control of asthma), with higher scores reflecting greater asthma control. An ACT score ≥ 20 indicates well-controlled asthma.
h. Asthma in pregnancy is associated with low birth weight, small for gestational age, preterm birth and preeclampsia.
i. Influenza vaccination is strongly recommended to be given in pregnancy.
j. Aspirin for preeclampsia prophylaxis is not contraindicated in women without previous aspirin allergies. In women with allergies, consider aspirin desensitisation or prescribe calcium carbonate instead, at 20 weeks of gestation.
k. Subcutaneous Omalizumab (recombinant humanized IgG1 monoclonal anti-IgE antibody) has been used in some pregnant women with poorly controlled Ig-E mediated asthma. Observational studies have not shown an increased risk of congenital anomalies.

2) Intrapartum considerations

a. Induction of labour with prostaglandin E2 can be used safely.
b. Patients on oral steroids (prednisolone ≥7.5mg/day for more than 2 weeks prior to delivery) should receive IV hydrocortisone 50–100mg 6 to 8 hourly to cover the stress of labour until oral medication is restarted.

c. Some women with poorly-controlled symptoms, recent asthmatic attack, exercise-induced or cold-induced asthma (considering ambient temperature in labour ward) may benefit from intrapartum steroids.
d. All forms of pain relief may be used safely.
e. Regional is preferable to general anaesthesia- decreased risk of chest infection and atelectasis.
f. Consider mechanical methods in the event of PPH as prostaglandin F2α (Carborpost) may increase the risk of bronchospasm. Ergometrine/oxytocin may be used for PPH prophylaxis.

ASTHMA CONTROL TEST™

Asthma Control Test provides a numerical score to determine the control of asthma symptoms.

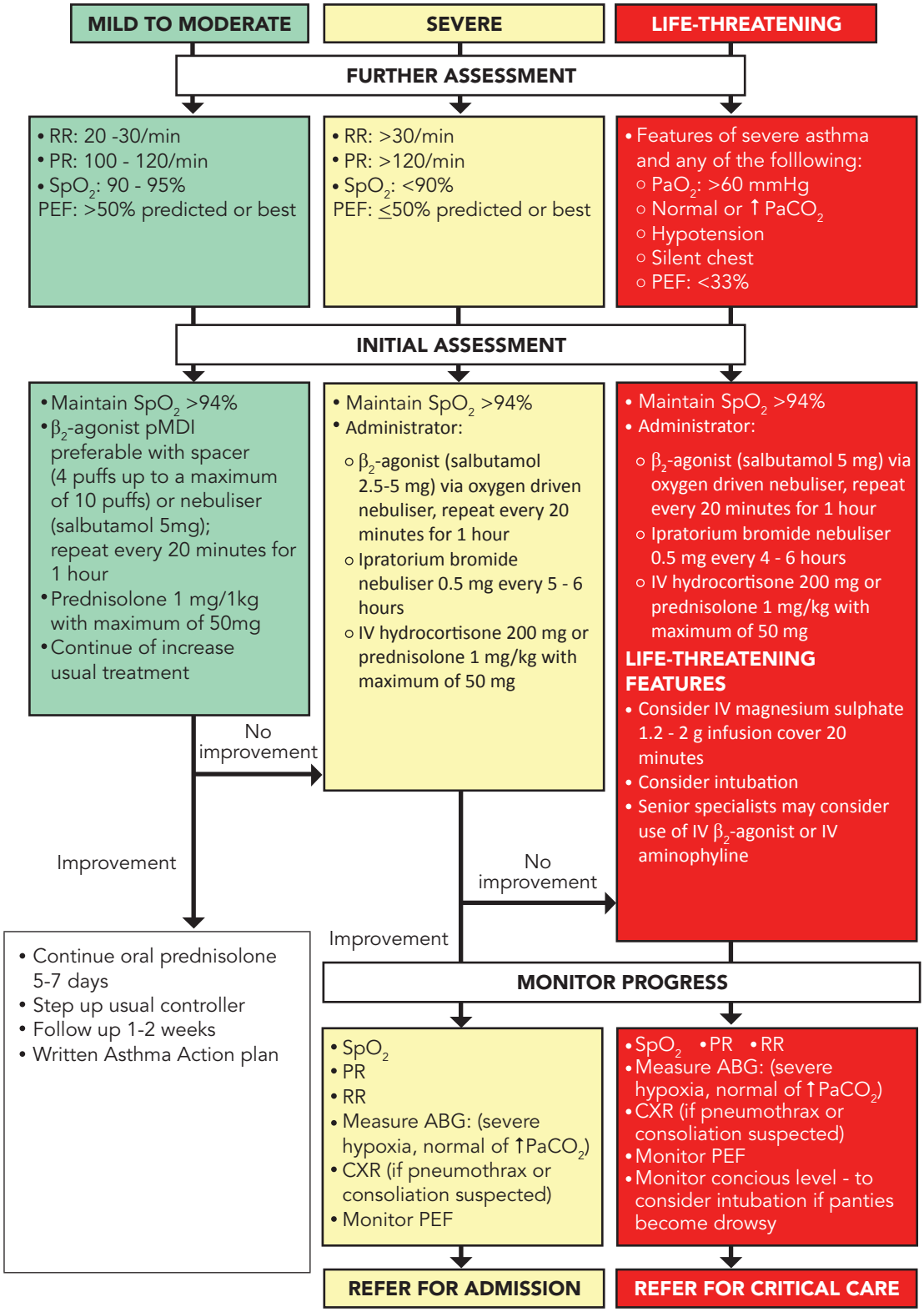
1.	In the past 4 weeks, how much of the time did your asthma keep you from getting as much done at work, school or at home?					Score
	All of the time (1)	Most of the time (2)	Some of the time (3)	A little of the time (4)	None of the time (5)	
2.	During the past 4 weeks, how often have you had shortness of breath?					Score
	More than once a day (1)	Once a day (2)	3 to 6 times a week (3)	Once or twice a week (4)	Not at all (5)	
3.	During the past 4 weeks, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?					Score
	4 or more nights a week (1)	2 to 3 nights a week (2)	Once a week (3)	Once or twice (4)	Not at all (5)	
4.	During the past 4 weeks, how often had you used your rescue inhaler of nebuliser?					Score
	3 or more times per day (1)	1 to 2 times per day (2)	2 or 3 times per week (3)	Once a week or less (4)	Not at all (5)	
5.	How would you rate your asthma control in the last 4 weeks?					Score
	Not controlled at all (1)	Poorly controlled (2)	Somewhat controlled (3)	Well controlled (4)	Completely controlled (5)	

Total score: _____

Source: MOH CPG Management of Asthma 2017

-ACT score ranges from 5 to 25
-A score of ≥ 20 indicates well-controlled asthma

3) Management of acute exacerbation



Modified from MOH CPG Management of Asthma 2017

4) Postpartum care

a. Asthma medications are safe in breastfeeding.
b. Non-steroidal anti-inflammatory agents (NSAIDs) should be avoided where possible.
c. Beta-blockers should be avoided as other antihypertensives are available.

5) Prevention of asthma in the offspring

a. Breastfeeding may reduce the risk of subsequent childhood asthma.
b. Despite initial data showing that high dose Vitamin D (4400 IU/day) supplementation in pregnancy vs low dose (400 IU/day) can reduce the risk of asthma in offspring, this benefit was not sustained beyond the first 3 years of life (Litonjua AA et al. NEJM 2020). Weighing against the risk of toxicity, high dose Vitamin D is not routinely recommended.

Reference:

1. MOH. Clinical practice guidelines: Management of asthma 2017.
2. Global Initiative for Asthma: Pocket guide for asthma management and prevention 2020.

D8. HEPATITIS B

1) Overview

a. Hepatitis B-associated deaths in adults are largely due to infections acquired at birth or the first 5 years of life.
b. The national immunization programme for Hepatitis B began in 1989 and has been a notifiable disease since 2010.
c. 12.6 in 100,000 cases of Hepatitis B were notified in 2015, with approximately half of the patients diagnosed between 20-40 years of age.
d. The National Strategic Plan for Hepatitis B and C (2019-2023) recommends routine HbsAg screening during the initial visit.

2) Acute Hepatitis B infection

a. Usually mild and not associated with increased maternal mortality or teratogenicity. Acute viral hepatitis is a common cause of jaundice in pregnancy.
b. Antivirals are usually not indicated except in acute liver failure.
c. 10% risk of perinatal transmission. Antivirals may be required if HBV DNA remains high at the time of delivery.

3) Chronic Hepatitis B infection (HBsAg +ve> 6 months)

a. Liver function test should be checked every trimester.
b. HBV DNA viral load should be checked if ALT is raised.
c. HBV DNA viral load should be routinely checked at 26-28 weeks and tenofovir disoproxil fumarate (TDF) 300mg/day started if HBV DNA ≥ 5.3 log10 IU/mL (≥ 200,000 IU/mL).
d. Studies have shown that mothers may transmit HBV to her infant even when the infant receives the timely birth dose vaccine, HBIG and completes the hepatitis B vaccine series beyond this threshold.
e. Risk of transmission is as high as 85% in HBeAg +ve mothers, without intervention.
f. Tenofovir (TDF) is the drug of choice and should be started from 28 weeks of pregnancy. It can either be stopped at delivery or at 4 weeks postpartum.

g. Lamivudine and telbivudine should not be used as they have a low barrier to drug resistance mutations, unless tenofovir is contraindicated (ex. Renal impairment)
h. Invasive diagnostic procedures should not be withheld, but women should be counseled on increased risk of transmission if viral load is ≥ 7.0 log10 IU/mL (SMFM)

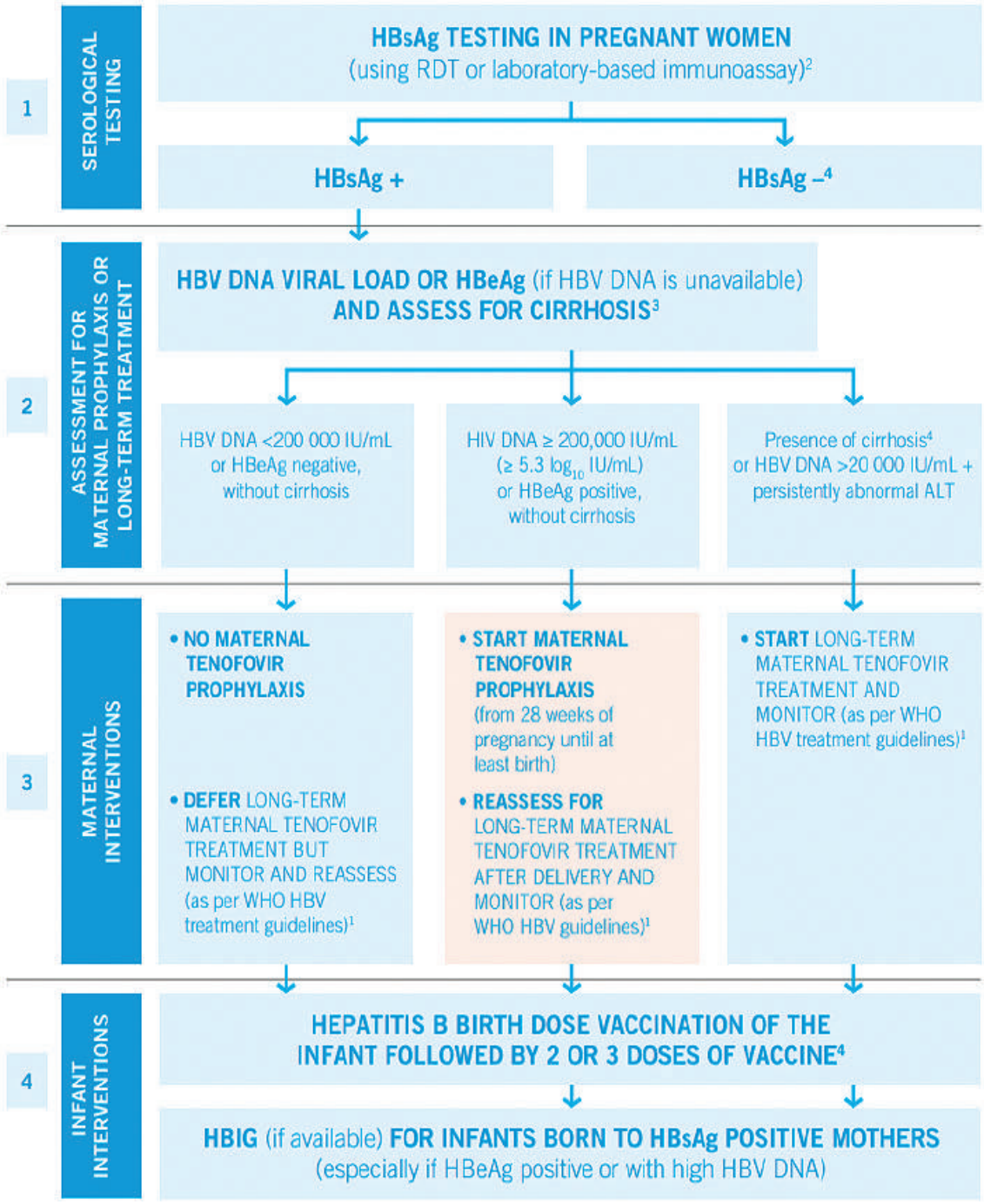
4) Intrapartum considerations

a. Hepatitis B infection is not an indication for caesarean section.
b. It is reasonable to avoid fetal scalp sampling or fetal scalp electrodes, especially in women with high viral load.
c. Whilst WHO recommends delayed cord clamping in women with HIV, there is no specific recommendation in Hepatitis B (WHO 2014).

5) Postpartum

a. Stop Tenofovir at delivery or at 4 weeks postpartum.
b. Postpartum flares (2 to 3 fold increase in ALT to >3 times the upper limit) may occur in up to 15-25% of women but are usually asymptomatic.
c. Hepatitis B immune globulin (HBIG) and HBV vaccine should be administered to their newborn <12 hours after delivery.
d. Breastfeeding is not contraindicated.

6) Algorithm for antiviral treatment in Chronic Hepatitis B in pregnancy



Source: WHO PMTCT of Hepatitis B Virus: Guidelines on antiviral prophylaxis in pregnancy 2020

Reference:

1. WHO. Prevention of mother-to-child transmission of Hepatitis B Virus: Guidelines on antiviral prophylaxis in pregnancy 2020.
2. Terrault et al. Update on prevention, diagnosis, and treatment of chronic hepatitis B: AASLD 2018 hepatitis B guidance.
3. Lee H et al. Hepatitis B and pregnancy. Uptodate Dec 2022.

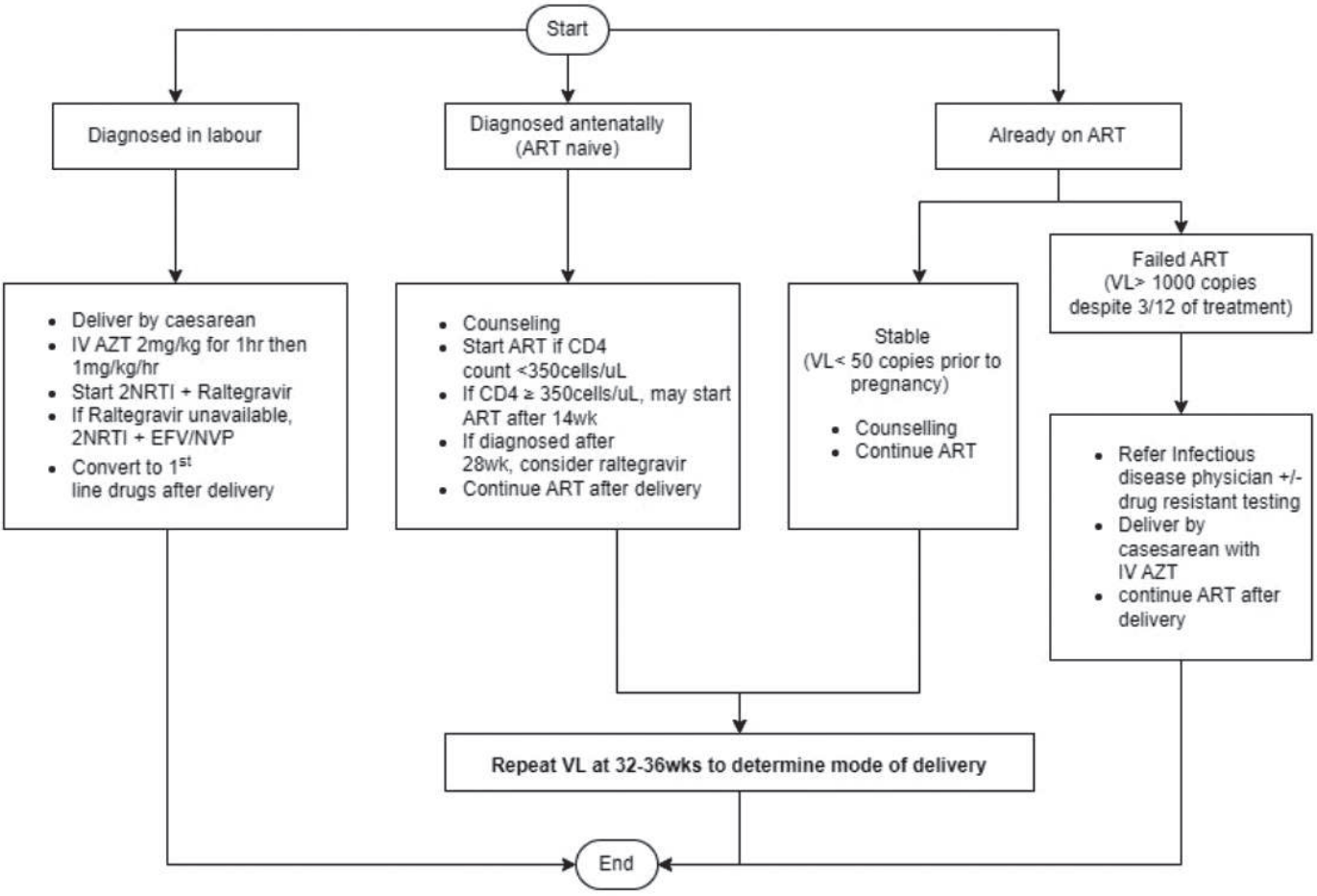
D9. HIV IN PREGNANCY

1) Overview

a. Routine screening for HIV should be performed at booking and again 12 weeks later in women with high risk behaviour.
b. Women who are already on ART (antiretroviral therapy) before pregnancy should continue their pre-pregnancy ART throughout pregnancy and after delivery. (Avoid the combination of didanosine and stavudine in pregnancy due to risk of lactic acidosis)
c. For women in whom HIV is diagnosed in pregnancy/ART naïve, the choice and timing of starting ART is summarized below:

PRESENTING CD4 COUNT	TIMING OF ART INITIATION IN NEWLY-DIAGNOSED, NON-LABOURING WOMEN
< 350 cells/μL	- Start ART as soon as possible. - Start ART even in the first trimester in women with opportunistic infections or WHO clinical stage 3/4 HIV infection.
> 350 cells/μL	- Start ART at 14 weeks of pregnancy. - ART is given primarily for PMTCT (prevention of mother-to-child transmission). - Consider starting earlier if viral load > 100,000 copies/ml.

Flowchart 19: Approach to HIV positive mother pregnancy



*AZT=Zidovudine; NRTI=Nucleoside transcriptase inhibitor; EFV=Efavirenz; NVP=Nevirapine

2) Choice of ART for PMTCT (Prevention of mother-to-child transmission)

a. 2 NRTI + [NNRTI OR Boosted Protease Inhibitor OR Integrase strand transfer inhibitor].
b. Preferred treatment: Tenofovir (TDF) + Emtricitabine (FTC) + Efavirenz (EFV)
c. Other regimes are also acceptable, depending on the ID Physician.
d. In women starting ART after 28 weeks, consider Raltegravir–based ART as Raltegravir crosses the placenta rapidly.

3) Additional antenatal considerations

a. Check CD4 count in early pregnancy and at delivery.
b. Check viral load as baseline, 2 weeks after starting treatment (if newly started in pregnancy), 24 weeks, 32 to 36 weeks and at delivery.
c. Delay invasive antenatal procedures such as amniocentesis until the viral load is < 50 copies/ml. Non-invasive prenatal testing should be offered.
d. If an urgent invasive procedure is needed, ART should be initiated to include raltegravir and also a single dose of nevirapine 2 to 4 hours prior to the procedure.
e. Serial growth scans should be performed from 26-28 weeks onwards.
f. Watch out for complications of HIV/AIDS, e.g. Kaposi sarcoma, chest infection, herpes simplex.

4) Mode of delivery and intrapartum considerations

a. External cephalic version is not contraindicated in women planning for vaginal delivery and viral load is <50 copies/ml.
b. Delivery should take place in hospitals with a paediatrician.
c. Universal precaution, personal protective equipment and use of blunt needles is advised.

VIRAL LOAD AT 32-36 WEEKS	MODE OF DELIVERY
< 50 copies	Vaginal delivery
50 – 399 copies	Consider planned LSCS
≥ 400 copies/unknown viral load	Planned LSCS recommended

d. BHIVA recommends that if women are suitable for vaginal delivery, management should not differ from HIV-negative women, including the use of instrumental delivery (forceps preferred).
e. Fetal scalp electrode and fetal blood sampling are unlikely to increase the risk of viral transmission, although it would be sensible to avoid this until more robust evidence is available.
f. Delayed cord clamping is not contraindicated in women allowed vaginal delivery (WHO 2014).
g. Intrapartum IV AZT should be used if:
   - Women are untreated and present in labour or rupture of membranes, OR
   - Viral load of >1000 copies/ml in women who present in labour, with rupture of membranes or planned for caesarean section.

h. Intrapartum IV AZT can be considered in women with a viral load between 50 and 1000 HIV RNA copies/mL, regardless of mode of delivery.
i. Dose of IV AZT: 2 mg/kg/H for one hour, followed by 1 mg/kg/H until cord clamping.
j. Allow at least 3 hours of infusion prior to elective caesarean section as the cord blood-to-maternal zidovudine levels are higher than those who received less than 3 hours of infusion (ACOG Opinion #751; 2018).
k. Continue regular oral ART but omit oral AZT during AZT infusion.
l. In the event of an emergency caesarean section, there is no need to complete 3 hours of AZT infusion prior to the operation. However, the paediatric team needs to be informed post-delivery to ensure adequate post-exposure prophylaxis.

5) Intrapartum considerations in women presenting with rupture of membranes

TIMING OF RUPTURE OF MEMBRANES (ROM)	MANAGEMENT
Beyond 37wks	- Aim for early induction/augmentation and delivery within 24 hours - Mode of delivery depends on viral load - Low threshold to start antibiotics if suspected chorioamnionitis as the risk of MTCT is increased
34-37wks	- Management as per term PROM, with addition of antibiotics for GBS prophylaxis
Before 34 wks	- Antenatal corticosteroids - Multidisciplinary discussion with paediatrician and infectious disease physician - May benefit from optimizing viral load in some cases, prior to delivery

6) Handling of the placenta by patients

a. Use double gloves and an apron.
b. For women who wish to bring home the placenta for cultural or religious purposes, the placenta should be immersed in Sodium Hypochlorite 1:10 for 10 minutes.
c. Drain out and carefully seal in double plastic bags before handing over to patient/relatives.

d. Provide them with 2 pairs of disposable latex/rubber gloves.
e. Educate them on the safe handling of the placenta at home.
f. For women who do not wish to bring home the placenta, discard appropriately as biohazard clinical wastes.

7) Postpartum

a. Refer to the ID physician regarding the continuation of ART. ART should be continued for life unless the woman is not motivated to be compliant, and her CD4 count is >350 cells/µl.
b. Cessation of ART should be monitored by the ID team to minimize the risk of drug resistance.
c. Baby should be referred to the paediatric team for further management and post-exposure prophylaxis.
d. Generally, most forms of contraceptives can be used in women on ART, although higher dose estrogens may be required with some ARTs. There is concern about the efficacy of subdermal implants in patients on Efavirenz. Updated individual ART interactions can be found at University of Liverpool HIV Drug Interaction Checker (https://www.hiv-druginteractions.org/).
e. Yearly cervical smears are advised.

8) Breastfeeding

a. Breastfeeding is not recommended as it is associated with a 14% chance of vertical transmission.
b. Suppressive maternal ART significantly reduces, but does not eliminate, the risk of vertical transmission of HIV through breastfeeding. The undetectable=untransmittable (U=U) statement applies only to sexual transmission, and there is currently lack of data to apply this to breastfeeding.
c. Suppression of lactation can be considered.

Reference:

1. Malaysian Consensus on Antiretroviral Therapy 2017.
2. BHIVA guidelines for the management of HIV in pregnancy and postpartum 2018 (2020 third interim update).
3. KKM. Garis Panduan Pengukuhan Program Pencegahan Jangkitan HIV dan Sifilis dari Ibu-ke-Anak 2021.

D10. SYPHILIS IN PREGNANCY

1) Overview

a. Universal screening using RPR/VDRL is performed at booking. TPHA is required for confirmation as low levels of false-positive VDRL occur in other conditions such as SLE (12%) and pregnancy (0.7%).
b. 3% of women may have false-negative results (-ve VDRL but +ve TPHA) due to prozone phenomenon.
c. For high risk mothers, syphilis screening is repeated at 28-32 weeks.

ACQUIRED	
Early Syphilis (<2 years) - Primary Syphilis - Secondary Syphilis - Latent Syphilis	Late Syphilis (>2 years) - Late latent Syphilis - Tertiary Syphilis Cardiovascular Neurosyphilis
CONGENITAL	
Early (onset< 2 years old)	Late (>2 years old)

d. All newly diagnosed Syphilis should be notified. Screen for other sexually-transmitted diseases including Hepatitis B/C.
e. Contact tracing of sexual partners within past 90 days (if primary Syphilis) and up to past 2 years (if secondary or early latent Syphilis).
f. Risk of congenital Syphilis is higher with early Syphilis due to higher levels of spirochetemia.

2) Special considerations in pregnancy

a. Doxycycline and tetracycline are teratogenic and should not be used in pregnancy
b. Jarisch-Herxheimer reaction is more common in pregnancy, occuring in 50% of Syphilis of unknown duration, 60-90% of secondary Syphilis and more than 90% of primary Syphilis, reflecting the level of spirochetemia.

c. The onset of Jarisch-Herxheimer reaction is usually 2-12 hours after treatment and women should be cautioned about symptoms such as fever, malaise, joint pain, change in fetal movements (70%) and contraction pain (60%).
d. Penicillin desensitisation as inpatient should be considered in women with a history of mild-moderate penicillin allergies as neither erythromycin nor azithromycin can prevent maternal-to-child transmission.
e. ONLY penicillin can prevent maternal-to-child transmission. There is insufficient evidence to show the same effect in ceftriaxone at the time of writing.
f. For women treated with alternative regimens, the newborn needs to be treated by the paediatric team.
g. More than 30 days must have passed between the last dose of treatment to the time of birth to be considered protective against maternal-to-child transmission.

LIKELY STAGE	RECOMMENDED TREATMENT	*ALTERNATIVE TREATMENT (ONLY IF PENICILLIN ALLERGY AND FAILED DESENSITISATION)
Infection within past 2 years: - Primary - Secondary - Latent	Benzathine Penicillin G, 2.4 MU IM in a single dose; OR Procaine penicillin G, 600,000 units IM daily for 10 days	Ceftriaxone 500 mg IM daily for 10 days; OR Erythromycin Ethylsuccinate 800 mg QID PO x 14 days; OR Azithromycin 2 g PO x single dose
NB. If drugs are missed ≥ 1 day during treatment, the whole course is repeated		

LIKELY STAGE	RECOMMENDED TREATMENT	*ALTERNATIVE TREATMENT (ONLY IF PENICILLIN ALLERGY AND FAILED DESENSITISATION)
Infection more than 2 years: - Late latent - Gummatous - Cardiovascular *	Benzathine penicillin G, 2.4 MU IM weekly X 3 weeks (Day 1, 8 & 15); OR Procaine penicillin G, 600,000 units IM daily for 14 days	Erythromycin 500 mg QID PO for 28 days; OR Erythromycin ES 800mg QID PO for 28 days
*NB. If drugs are missed ≥ 2 weeks between weekly doses, the whole course is repeated. *For cardiovascular syphilis, consider prednisolone 40-60 mg OD for 3 days, starting 24 hours before the antibiotics.*		
Neurosyphilis	Benzylpenicillin 4 MU IV 4 hourly for 14 days; OR Procaine Penicillin 2.4 MU IM daily; PLUS Probenecid 500 mg PO 6 hourly, both for 14 days.	Ceftriaxone 2 g IM (with Lidocaine as diluent); OR IV (with water for injection as diluent NOT Lidocaine) for 10-14 days (if no anaphylaxis to penicillin)
NB. For neurosyphilis, consider prednisolone 40-60 mg OD for 3 days starting 24 hours before the antibiotics.		

3) Maternal surveillance

a. Abstain from sexual intercourse for 2 weeks after the patient and partner have completed treatment.
b. RPR/VDRL should be performed monthly till 4-fold reduction/non-reactive. Thereafter, RPR/VDRL is repeated two-monthly till delivery.

4) Antenatal fetal surveillance

a. Transplacental passage of spirochetes can occur at any stage in pregnancy. They have been found in pregnancy tissues as early as 9 weeks of gestation.
b. Depending on the stage of the infection, there is a 40% chance of stillbirth and 30-40% chance of congenital Syphilis if left untreated.
c. Fetuses with congenital Syphilis may exhibit fetal hepatomegaly (80%), fetal anemia (33%), placentomegaly (27%), polyhydramnios (12%) or hydrops (10%).
d. These features are rarely seen prior to 16-18 weeks of gestation as the fetus is yet to be able to mount an inflammatory response.
e. Severe features such as hydrops and fetal anemia are first to resolve if treatment is successful.
f. Serial growth scans after 26-28 weeks is recommended due to risk of fetal growth restriction.

5) Intrapartum considerations

a. Timing and mode of delivery is per routine obstetric indications in uncomplicated cases.
b. In some cases it may be reasonable to delay planned induction to allow time for maternal antibiotics to confer fetal protection.
c. There are no recommendations against amniotomy, fetal blood sampling or delaying cord clamping, especially in women who have completed treatment.
d. VDRL/RPR should be repeated intrapartum or early postpartum to allow comparison with titres in the newborn.

6) Postpartum

a. The paediatrician should be notified after birth and alerted if women have incomplete treatment, completed treatment less than 30 days ago or failed to demonstrate a 4-fold titre reduction after treatment (see table below).
b. Breastfeeding is not contraindicated if there are no active syphilitic ulcers on the breast.
c. A follow-up plan should be coordinated with the family medicine specialist/ genitourinary medical team.

Newborn should be considered for treatment with penicillin if any of these:

- Mother has incomplete treatment course
- Mother was treated with non-penicillin medication
- Mother completed treatment <30 days prior to birth
- Mother failed to demonstrate a 4-fold reduction in VDRL/RPR
- Mother is suspected of or at high risk of reinfection after treatment was given
- Active signs of infection in newborn
- Positive CSF-VDRL in newborn
- Abnormal CSF in newborn (ex WBC> 5/mm3 or protein >50 mg/dl)
- Newborn RPR/VDRL at least 4-fold more than maternal titres

Reference:

1. WHO Guideline on syphilis screening and treatment for pregnant women. 2017.
2. MOH. Garis panduan pengukuhan program pencegahan jangkitan HIV dan sifilis dari ibu-ke-anak. 2021.

SECTION

E

INTRAPARTUM CARE (NORMAL & ABNORMAL LABOUR

E1. FIRST STAGE OF LABOUR

a. The first stage of labour is characterized by regular painful contractions which are increasing in intensity, frequency and duration. It is associated with progressive cervical effacement and dilatation up to full dilatation.
b. It is divided to:
   - Latent phase of labour: cervical os from closed to 3 cm.
   - Active phase of labour: cervical os from 4 cm* to 10 cm.

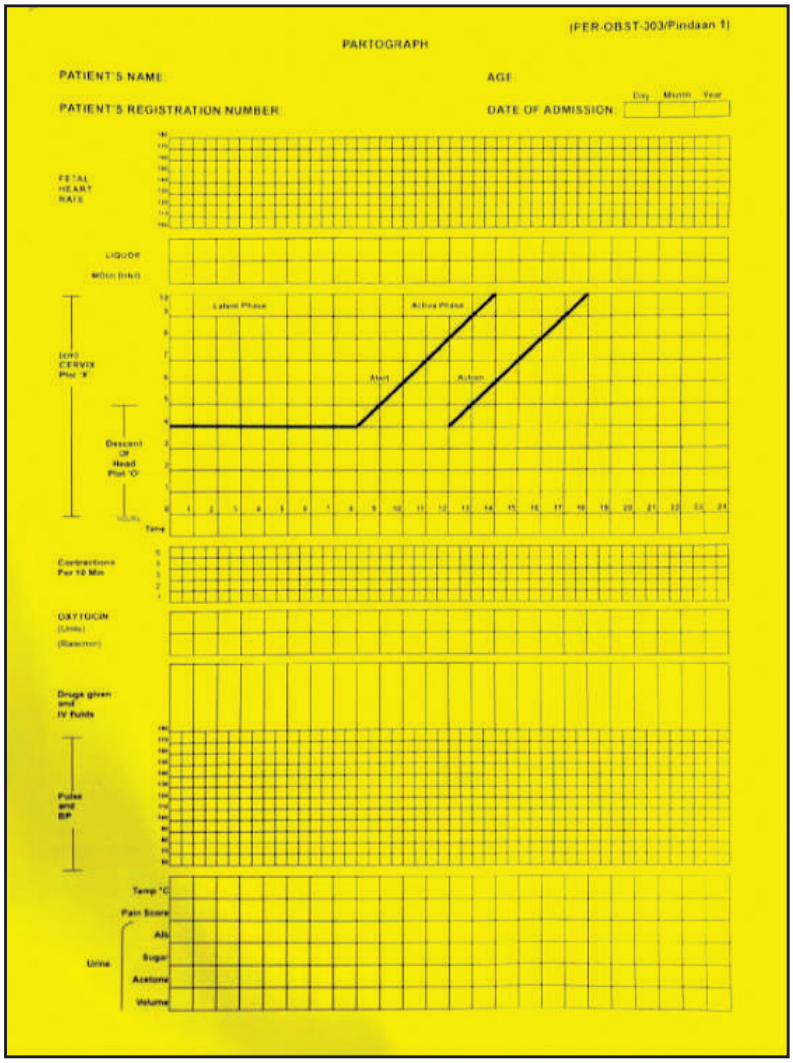
(*WHO Labour Care Guide 2020 uses 5 cm to define the onset of active phase of labour, and may be adopted by any labour unit)

c. A complete assessment of a pregnant woman in labour should be done during admission. A high-risk case should be reviewed directly by a medical officer or specialist.
d. During the latent phase of labour, fetal monitoring for pregnancy can be done by intermittent auscultation with handheld doppler ultrasound (daptone) or intermittent cardiotocogram (CTG) as required.
e. A partogram is commenced once the labour progresses to active phase or earlier in certain circumstances, such as if amniotomy was performed.
f. Monitoring of maternal and fetal conditions will be charted on partogram.
g. Maternal monitoring:
   - Blood pressure 4 hourly (more frequent in hypertensive disorders)
   - Temperature 4 hourly
   - Pulse rate 4 hourly
   - Frequency of contractions half-hourly and pain score
   - Urine output +/- urine ketone 4 hourly
   - Vaginal examination 4 hourly
   - Woman's wishes, expectations and concerns
h. Fetal monitoring:
   - Once in the active phase of labour, monitor fetal heart rate every 15 – 30 minutes. (If daptone is used, perform auscultation during and immediately after contraction for at least 1 minute).
   - High-risk women in active phase will require continuous CTG monitoring
i. Mother-friendly care should be encouraged throughout the labour in order to promote Baby Friendly Hospital Initiatives.

j. A satisfactory labour progress is defined by:
   - Contractions which are progressively increasing in frequency and duration.
   - Rate of cervical dilatation of at least 0.5 cm per hour in primigravidas and 1 cm per hour in multigravidas during active phase.
   - Presenting part remains well applied to the cervix with good descent.

k. Hyperstimulation is defined as:
   - More than 5 contractions in 10 minutes over a 30-minute period; or
   - Each contraction lasts more than 2 minutes in duration.

l. Meconium-stained liquor
   - A specialist input should be obtained.
   - Interpretation of CTG or fetal blood sampling should be done with caution when the liquor is meconium-stained.
   - A trained healthcare professional in neonatal life support should be readily available during the delivery.



Adapted from:

1. Sarawak General Hospital's Labour Ward Manual 2020.
2. Obstetrics and Gynaecology Protocol State of Kedah 2019.

E2. SECOND STAGE OF LABOUR

a. The second stage of labour is defined as the period from the full dilatation of the cervix until the delivery of the baby.
b. It is divided into passive and active second stage of labour:
   - Passive: Full dilatation of cervix in the absence of involuntary expulsive contractions.
   - Active: Full dilatation of cervix with expulsive contractions or with active maternal effort.
c. Passive second stage of labour can be allowed up to one hour if there is no evidence of maternal or fetal compromise.
d. In the event of prolonged second stage of labour, refer to a specialist if baby is not delivered after:
   - Nulliparous: 2 hours of active second stage with regional anaesthesia, or 1 hour without regional anaesthesia.
   - Multiparous: 1 hour of active second stage with or without regional anaesthesia.
e. Shortening of the second stage of labour may be indicated in women with certain medical conditions (eg: cardiac diseases, hypertensive disorders in pregnancy etc).
f. Appropriate universal precaution should be practiced including gowning, gloves with or without goggles.
g. Episiotomy is performed only if indicated. Give local anaesthesia if an episiotomy is required.
h. A paediatric doctor should be on standby for high-risk cases and instrumental deliveries.
i. Ensure all medical equipment and gasses required for delivery and baby resuscitation are available and functioning.
j. Fetal monitoring during second stage of labour:
   - Monitor fetal heart rate can be achieved with CTG monitoring continuously or with daptone monitoring every 5 minutes after each contraction for one minute.
   - CTG interpretation can be challenging especially when the mother is bearing down.

k. Intervention may be needed either via instrumental delivery or caesarean section in the following conditions:
   - Prolonged second stage
   - Pathological CTG
   - Moderate and thick meconium stained liquor

l. Give uterotonic when the anterior shoulder of the fetus is delivered. Options will be either Syntocinon 1 ml (10 IU) or intramuscular Syntometrine 1ml (oxytocin 5IU and Ergometrine 0.5mg)

m. Syntometrine should be avoided if the woman has heart disease or hypertension.

Adapted from:

1. Obstetrics Protocol O&G Department Hospital Tuanku Fauziah Kangar Perlis 2020-2025.
2. Obsterics and Gynaecology Protocol State of Kedah 2019.
3. Penang State Obstetrics Protocol 2021.

E3. THIRD STAGE OF LABOUR

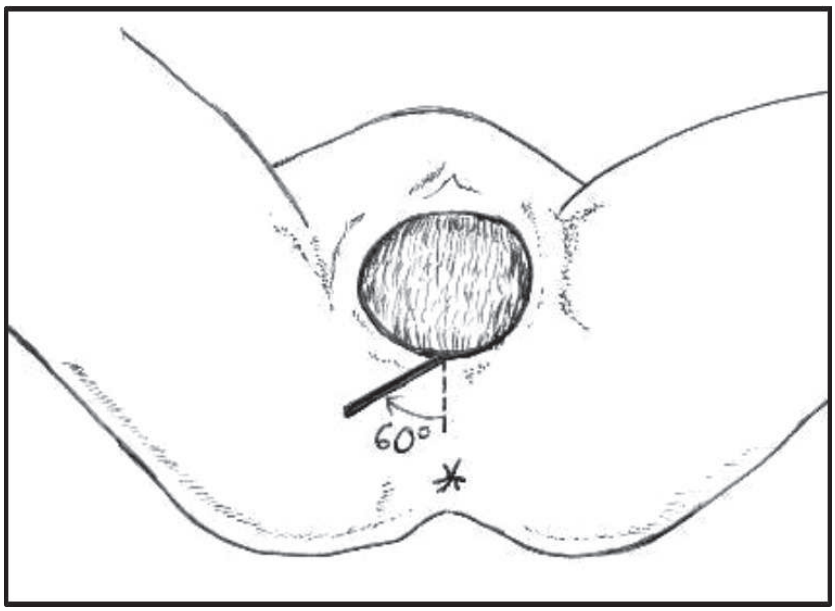
a. The third stage of labour is defined as the period from the birth of the baby to the expulsion of the placenta.
b. Signs of placenta separation:
   - Gushing of blood
   - Lengthening of the umbilical cord
   - Uterus becomes globular and raised
c. Delayed cord clamping is recommended for at least 1 minute unless the baby needs to be moved for immediate resuscitation or mother needs resuscitation.
d. Active management of the third stage of labour includes:
   - Routine use of uterotonic drugs. Commonly used agents are intramuscular oxytocin 10IU or intramuscular Syntometrine (oxytocin 5IU and Ergometrine 0.5mg).
   - Controlled cord traction once signs of placenta separation are being observed.
e. Consider starting 40 IU oxytocin in 500mls normal saline infusion over 4-6 hours in mothers with high risk of postpartum haemorrhage, such as grand multiparity and obesity.
f. The placenta completeness and also the umbilical cord vessels are checked and documented.
g. Mother should be monitored regularly for an hour. Reassessment should be done before transferring mother to postnatal ward. This is to ensure the vital signs are stable, uterus well contracted with no excessive lochia loss and perineal checked.
h. Prolonged third stage of labour is diagnosed when the placenta is not delivered within 30 minutes from the delivery of the baby. Retained placenta is an obstetric emergency which can cause postpartum haemorrhage. Thus, it needs to be attended to immediately and manual removal of placenta should be planned if needed.

Adapted from:

1. Penang State Obstetrics Protocol 2021.
2. Obsterics and Gynaecology Protocol State of Kedah 2019.
3. Obstetrics Protocol O&G Department Hospital Tuanku Fauziah Kangar Perlis 2020-2025.

E4. EPISIOTOMY

a. Episiotomy is a surgical incision made at the perineum to widen the vaginal opening to facilitate the delivery of a baby.
b. Restricted use of episiotomy is recommended as evident by Cochrane review.
c. 5-10 mls of lignocaine (1% or 2%) should be infiltrated to the perineum before episiotomy.
d. When episiotomy is indicated, the mediolateral technique is recommended, with the angle is 60 degrees away from the midline when the perineum is distended.



**Picture copied from Negeri Sembilan O&G Protocol 2018*

Repair of episiotomy/second degree tear

a. Good lighting and exposure to assess the type and extent of perineal tear is important (especially third or fourth degree tear). If there is any doubt or difficulty in determining the degree of tear, it is advisable to examine the patient in the operating theater under anaesthesia.
b. Use proper surgical instruments and suture material (use rapidly absorbed polyglactin 910 or polyglactin 2-0 braided suture).
c. Figure of eight sutures should be avoided because they are haemostatic in nature and may cause tissue ischaemia.
d. Identify the apex of the vaginal tear, anchor suture 1 cm above the apex.

e. Repair the vaginal mucosa using continuous or interrupted suturing technique towards the hymenal ring and tie proximal to the ring.
f. Identify the transverse perineal muscle and bulbocavernosus muscles on each side of the perineal tear. Approximate both ends of the muscles with transverse interrupted or continuous sutures.
g. Repair the perineal skin using continuous or subcuticular technique. Subcuticular sutures are associated with less pain and higher maternal satisfaction.
h. Perform vaginal examination to evacuate remnants of blood clot, and to ensure no vaginal haematoma or foreign body being missed.
i. Perform a per rectal examination to assess the anal tone and to make sure sutures did not extend beyond the anal mucosa which poses risk of anovaginal fistula formation.
j. Ensure correct instrumental and swab count at the end of the repair.
k. Document the procedure and the estimated blood loss.
l. Standard: Overall episiotomy rate in normal vaginal delivery should not be more than 30%.

Adapted from:

1. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.
2. Penang State Obstetrics Protocol 2021.
3. Sarawak General Hospital's Labour Ward Manual 2020.

E5. OBSTETRIC ANAL SPHINCTER INJURY (OASIS): THIRD AND FOURTH DEGREE PERINEAL TEARS

CLASSIFICATION OF PERINEAL TEAR	DEGREE OF INJURY
First-degree tear	Injury to perineal skin and/or vaginal mucosa.
Second-degree tear	Perineal muscles injury.
Third-degree tear: Grade 3a tear Grade 3b tear Grade 3c tear	Anal sphincter complex injury: Less than 50% external anal sphincter (EAS) thickness torn. More than 50% EAS thickness torn. Both EAS and internal anal sphincter (IAS) are torn.
Fourth-degree tear	Anal sphincter complex (EAS and IAS) and anorectal mucosa injury.

a. OASIS should be repaired in operation theater to ensure sterility, good lighting, optimal positioning and adequate anaesthesia.
b. Repair must be conducted by a trained clinician or by a trainee under supervision.
c. Prophylactic antibiotics are recommended to reduce the risk of postoperative infections and wound dehiscence.

PERINEAL TEAR	TECHNIQUES	SUTURE CHOICES
Partial thickness EAS tear	End-to-end technique	**Monofilament sutures eg: PDS 3-0 or Braided sutures eg: polyglactin 2-0**
Full thickness EAS tear	Overlapping or end-to-end technique.	
IAS tear	Interrupted or mattress sutures without overlapping the IAS.	
Anorectal mucosa tear	Continuous or interrupted sutures	Polyglactin 3-0

d. When repairing the EAS and IAS, the burying of surgical knots beneath the superficial perineal muscles is recommended to minimize the risk of knot and suture migration to the skin.

e. Repair vaginal mucosa, perineal muscle and skin as described in episiotomy/ second-degree tear chapter.
f. Perform vaginal examination to evacuate remnants of blood clot, and to ensure no vaginal haematoma or foreign body being missed.
g. Perform a per rectal examination to make sure sutures did not extend from vagina beyond the anal mucosa which poses risk of anovaginal fistula formation.
h. Ensure correct instrumental and swab count at the end of the repair.
i. Document the procedure and the estimated blood loss.
j. Postoperative laxative (syrup lactulose) is recommended to reduce the risk of wound dehiscence.
k. Referral to physiotherapist for pelvic floor muscle exercises.
l. Antibiotics, laxatives and follow-up of women should follow the local protocols.
m. Debriefing and audit should be carried out after the OASIS incident.
n. 60-80% of women are asymptomatic 12 months following delivery and EAS repair.
o. Women who sustained OASIS should be counseled on mode of delivery in their subsequent pregnancy.
p. Women with OASIS before and who are symptomatic or have abnormal endoanal ultrasonography and/or manometry should be counseled regarding the option of elective caesarean section.

End-to-end technique for repair EAS

Overlapping technique for repair EAS

Picture adapted from Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018

Adapted from:

1. Sarawak General Hospital's Labour Ward Manual 2020.
2. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.

Reference:

1. The Management of Third- and Fourth-Degree Perineal Tear. Green-top Guideline No.29. June 2015.

E6. INDUCTION OF LABOUR (IOL) /AUGMENTATION

1) Overview

TERM	DEFINITION
Induction of labour (IOL)	Artificial initiation of labour
Augmentation of labour	Active intervention during labour to promote the frequency, duration and amplitude of uterine contractions.

2) Prerequisites for IOL:

a. Review of maternal history.
b. Confirmation of gestational age of fetus.
c. Assessment of indications and contraindications of IOL.
d. Confirmation of fetus presentation and engagement.
e. Vaginal examination to assess for Bishop score and membrane (intact/ rupture).
f. Assessment of fetal wellbeing. (A normal CTG before IOL).
g. Women being counseled and informed consent obtained.

3) Indications of IOL

INDICATIONS OF IOL	TIMING OF IOL
Post-dated in uncomplicated pregnancy	• 40 weeks + 7 days
Term pre-labour rupture of membranes (ROM)	
GBS positive Non-GBS	• IOL as soon as ROM is confirmed. • IOL within 24 hours after ROM
Preterm pre-labour rupture of membranes (PPROM)	
36 - 37 weeks 34 – 35 weeks + 6 days Less than 34 weeks	• IOL if spontaneous labour has not commenced within 24 hours. • IOL is not routinely recommended unless there are maternal or fetal indications. • IOL is not generally recommended, with exceptions only following careful consideration.

INDICATIONS OF IOL	TIMING OF IOL
Gestational diabetes/ diabetes mellitus	
Requiring treatment Well-controlled with diet and no evidence of macrosomia	• 37 - 38 weeks + 6 days • 40 weeks
Hypertensive disorders	
Well-controlled on anti-hypertensive Well-controlled not requiring treatment	• 37 – 38 weeks • 40 weeks
Twin pregnancy	
Monochorionic diamniotic Dichorionic diamniotic	• 36 – 37 weeks • 37 – 38 weeks
Small-for gestational age (SGA) & Fetal growth restriction (FGR)	
Constitutionally small healthy fetus FGR	• Not to be allowed post-date • Timing depends on the severity of IUGR and presence of evidence of fetal compromise. • Consider IOL for term FGR. • IOL is not recommended for severe FGR
Intrauterine fetal death (IUFD)	• Timing depends on a woman's wishes and presence of complications eg: coagulopathy (risk increases after 4 weeks of IUFD).
Reduced fetal movement (RFM)	• Consider IOL if RFM at term.
Oligohydramnios	• Timing of delivery prior to term will depend on gestational age, underlying etiology and fetal wellbeing. • Consider IOL if oligohydramnios at term.

4) Contraindications of IOL:

a. Previous classical/ inverted T/ J-incision caesarean section
b. Previous hysterotomy
c. Previous myomectomy with entry into uterine cavity/ extensive dissection
d. Previous uterine rupture
e. Suspected macrosomia (≥ 4kg)
f. Suspected cephalopelvic disproportion
g. Cord presentation
h. Breech
i. Active genital herpes
j. Malpresentation

5) Modified Bishop Score

CERVIX SCORE	0	1	2	3
Dilatation (cm)	<1	1-2	3-4	>4
Length (cm)	>4	3-4	1-2	<1
Station	-3	-2	-1/0	+1/+2
Consistency	Firm	Medium	Soft	-
Position	Posterior	Middle	Anterior	-

Favourable cervix: Score ≥ 7

Unfavourable cervix: Score < 7

6) Counseling on IOL

a. Indications
b. Methods
c. Potential risks
d. Success/failure rate
e. Timing and place of IOL
f. Options of pain relief
g. Options if IOL unsuccessful
h. Alternatives if IOL is declined

METHOD FOR INDUCTION OF LABOUR			
	INDICATIONS	**BENEFITS**	**RISKS/CONTRAINDICATIONS**
Membrane sweeping	• To promote spontaneous labour and reduce IOL with other methods. • Reduce post date significantly if done between 39 – 40 weeks.	• Applicable to both favourable and unfavourable cervix. • No evidence of increased maternal and neonatal infections.	• Associated with discomfort and vaginal bleeding.
Mechanical method (Transcervical catheter/ Foley catheter/ Hygroscopic stents)	• For relatively high risk IOL with prostaglandin E2 (PGE2): previous caesarean section, grand multiparity.	• Lower risk of hyperstimulation. • No evidence of increased infections.	• Contraindicated in ruptured membranes, active herpes and GBS, antepartum haemorrhage cases.
Amniotomy	• Favourable cervix (Bishop score ≥7) • Amniotomy alone should not be considered a primary method of IOL unless there are specific clinical reasons.	• May reduce length of labour. • Reveal colour and smell of liquor.	• Caution in high presenting parts, risk of cord prolapse. • Trauma to cervix or fetal scalp, bleeding.
Vaginal prostaglandin E2 (PGE2)	• Unfavourable cervix (bishop score <7). • Regime: First dose 3 mg followed by second dose 3 mg after 6 hours if labour is not established (Maximum 2 doses). • Decision for third dose only by specialist/ consultant after careful clinical evaluation.	• Ripening and softening of cervix	• Contraindicated in known hypersensitivity, sign of maternal/ fetal compromise, chorioamnionitis, vaginal bleeding. • Caution in multiple pregnancy, parity > 5, previous caesarean scar/ uncomplicated uterine surgery, cardiovascular disease, epilepsy and glaucoma. • Can cause gastrointestinal upset (nausea, vomiting or diarrhoea) • 4% risk of hyperstimulation.

METHOD FOR INDUCTION OF LABOUR			
CERVIX SCORE	**INDICATIONS**	**BENEFITS**	**RISKS/ CONTRAINDICATIONS**
Intravenous oxytocin with amniotomy	• Preferred method if bishop scores favourable. • For cases with relatively high risk with PGE2 (previous caesarean scar, high station and polyhydramnios) • Initial dose: 1-2 milliunits/minute, titrates half-hourly until good uterine contractions are achieved. • Maximum dose: 32 milliunits/min for primigravida and 16 milliunits/min for multipara.	• Shorten duration of labour. • Decrease risk of chorioamnionitis and neonatal infection in term prelabour rupture of membrane cases.	• Should not start within 6 hours after vaginal PGE2. • Risk of hyperstimulation. • Caution in patients with previous caesarean sections.

Adapted from:

1. Induction of labour, Obstetrics Protocol, Hospital Raja Permaisuri Bainun Ipoh 2021.
2. Sarawak General Hospital's Labour Ward Manual 2020.
3. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.

Reference:

1. Guidelines on induction of labour 2021, Ministry of Health Malaysia

E7. OPERATIVE VAGINAL DELIVERY

1) Indications

a. Vaginal birth can be assisted by vacuum or forceps for maternal and fetal indications:

MATERNAL
➢ Prolonged second stage • Nulliparous: 2 hours of active second stage with regional anaesthesia, or one hour without regional anaesthesia. • Multiparous: 1 hour of active second stage with or without regional anaesthesia, ➢ Class III or IV cardiac disease ➢ Hypertensive crisis ➢ Cerebral vascular disease ➢ Myasthenia gravis ➢ Spinal cord injury ➢ Maternal exhaustion
FETAL
➢ Presumed fetal compromise ➢ Delivery of after-coming head in breech presentation (Forceps)

b. Safe operative vaginal delivery requires a careful assessment of the clinical situation, clear communication with the woman and healthcare personnel who is credentialed in the chosen procedure.

SAFETY CRITERIA FOR OPERATIVE VAGINAL DELIVERY	
Prerequisites (Full abdominal and vaginal examination)	**F** - fully dilated os. **O** - occiput anterior or posterior (for forceps). **R** - rupture of membranes. **C** - cephalopelvic disproportion excluded, caput and moulding < 2+, catheterisation of bladder, adequate contraction. **E** - engagement of head (≤ 1/5 head palpable per abdomen). **P** - pain relief (local anaesthesia or pudendal block), pelvis is deemed adequate. **S** - Skills, supervision, sterility.

Preparation of mother	➢ Clear explanation and informed consent taken. ➢ Trust and full cooperation established.
Preparation of staff	➢ Operator has adequate knowledge, experience and skills. ➢ Adequate facilities: equipment, bed, lighting. ➢ Backup plan: access to the operating theater if operative vaginal delivery unsuccessful. ➢ Anticipation of complications (perineal trauma, postpartum haemorrhage, shoulder dystocia). ➢ Presence of personnel trained in neonatal resuscitation.

2) Classification of Operative Vaginal Delivery:

Outlet	➢ Fetal skull on the perineum. ➢ Fetal scalp visible without separating the labia. ➢ Sagittal suture is in antero-posterior diameter/ right or left OA or OP position (rotation < 45 degree).
Low	➢ Leading point of the skull (not caput) is at station +2 or more but not on the perineum. ➢ Two subdivisions: • Non-rotational ≤ 45 degree • Rotational > 45 degree
Mid	➢ Fetal head no more than 1/5 palpable per abdomen ➢ Leading point of the skull at station 0 or +1 cm ➢ Two subdivisions: • Non-rotational ≤ 45^0 • Rotational > 45^0
High	➢ Fetal head is 2/5 or more palpable per abdomen ➢ Leading point of skull above ischial spines. ➢ NOT RECOMMENDED for operative vaginal delivery.

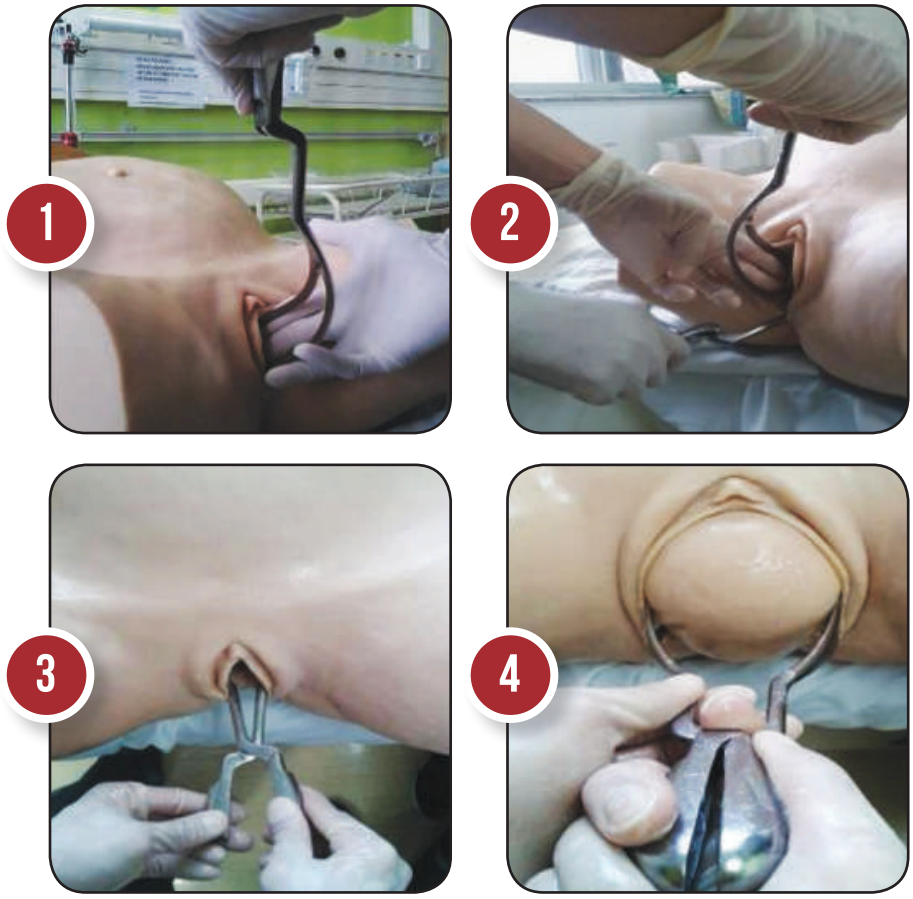
3) Contraindications:

a. Head palpable per abdomen > 1/5
b. Evidence of relative or absolute cephalopelvic disproportion (eg: clinically big baby, suspected macrosomia)
c. Cervix not fully dilated
d. Station above ischial spine
e. Unable to determine fetal position
f. Abnormal presentation except for after-coming head in vaginal breech delivery
g. Vacuum should not be performed for gestation less than 34 weeks
h. Confirmed or high probability of fetal bleeding disorders (eg: alloimmune thrombocytopenia)
i. Fetal predisposition to bony fracture eg: osteogenesis imperfecta

4) Choices of instruments:

	FORCEPS	VACUUM
Types	➢ Simpsons, Neville-Barnes (low/mid cavity) ➢ Wrigley's (Outlet) ➢ Kielland's (rotational) ➢ Piper (Aftercoming head of breech presentation)	➢ Soft/ silicone cup ➢ Metal cup: Malmstrom/Birds ➢ Kiwi Omnicup
Benefits	➢ Does not require chignon formation. ➢ More likely to succeed especially in maternal exhaustion. ➢ Useful for aftercoming head in breech delivery	➢ Easier learning curve. ➢ Can be used in fetal occipital transverse position. ➢ Less genital tract trauma risk.
Risks	➢ Significant perineal tear: 20% ➢ OASIS: 8-12% ➢ Facial nerve palsy: rare ➢ Skull fracture: rare	➢ Higher failure rate. ➢ Significant perineal tear: 10% ➢ OASIS: 1-4% ➢ Cephalohaematoma: 1 - 12% ➢ Retinal haemorrhage: 17 - 38% ➢ Subgaleal bleeding: 3 - 6/1000.
	➢ Facial/scalp laceration: 10% ➢ Hyperbilirubinemia: 5 - 15% ➢ Intracranial haemorrhage: 5 - 15/10,000 ➢ Fetal death: very rare	

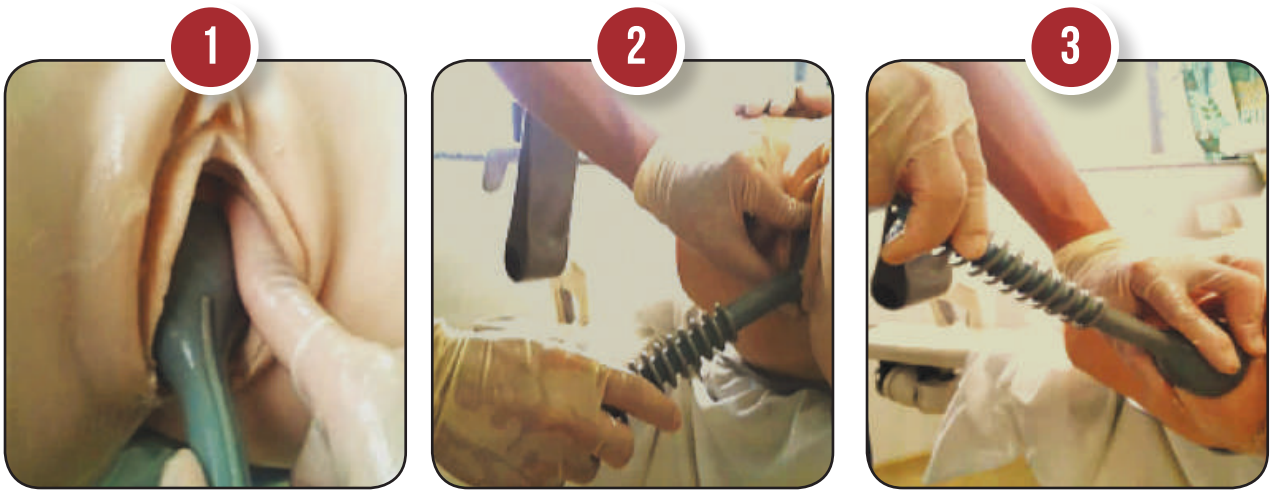
5) Forceps Delivery Techniques



Pictures adapted from Sarawak General Hospital's Labour Ward Manual 2020.

a. Atraumatic insertion
b. Hold the handle of the left blade like a pencil with your left hand. Gently insert the right hand to protect the left vagina wall. Introduce the blade in between contractions. (*Picture 1*)
c. Gently slide and swing the left blade upward along the pelvic curve. The right hand guides the blade while guarding the lateral vagina wall
d. Repeat the same for the right blade. (*Picture 2*)
e. The blades should lock easily. (*Picture 3*)
f. Ensure the suture lies in the midline with the shanks. The posterior fontanelle is one finger breadth above the shanks. The lambdoid suture is equidistant from the forceps blades. (*Picture 4*)
g. Angle of traction:
   - Apply force perpendicular to the handle and downwards to maintain and increase flexion. (Pajot's maneuver)
   - Once the posterior fontanelle is below the symphysis pubis, the handles are elevated in a "J" direction.
h. Remove both the blades after the head is delivered.

6) Vacuum Delivery Techniques



Pictures copied from Sarawak General Hospital's Labour Ward Manual 2020.

a. Atraumatic insertion
b. Place the cup over the sagittal suture at the flexion point (centre of the cup is 3 cm anterior to the posterior fontanelle). (*Picture 1*)
c. Turn on the suction pressure to achieve 60 – 80 kPa. The increment of pressure can be either rapid or stepwise.
d. Ensure no vagina or cervical tissue is caught in between the cup. (*Picture 2*)
e. During contraction, apply traction perpendicular to the cup with the axis of traction following the pelvic curve. (*Picture 3*)
f. Remove the cup once the fetal head is delivered by releasing the suction pressure and allowing the cup to detach spontaneously.

7) Abandon operative vaginal delivery if:

a. Difficulty in applying the instruments.
b. No evidence of progressive descent with each pull.
c. No evidence of imminent birth after 3 pulls.
d. Birth not imminent within 20 minutes.
e. Vacuum cup slips two times.

Operative vaginal delivery that has a higher risk of failure should be considered a trial and be attempted in a place where immediate recourse to caesarean section can be undertaken.

8) Higher rates of failure are associated with:

a. Maternal BMI > 30kg/m2
b. Short maternal stature
c. Head circumference > 95th centile.
d. Occipito-posterior position
e. Mid-cavity birth or 1/5 of head is palpable per abdomen

9) Sequential instruments

a. The use of sequential instruments is associated with an increased risk of trauma to the infant. However, the operator needs to balance the risks of caesarean birth following failed vacuum extraction with the risk of forceps birth following failed vacuum extraction. The decision for sequential instruments must be made by a specialist.
b. Please alert paediatric teams when there is failed vacuum extraction, sequential use of instruments or failed forceps extraction due to increased neonatal morbidity.

10) Post procedure

a. Examine the perineum for tear and repair accordingly.
b. A single dose of IV broad spectrum antibiotic within an hour post-delivery is recommended to prevent infection.
c. Provide regular oral analgesia (eg: NSAIDs and paracetamol).
d. Ensure mother can void normally.
e. Document the procedure.

Adapted from:

1. Obstetrics Protocol O&G Department Hospital Tuanku Fauziah Kangar Perlis 2020-2025
2. Sarawak General Hospital's Labour Ward Manual 2020.
3. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.

Reference:

1. Assisted Vaginal Birth. Green-top Guideline No.26. April 2020.
2. Operative Vaginal Delivery, Obstetrics Protocol Hospital Raja Permaisuri Bainun, Ipoh. 2021.

E8. TERM PRELABOUR RUPTURE OF MEMBRANES (TERM PROM)

1) Overview

a. Term PROM is defined as spontaneous rupture of membranes with a latent period before the onset of uterine activity, occurring after 37 weeks of gestation.
b. Clinical assessment of Term PROM aims to confirm the leaking liquor and to evaluate for evidence of intrauterine infection, abruptio placentae and fetal compromise.

2) History: Involuntary gushing of fluid, dribbling along the thigh and recurrent dampness are highly suggestive of leaking liquor.

3) Physical examination

a. Vital signs to look for fever or hypothermia, maternal tachycardia, hypotension.
b. Abdominal palpation for symphysio-fundal height, contraction, uterine tenderness, fetal lie and presentation.
c. Sterile speculum examination to look for pooling of liquor at the posterior fornix spontaneously or after cough impulse. Also, to assess the cervical length, os, presence of per vaginal bleeding, meconium or foul-smelling liquor.
d. Presence of liquor can be supported by litmus paper test or other commercial test kit to test for insulin-like growth factor-binding protein I (IGFBP-I) or placental alpha microglobulin-I (PAMG-I).
e. Avoid unnecessary digital vaginal examination as it can increase the risk of chorioamnionitis, postpartum endometritis and neonatal infection.

4) Investigations

a. Full blood count to look for leukocytosis.
b. Low vaginal and anorectal swab (can use a single swab) for culture and sensitivity to test for Group B Streptococcus (GBS).
c. Transabdominal ultrasound to assess the fetal presentation and liquor volume.
d. CTG to assess fetal well-being.

5) Management of Term PROM

EXPECTANT	INDUCTION OF LABOUR
➢ 79% will progress into labour spontaneously within 12 hours, 95% within 24 hours. ➢ 50% will deliver within 33 hours and 95% deliver within 94 – 107 hours.	➢ Reduced time from rupture of membranes to delivery. ➢ Reduce the rates of chorioamnionitis and endometritis. ➢ Reduce admission to neonatal intensive care units. ➢ No increase in caesarean delivery or operative vaginal delivery. ➢ Higher maternal satisfaction.
EXPECTANT	**INDUCTION OF LABOUR**
➢ If maternal GBS status is negative or unknown, expectant management up to 24 hours can be an option if mother declines IOL after adequate counseling regarding risk of prolonged leaking and both mother and fetal conditions are reassuring.	➢ IOL should be offered in: ➢ GBS carrier mother ➢ Prolonged leaking > 24 hours ➢ Prostaglandins and oxytocin are equally effective. ➢ Prostaglandin is associated with higher rates of chorioamnionitis as compared to oxytocin.

6) Intrapartum antibiotic prophylaxis (IAP)

a. IAP is indicated in:
   - ➢ GBS bacteriuria identified antenatally.
   - ➢ GBS carrier detected incidentally or by intentional testing.
   - ➢ Previous infant with early- or late-onset GBS disease.
   - ➢ Previous pregnancy GBS carrier and not keen for GBS testing in late pregnancy this time (50% likelihood of maternal GBS carriage in current pregnancy. If keen for GBS testing, it should be carried out at 35-37 weeks of gestation or 3-5 weeks prior to the anticipated delivery date, then offer IAP if still positive for GBS).

b. There is insufficient evidence to justify the routine use of prophylactic antibiotics immediately after the diagnosis of Term PROM in the absence of an indication for GBS IAP. It should be weighed against the risk of antibiotic resistance and anaphylactic reaction.

c. However, for women being managed expectantly, the duration of rupture of membrane is more prolonged, thus, there is a role for antibiotics to reduce infectious morbidity.

d. The practice of administration of antibiotics in Term PROM with prolonged leaking may differ according to hospitals (initiation of antibiotic at 12 or 18 hours of leaking).

7) Choice of antibiotic

a. IAP with benzylpenicillin or ampicillin reduces the incidence of early-onset neonatal GBS disease.
b. Benzylpenicillin has a narrow-spectrum of activity thus it is less likely to promote antibiotic resistance.
c. Dosage: IV ampicillin 2g stat then 1g 4 hourly or IV Benzylpenicillin 3g stat then 1.5g 4 hourly or IV Clindamycin 900mg stat then 8 hourly in women with penicillin allergy.

8) Monitoring (Assess for signs of chorioamnionitis)

a. Fever > 37.4^0C
b. Maternal tachycardia
c. Uterine tenderness
d. Fetal tachycardia
e. Foul-smelling liquor
f. Leukocytosis.

Adapted from:

1. Obstetrics Protocol O&G Department Hospital Tuanku Fauziah Kangar Perlis 2020-2025.
2. Sarawak General Hospital's Labour Ward Manual 2020.
3. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.
4. Obstetrics and Gynaecology Protocol State of Kedah 2019.

Reference:

1. Prelabour Rupture of Membranes, ACOG Practice Bulletin, Number 188, Jan 2018.
2. Cochrane review: Planned early birth versus expectant management (waiting) for prelabour rupture of membranes at term (37 weeks or more) 2017.
3. Cochrane review: Antibiotics for prelabour rupture of membranes at or near term 2014.
4. Prevention of early-onset neonatal Group B Streptococcal disease. Green-top guideline No.36. September 2017.
5. Term prelabour rupture of membranes (Term PROM). The Royal Australian and New Zealand College of Obstetricians and Gynaecologists Statement. March 2017.

E9. PRETERM PRELABOUR RUPTURE OF MEMBRANES (PPROM)

1) Overview

a. PPROM is defined as spontaneous rupture of membranes before the onset of regular uterine contraction prior to 37 weeks.
b. It complicates up to 3% of pregnancies and is associated with 30-40% of preterm births.
c. Clinical assessment of PPROM aims to confirm the leaking liquor and to evaluate for intrauterine infection, abruptio placentae and fetal compromise.

2) History: Involuntary gushing of fluid, dribbling along the thigh and recurrent dampness are highly suggestive of leaking liquor.

3) Physical examination

a. Vital signs to look for fever or hypothermia, maternal tachycardia, hypotension.
b. Abdominal palpation for symphysio-fundal height, contraction, uterine tenderness, fetal lie and presentation.
c. Sterile speculum examination to look for pooling of liquor at the posterior fornix spontaneously or after cough impulse. Also, to assess the cervical length, os, presence of per vaginal bleeding, meconium or foul-smelling liquor.
d. Presence of liquor can be supported by a litmus paper test or other commercial test kit to test for insulin-like growth factor-binding protein I (IGFBP-I) or placental alpha microglobulin-I (PAMG-I).
e. Avoid unnecessary digital vaginal examination as it can increase the risk of chorioamnionitis, postpartum endometritis and neonatal infection.

4) Investigations

a. Full blood count to look for leukocytosis.
b. C-reactive protein.
c. Low vaginal and anorectal swab (can use a single swab) for culture and sensitivity to test for Group B Streptococcus (GBS).
d. Transabdominal ultrasound to assess the presentation and liquor volume.
e. CTG to assess fetal well-being.

5) Management

a. Start T. Erythromycin Ethylsuccinate (EES) 400mg BD (dose may be adjusted for high BMI patients) for 10 days.
b. Antenatal corticosteroid requirement:

Below 24 weeks	Consultant-led discussion with the woman.
24^{+0} – 34^{+6} weeks	Offer to all women if preterm birth is anticipated (established preterm labour, PPROM or planned preterm birth).
35^{+0} – 36^{+6} weeks	Short term respiratory benefit should be weighed against the risk of neonatal hypoglycaemia and long-term neurodevelopmental concerns.

c. Admit woman for monitoring for at least 48 -72 hours:
   - Blood pressure, pulse rate and temperature 4 hourly.
   - Fetal heart rate monitoring 4 hourly.
   - Uterine contraction/tenderness 4 hourly.
   - Pad charting – to inform if any change of liquor colour or smell.
d. Consider hospital outpatient expectant management after initial inpatient monitoring for women who live near to hospital and able to come back for follow up.
   - Ensure appropriate counseling on signs and symptoms of chorioamnionitis and to seek medical attention early if unwell.
   - Biweekly full blood count (to monitor for white cell count trend) and C-reactive protein.
   - Weekly liquor volume.

6) Further management will depend on gestational age:

36 – 37 weeks	➢ IOL if spontaneous labour has not commenced within 24 hours.
34 – 35 weeks + 6 days	➢ IOL is not routinely offered unless there are maternal or fetal indications. ➢ Weigh the balance between the benefits and risks of delivery or expectant management. ➢ Decision to prolong a pregnancy with PPROM should be discussed between specialist and the woman after considering the individual risk factors. ➢ If leaking has stopped, vital signs are stable, blood and ultrasound scan parameters are normal, consider allowing hospital outpatient management. Timing of birth should be discussed with women on an individual basis with careful consideration of patient preference and ongoing clinical assessment. ➢ Tocolysis is not recommended as it does not significantly improve perinatal outcome.
Less than 34 weeks	➢ IOL is not generally recommended, with exceptions only following careful consideration. ➢ Expectant management. ➢ Consider tocolysis if the woman is in labour to allow time for completion of antenatal corticosteroid provided there is no evidence of maternal or fetal compromise. ➢ Allow labour if completed antenatal corticosteroid. ➢ If leaking has stopped, vital signs are stable, blood and ultrasound scan parameters are normal, consider allowing hospital outpatient management. Timing of birth should be discussed with women on an individual basis with careful consideration of patient preference and ongoing clinical assessment.

7) PPROM happened at the threshold of viability or earlier before 24 weeks

a. Mid-trimester PPROM, especially when it is associated with anhydramnios, has a somber prognosis (fetal lung hypoplasia and limb contracture).
b. Paediatric team should be informed if delivery is anticipated. Women should have the opportunity to meet the paediatric team for counseling.

8) Fetal Neuroprotection with IV $MgSO_4$

Gestational age	Magnesium sulfate usage in imminent preterm birth or at least 4 hours prior to a planned preterm birth
23^{+0} to 23^{+6} weeks	Should be discussed based on individual cases.
24^{+0} to 29^{+6} weeks	Should be offered.
30^{+0} to 33^{+6} weeks	Should be considered.

9) If chorioamnionitis is suspected, delivery is indicated irrespective of the gestational age

a. Take blood and urine for culture and sensitivity and start IV broad spectrum antibiotics.
b. Aim for vaginal delivery unless suspected fetal compromised or other obstetric indications.
c. After delivery, take a placental swab at the chorion-amnion interface to send for culture and sensitivity.

Adapted from:

1. Sarawak General Hospital's Labour Ward Manual 2020.
2. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.

Reference:

1. Care of women presenting with suspected preterm prelabour rupture of membranes from 24+0 weeks of gestation. Green-top guideline No. 73. June 2019.
2. Guidelines on Induction of Labour2021, Ministry of Health Malaysia.
3. Magee LA, De Silva DA, Sawchuck D et. al. NO. 376 Magnesium sulphate for fetal neuroprotection. J Obstet Gynaecol Can 2019;41(4):505-522

E10. PRETERM LABOUR

1) Overview

Preterm labour is defined as onset of labour (characterized by regular uterine contraction with cervical dilatation and effacement leading to descent of the fetus) from 22^{+0} to 36^{+6} weeks of gestation.

2) Identify predisposing factors

a. PPROM
b. Infection
c. Placental abruption
d. Placenta praevia
e. Multiple pregnancy
f. Polyhydramnios
g. Trauma
h. Fetal anomaly

3) Assessments

a. Vital signs
   - Blood pressure (hypertensive disorders in pregnancy can lead to placental abruption, hypotension can be due to septic shock or haemorrhagic shock in placental abruption)
   - Pulse rate
   - Temperature (tachycardia and fever will indicate underlying infection).

b. Abdominal examination
   - Symphysio-fundal height
   - Fetal lie and presentation
   - Uterine irritability/tenderness
   - Signs of other intra abdominal infections.

c. Speculum examination
   - Cervical dilatation, fetal presentation, membrane intact or not, presence of liquor or blood.

d. Ultrasound scan
   - Fetal parameters, lie, presentation and estimated fetal weight
   - Placenta site
   - Amniotic fluid index
   - Transvaginal scan to assess cervical length (a cervical length of < 15mm increases the likelihood of preterm birth within the next 7 days).

4) Investigation

- Full blood count for haemoglobin, total white cell count and platelet count.
- Urine FEME and culture and sensitivity to rule out urinary tract infection.
- Low vaginal swab and rectal swab to rule out infection/ group B streptococcus.

5) Management

a. The aim of management is to optimize the fetal outcome while ensuring maternal well-being is not compromised.
b. Antenatal corticosteroid
c. Proven to reduce rates of neonatal death, respiratory distress syndrome and intraventricular haemorrhage.
d. Dosage: IM Dexamethasone 12 mg BD x 2 doses or IM Dexamethasone 6 mg BD x 4 doses for women with diabetes and delivery is not imminent.

Below 24 weeks	Consultant-led discussion with the woman.
24^{+0} – 34^{+6} weeks	Offer to all women if preterm birth is anticipated (established preterm labour, PPROM or planned preterm birth).
35^{+0} – 36^{+6} weeks	Short term respiratory benefit should be weighed against the risk of neonatal hypoglycaemia and long-term neurodevelopmental concerns.

e. Maximal benefit of antenatal corticosteroid is achieved 24 hours and up to 7 days after completion of the 24 mg dexamethasone.
f. Birth should not be delayed for antenatal corticosteroid if the indication for birth is impacting the health of the woman or her baby.
g. WHO recommends a single rescue course of antenatal corticosteroids if women below 34 weeks gestation remain at high risk of preterm birth and more than 7 days have elapsed since previous treatment. However, women should be informed that currently there is limited evidence to recommend this practice as there is no reduction in serious morbidity or long-term benefits have been seen, but it may reduce the need for neonatal respiratory support.
h. Antenatal corticosteroid therapy should be used with caution in chorioamnionitis or ongoing systemic infection.

6) Tocolysis

a. Tocolysis is recommended for spontaneous preterm labour between 24^{+0} and 34^{+6} weeks.
b. It permits a course of antenatal corticosteroids to be administered, and enables transfer of the mother to a facility with better neonatal care if needed.
c. Contraindications: maternal or fetal compromise, vaginal bleeding, placental abruption or intrauterine infection.
d. WHO considered nifedipine to be the preferred option as the balance of benefits and harms, cost, acceptability and feasibility was superior to other tocolytic agents.
e. Oxytocin receptor antagonists and nitric oxide are more costly.
f. Betamimetics have higher side effects, which may sometimes be life-threatening.
g. Nifedipine
   - Loading dose: 20mg every 30 minutes x 3 doses
   - Maintenance dose: 20 mg TDS for 2 days
   - Monitoring: uterine contraction, blood pressure, pulse rate, fetal heart rate monitoring.
   - CTG monitoring can be done from 28 weeks of gestation onwards.
   - Side effects: flushing, headache, hypotension, tachycardia, palpitation, giddiness or nausea.

7) Fetal Neuroprotection with IV Magnesium sulfate

a. Magnesium sulfate has been proven to reduce the incidence of cystic periventricular leukomalacia and cerebral palsy in preterm birth.

Gestational age	Magnesium sulfate usage in established preterm labour or having a planned preterm birth within 24 hours.
23^{+0} to 23^{+6} weeks	Should be discussed based on individual cases.
24^{+0} to 29^{+6} weeks	Should be offered.
30^{+0} to 33^{+6} weeks	Should be considered.

b. Dosing:
   - Loading dose: Intravenous 4g bolus over 15 minutes
   - Maintenance dose*: Intravenous 1g/hour until delivery or for 24 hours (whichever sooner).

     * One meta-analysis has not shown any benefit of maintenance dose after loading compared with loading dose alone (8).

c. Monitoring:
   - Monitor for magnesium toxicity hourly by checking the blood pressure, pulse rate, respiratory rate and deep tendon reflexes.

8) Intrapartum antibiotic as GBS prophylaxis

a. Offer antibiotics during labour to women who are in preterm labour.
b. IV ampicillin 2g stat then 1g 4 hourly or IV Benzylpenicillin 3g stat then 1.5g 4 hourly or IV clindamycin 900mg stat then 8 hourly in women with penicillin allergy.

9) Delivery

a. Allow vaginal delivery if cephalic presentation.
b. Episiotomy should not be done routinely.
c. If women are less than 34 weeks of gestation, avoid fetal scalp electrode, fetal scalp sampling and vacuum assisted delivery.
d. A normal cardiotocography trace is reassuring, but an abnormal trace does not necessarily indicate fetal hypoxia or acidosis especially in extreme preterm labour between 23^{+0} and 25^{+6} weeks of gestation.

Adapted from:
1. Sarawak General Hospital's Labour Ward Manual 2020.
2. Obstetrics Protocol O&G Department Hospital Tuanku Fauziah Kangar Perlis 2020-2025.

Reference:
1. Preterm labour and birth. NICE guideline. November 2015.
2. Antenatal corticosteroids to reduce neonatal morbidity and mortality. Green-top guideline No. 74. July 2022.
3. WHO recommendations on antenatal corticosteroids for improving preterm birth outcomes 2022.
4. WHO recommendation on tocolytic therapy for improving preterm birth outcomes 2022.
5. Prevention of early-onset neonatal Group B Streptococcal disease. Green-top guideline No.36. September 2017.
6. Care of women presenting with suspected preterm prelabour rupture of membranes from 24+0 weeks of gestation. Green-top guideline No. 73. June 2019.
7. Magee LA, De Silva DA, Sawchuck D et. al. NO. 376 Magnesium sulphate for fetal neuroprotection. J Obstet Gynaecol Can 2019;41(4):505-522.
8. Crowther CA, Middleton PF, Voysey M et al. Assessing the neuroprotective benefits for babies with antenatal magnesium sulphate: an individual participant data meta-analysis. PLoS Med 2017;14:e1002398.

SECTION

F

OBSTETRIC EMERGENCIES

F1. MATERNAL COLLAPSE

<table>
<tr><td>Definition</td><td colspan="3">An acute event involving the cardiorespiratory systems and/or central nervous systems, resulting in a reduced or absent conscious level (and potentially cardiac arrest and death), at any stage in pregnancy and up to 6 weeks after birth.</td></tr>
<tr><td rowspan="5">Causes</td><td>4Hs</td><td>4Ts</td><td>1E</td></tr>
<tr><td>➢ Hypovolaemia
- Bleeding (including non-obstetric causes)
- Septic shock
- Neurogenic shock</td><td>➢ Thromboembolism
- Pulmonary embolism
- Amniotic fluid embolism
- Air embolism</td><td rowspan="4">➢ Eclampsia
- Intracranial haemorrhage</td></tr>
<tr><td>➢ Hypoxaemia
- Cardiomyopathy
- Acute pulmonary oedema
- Myocardial infarction
- Aortic dissection</td><td>➢ Toxicity
- Local anaesthetic
- Anaphylaxis
- Magnesium toxicity</td></tr>
<tr><td>➢ Hypo/ hyperkalaemia</td><td>➢ Tension pneumothorax</td></tr>
<tr><td>➢ Hypothermia</td><td>➢ Tamponade (cardiac)</td></tr>
<tr><td>Diagnosis</td><td colspan="3">Unresponsive woman with no breathing or abnormal breathing</td></tr>
</table>

Early assessment	**D** – Danger ➢ Assess for danger especially if collapse happens in a community setting **R** – Response ➢ Assess for response by tapping on a woman's shoulder and saying "Hello! Hello! Are you ok?" **A** – Alert **V** – Responding to verbal stimulus **P** – Responding to pain stimulus **U** – Unresponsive ➢ If there is response, put the woman in recovery position ➢ If there is no response to call for help and trigger CODE BLUE/RED ALERT (depending on local code)
Management	Call for help – Assign a person to call for help and provide situation and location; trigger CODE BLUE or RED ALERT (depending on the local protocol); at least 4 responders for BLS Effective communication in the resuscitation team which consists of a leader, provider of compressions, scriber, runner and etc. **ABC is no longer recommended in the 2015 ILCOR (International Liaison Committee on Resuscitation) Guidelines.** **C** – Circulation Check for pulse immediately if patient unresponsive; ➢ If pulse is present, check breathing • If pulse is present and there is abnormal breathing, administer one breath every 5-6 seconds and reassess pulse every 2 minutes • If pulse is present and breathing is normal, to put patient in recovery position

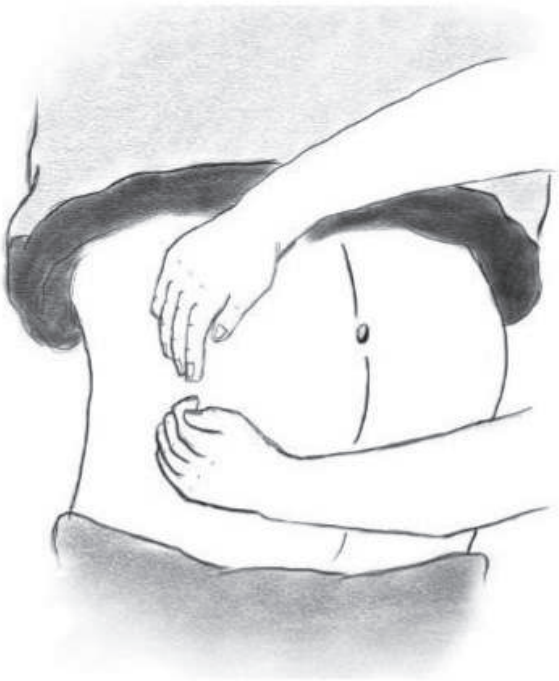
Management	➢ If pulse is absent, start effective chest compression; note the time: • Manual left uterine displacement is recommended to reduced aortocaval compression if uterus is > 20 weeks size i.e. palpable above umbilicus • After 30 compressions, open airways (A) and deliver 2 rescue breaths (B) • Use bag-valve-mask with oropharyngeal airway and 100% oxygen with flow rate of at least 15 L/min • Hold mask using E-C or E-O method • Open airway with head tilt-chin lift (avoid moving the neck if cervical spine injury is suspected) • Deliver each breath over 1 second and watch for chest rise • If no chest rise, reopen airway, improve seal and try again • Attach AED/cardiac monitor and SpO^2 monitor if available ➢ Check rhythm/pulse every 2 minutes (5 cycles of 30:2) • Check for pulse for 5-10 seconds • If no pulse or unsure, resume CPR • If AED is attached and shock is recommended, administer shock followed by immediate CPR for another 2 minutes before next rhythm check ➢ Advanced airway management with cuffed endotracheal tube should be attempted once expertise available ➢ CPR should be continued until ROSC or a decision to stop by obstetrician.
	Resuscitative Hysterotomy/Perimortem caesarean section (PMCS): ➢ If there is no return of spontaneous circulation (ROSC) within 4 minutes, resuscitative hysterotomy/PMCS should be performed in all women above 20 weeks of gestation ➢ There is no need to check fetal viability before proceeding with delivery ➢ It should be done at the site of collapse ➢ The minimum equipment required should be fixed blade scalpel and 2 umbilical cord clamps (Refer to Appendix) ➢ If resuscitation is successful, transfer to operating theater for proper anaesthesia and to control bleeding and complete the operation ➢ CPR should be continued during resuscitative hysterotomy/PMCS

Management	**Concurrent management** ➢ To look for reversible causes and treat accordingly; full assessment from head to toe ➢ In hospital setting: • Insert 2 large bore cannula above level of diaphragm • Blood investigations – FBC, Coagulation profile, Renal Profile, LFT, GXM, blood glucose • Fluid resuscitation • Insert CBD **Subsequent management** ➢ If resuscitation is successful, patient should be transferred to intensive care unit ➢ Monitoring of fetus should be carried out if not delivered ➢ Debrief of patient, husband and family ➢ Proper documentation

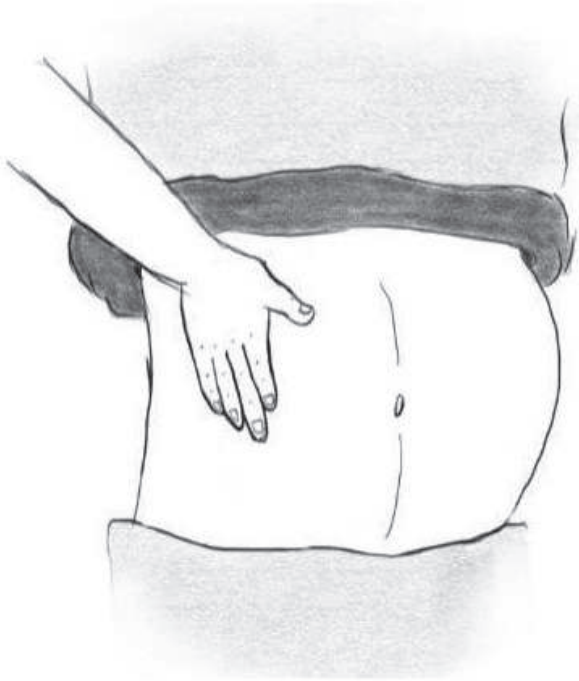
Effective Cardiopulmonary Resuscitation

RATE /MIN	DEPTH	RATIO	LOCATION	SPECIAL FEATURES
100-120	➢ 5-6 cm. ➢ Ensure full recoil in between compressions without losing contact	30:2	➢ Lower half of sternum. ➢ Rescuer's shoulders should be above the patient's chest and both arms should be straight	➢ Apply backboard if available ➢ Perform manual Left Uterine Displacement (LUD)

Manual Left Uterine Displacement (LUD)

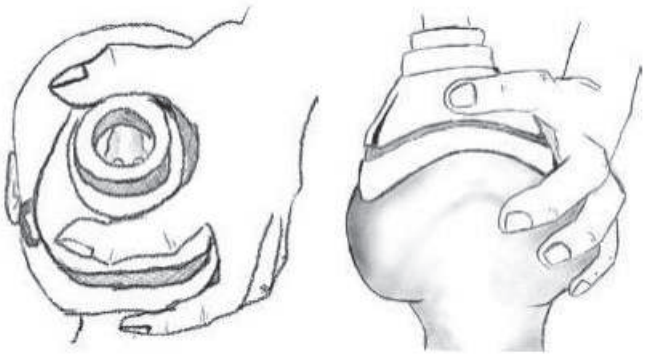


Manual left uterine displacement by the 2-handed method from the left of the patient

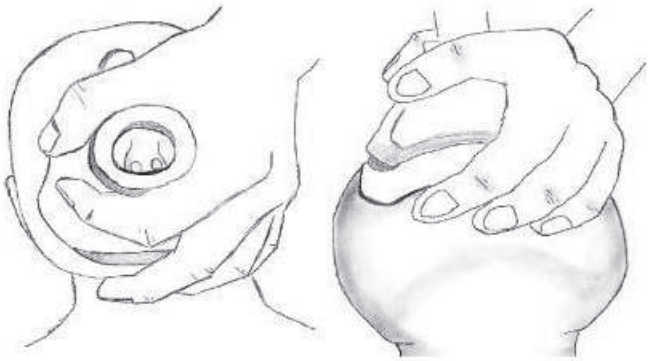


Manual left uterine displacement by the 1-handed method from the right of the patient

E-C and E-O methods

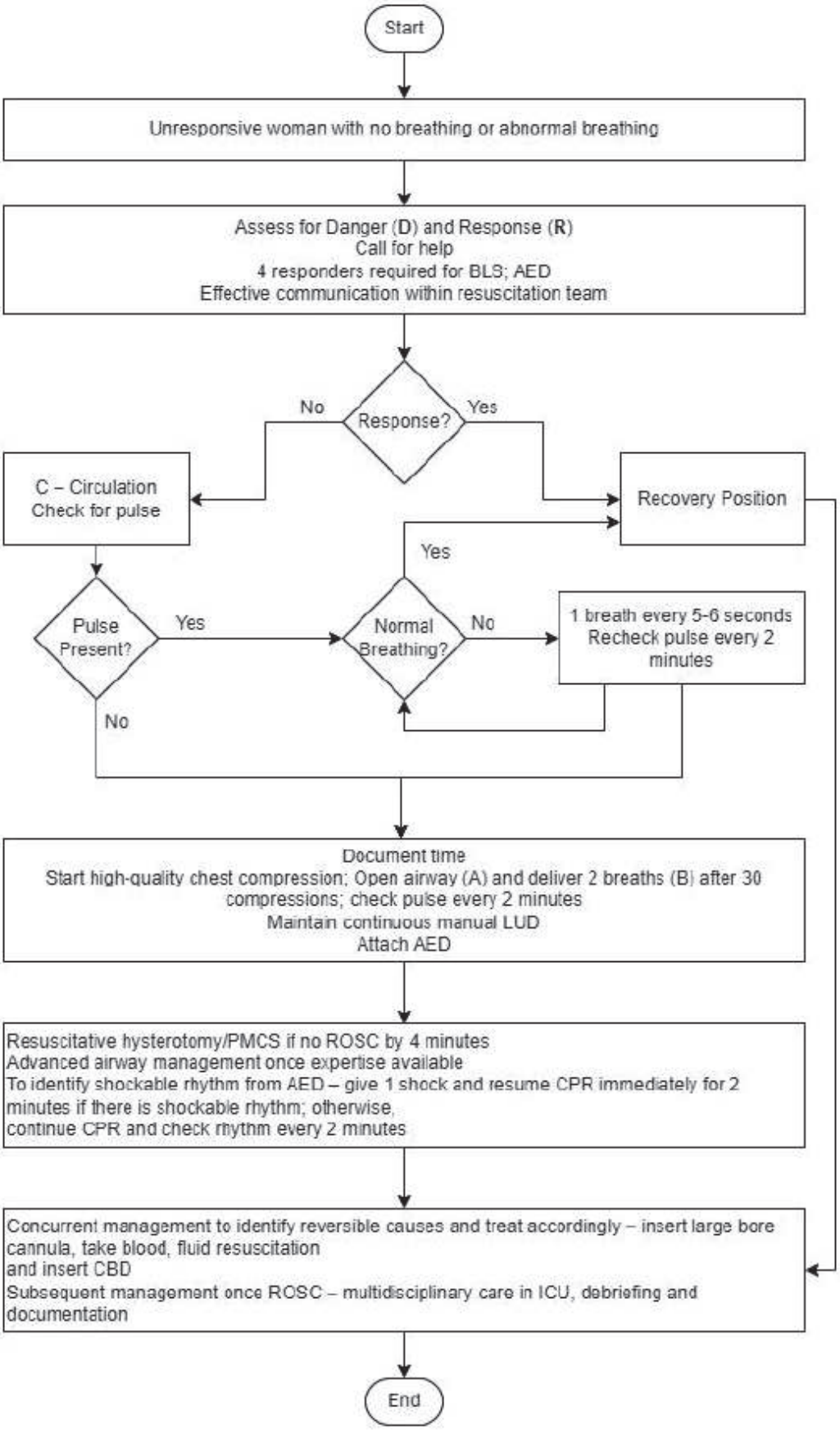


E-C methods



E-O methods

Flowchart 20: Summary of the management of maternal collapse



Adapted from:

1. O&G Protocol, State of Kedah, 2019.
2. Penang Stage Obstetric Protocol, 2021.
3. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar, Perlis, 2020-2025.
4. Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022.

Reference:

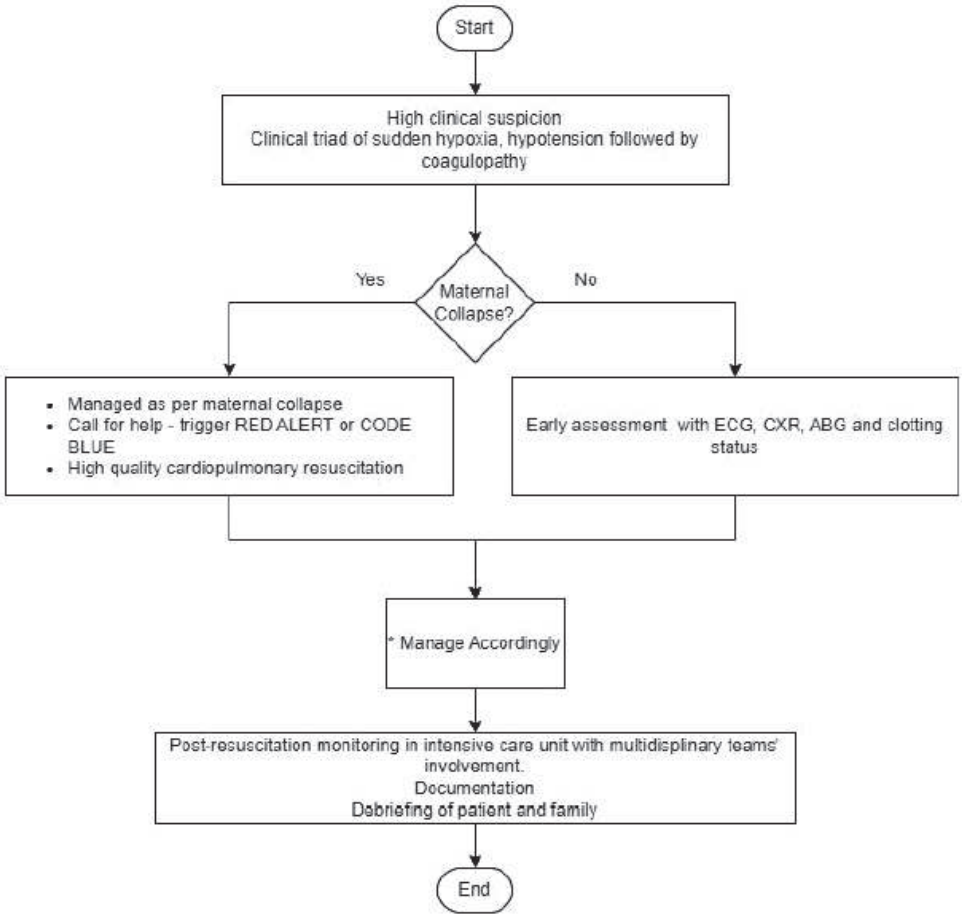
1. Chu J, Johnston TA, Geoghegan J, on behalf of the Royal College of Obstetricians and Gynaecologists. Maternal Collapse in Pregnancy and the Puerperium. BJOG 2020;127:e14-e52.
2. 2020 AHA Basic Life Support Guidelines.

F2. AMNIOTIC FLUID EMBOLISM

Definition	➢ A condition in which amniotic fluid, fetal cells, hair or other debris enters the maternal pulmonary circulation, causing cardiovascular collapse. ➢ It is rare, sudden and unpredictable with high mortality rate of 60-80%
Clinical presentation	➢ High index of suspicion ➢ Classical clinical triad of sudden hypoxia, hypotension and followed by coagulopathy, commonly occurs in relation to labour and delivery; rarely occurs in first and second trimester
Risk factors	➢ High parity ➢ Amniotomy ➢ Induction or augmentation of labour ➢ Caesarean section ➢ Excessive uterine contraction ➢ Overdistension of uterus or high intrauterine pressure (i.e. in placental abruption) ➢ Rupture of uterus
Diagnosis	It is a clinical diagnosis based on the typical clinical presentation Absence of specific diagnostic test to diagnose or refute the diagnosis of AFE
Early assessment	➢ Assessment as in maternal collapse (refer to Maternal Collapse Chapter) ➢ Early assessment cardiac status i.e. – ECG (Right axis deviation) ➢ ABG ➢ CXR – pulmonary oedema and perihilar infiltrates ➢ Early assessment of clotting status – coagulation profile, Fibrinogen level

Management	Principles of management in AFE: 1. Call for help – trigger RED ALERT OR CODE BLUE depending on the clinical situation 2. Immediate high-quality cardiopulmonary resuscitation - refer to Maternal Collapse Chapter; with standard basic life support and advanced life support protocols 3. Multidisciplinary involvement – anaesthetist, physician, blood bank specialist and O&G specialist, paediatrician 4. Consider delivery in cardiac arrest with amniotic fluid embolism; in cases where patient has ROSC before delivery via resuscitative hysterotomy/PMCS 5. Adequate oxygenation and ventilation with haemodynamic support – to maintain maternal cardiac output a. Avoid excessive fluid resuscitation b. Inotropic support for the right ventricular failure c. Decrease pulmonary afterload 6. Correct coagulopathy – activate Massive Transfusion Protocol if necessary a. Uterine atony is a common complication of AFE; aggressive management of uterine atony is recommended (refer to Obstetric Haemorrhage Chapter) b. Careful assessment and management for genital tract trauma especially in operative vaginal delivery 7. Post-resuscitation monitoring in intensive care unit with multidisciplinary teams' involvement 8. Documentation and debriefing

Flowchart 21: Summary of the management of AFE



* Management of AFE Accordingly

Delivery	Multidisciplinary Involvement	Early phase	Second phase	Coagulopathy
• Consider delivery in maternal collapse in cases ROSC occurs before PMCS	• Anesthetist, obstetrician, physician, blood bank specialist, paediatrician	• Right ventricular failure • Avoid excessive fluid. • Inotropic support. • Decrease pulmonary afterload	• Left ventricular failure and cardiogenic pulmonary oedema. • Inotropic support and limit excessive fluid.	• Early detection and correction of coagulopathy. • Activate MTP. • Aggressive treatment of PPH – uterine atony or trauma.

Adapted from:

1. Penang Stage Obstetric Protocol, 2021.
2. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar, Perlis, 2020-2025.
3. A Quick Guide to Labour Room Management, Department of O&G, Hospital Tengku Ampuan Afzan, Kuantan & Department of O&G, Kulliyyah of Medicine, IIUM, Kuantan, 3rd Edition.

Reference:

1. Society for Maternal-Fetal Medicine (SMFM) with the assistance of Pacheco LD, Saade G, et al. Amniotic fluid embolism: diagnosis and management. Am J Obstet Gynecol 2016;215:B16-24.

F3. OBSTETRIC HAEMORRHAGE

Definition	Obstetric haemorrhage encompasses bleeding from genital tract during pregnancy (antepartum haemorrhage) and after delivery (postpartum haemorrhage) **Antepartum Haemorrhage (APH)** Bleeding from genital tract occurring after 22 weeks of pregnancy **Postpartum Haemorrhage (PPH)** 1. Primary PPH – Bleeding from genital tract occurring within 24 hours after delivery • ≥ 500 ml after vaginal delivery • ≥ 1000 ml after caesarean section 2. Secondary PPH – Abnormal bleeding occurring after 24 hours up to 42 days after delivery
Early assessment	Early assessment in obstetric haemorrhage to determine: 1. The severity of the haemorrhage 2. The cause(s) of bleeding Assessment should be comprehensive, quick and precise, including examination from head to toe, assessment of patient's conscious level, alertness and vital signs. **Assessment of the severity of the haemorrhage can be based on:** 1. Visual estimation of blood loss according to picture below - The assessment should be continuous process - Tend to underestimate blood loss - The visualized vaginal bleeding in concealed placental abruption might not be representative of the severity of the situation 2. Clinical signs and symptoms of hypovolaemic shock - Tachycardia is the early signs of hypovolaemia - The clinical signs and symptoms of shock according to the stages of shock is shown in Table 1 3. Obstetric Shock Index (OSI) - Shock index is the ratio of heart rate to systolic BP - It is used as an early marker of compromise - For pregnant population, normal SI ranges from 0.7-0.9; SI ≥ 1 predicts adverse clinical outcome

<table>
<tr><td rowspan="2">Definition</td><td colspan="2">Assessment to identify the cause(s) of bleeding:</td></tr>
<tr><td>ANTEPARTUM HAEMORRHAGE</td><td>POSTPARTUM HAEMORRHAGE</td></tr>
<tr><td></td><td>1. Placental abruption
2. Placenta praevia
3. Local causes (including uterine rupture)
4. Indeterminate APH
5. Vasa praevia</td><td>Primary PPH
1. Tone (uterine atony)
2. Trauma (including uterine rupture)
3. Tissue (retained placenta or tissue)
4. Thrombin (coagulopathy)

Secondary PPH
1. Infection (most common)
2. Retained product of conception
3. Unrecognized genital tract trauma
4. Bleeding disorder
5. Persistent trophoblastic disease (uncommon)
6. Others – chronic subinvolution of uterus, uterine AV malformation (rare)</td></tr>
<tr><td>Management</td><td colspan="2">Principles of management obstetric haemorrhage are:
1. Call for help and resuscitation according to the severity of the situation
2. Fluid resuscitation and blood transfusion to be done simultaneously with management to arrest bleeding
3. In non-specialist hospital, transfer patient once patient is stabilized and bleeding controlled with temporary method; anti-shock garment is recommended in PPH if available
4. Post-event monitoring in HDU or ICU depending on the severity; documentation and debriefing</td></tr>
</table>

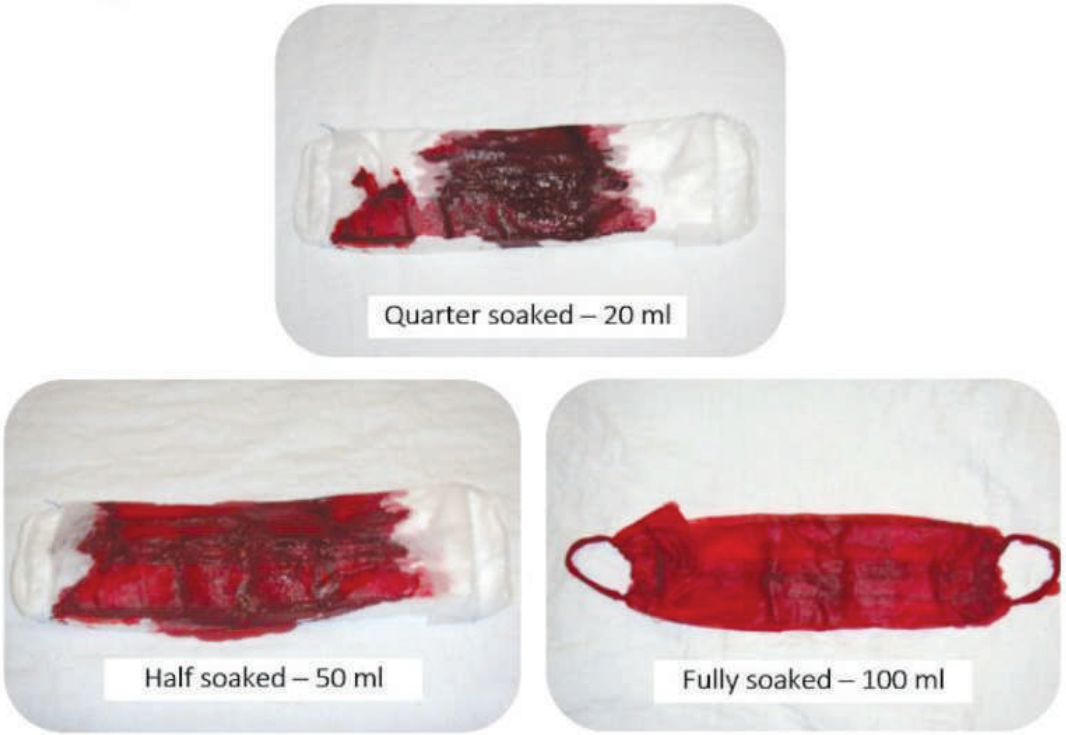
	MAJOR OBSTETRIC HAEMORRHAGE	MINOR OBSTETRIC HAEMORRHAGE WITH NO EVIDENCE OF SHOCK
Management	1. Call for help – to involve obstetrician and medical officers, anaesthetist and anaesthetic medical officers, midwives, blood bank personnel, and identify runners. 2. Trigger RED ALERT once there is MASSIVE HAEMORRHAGE (blood loss ≥ 1500ml) or when the patient is clinically unstable, regardless of the blood loss. 3. Assessment and resuscitation: ➢ Assess DR CAB – manage as per Maternal Collapse Chapter if patient collapses ➢ Place the patient flat and warm the patient ➢ Oxygen supplementation at the rate of 15 L/min via facemask ➢ Set 2 large bore intravenous cannula – 14G or 16G ➢ Take blood for FBC, Coagulation screen, renal profile and GXM 4 pints packed cells ➢ Fluid resuscitation with crystalloid while waiting for blood products ➢ Blood transfusion is usually needed; transfusion with Safe O if the need arises ➢ Activate Massive Transfusion Protocol (MTP) 4. Monitor vital signs every 15 minutes or more often until patient is stabilised 5. Continue to assess the blood loss and OSI if there is ongoing lost 6. Monitor fetus in APH 7. Arrest bleeding according to the cause of bleeding.	1. Call for help – obstetrician and medical officers and midwives 2. Assessment and resuscitation: ➢ Set 1 large bore intravenous cannula; may consider second cannula if bleeding continues. ➢ Take blood for FBC, Coagulation screen and GXM 2 pints packed cells ➢ Fluid resuscitation; blood transfusion rarely needed 3. Monitor vital signs every 15 minutes 4. Continue to assess the blood loss and OSI if there is ongoing lost 5. Monitor fetus in APH 6. Arrest bleeding according to the cause of bleeding

Clinical stages of shock

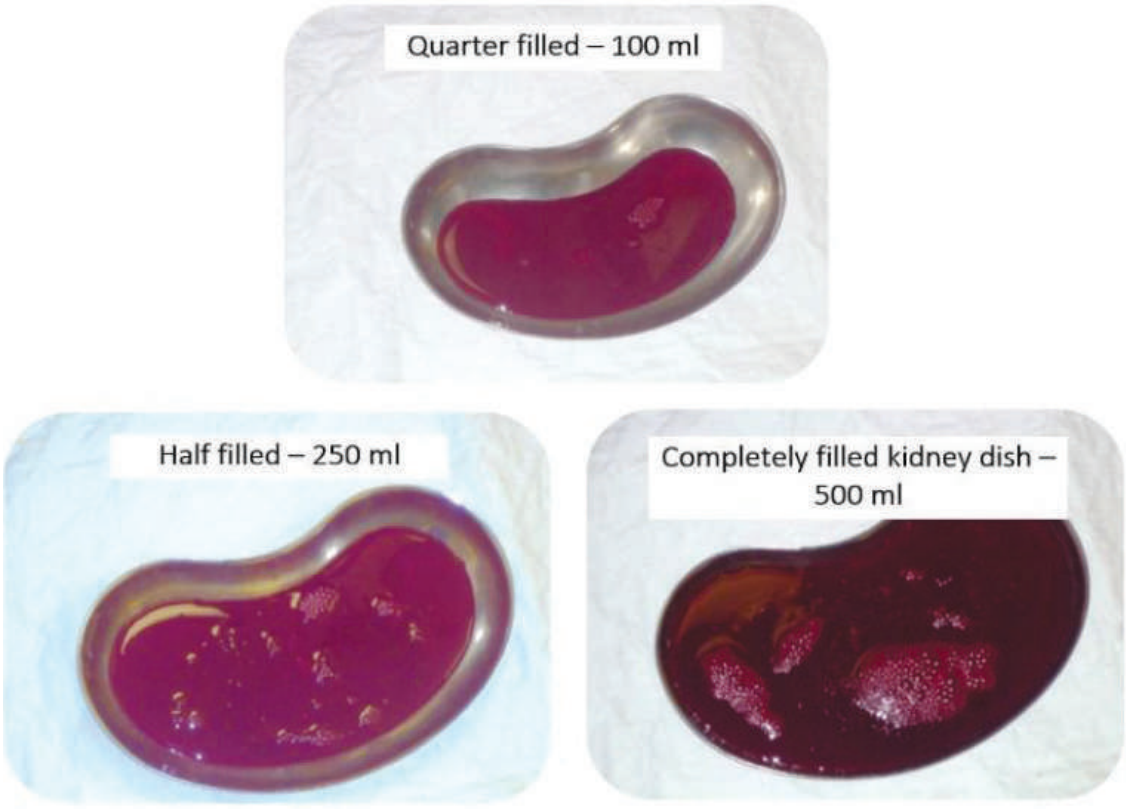
STAGE	BLOOD LOSS (ML) (% OF BLOOD VOLUME) BASED ON BODY WEIGHT OF 50 KG	PULSE RATE (BEATS PER MIN)	BLOOD PRESSURE	RESPIRATORY RATE (BREATHS PER MIN)	MENTAL STATUS	URINE OUTPUT (ML/H)
I	Up to 750 ml (< 15%)	< 100	Normal	14 - 20	Normal	> 30
II	750 – 1500 ml (15 – 30%)	> 120	Normal but may have narrow pulse pressure	20 - 30	Anxious	20 – 30
III	1500 – 2000 ml (30 – 40%)	> 120	Reduced	30 - 40	Confused	5 – 15
IV	> 2000 ml (> 40%)	> 140	Very low, can be not recordable	> 35	Lethargic	Nil

Visual estimation of blood loss

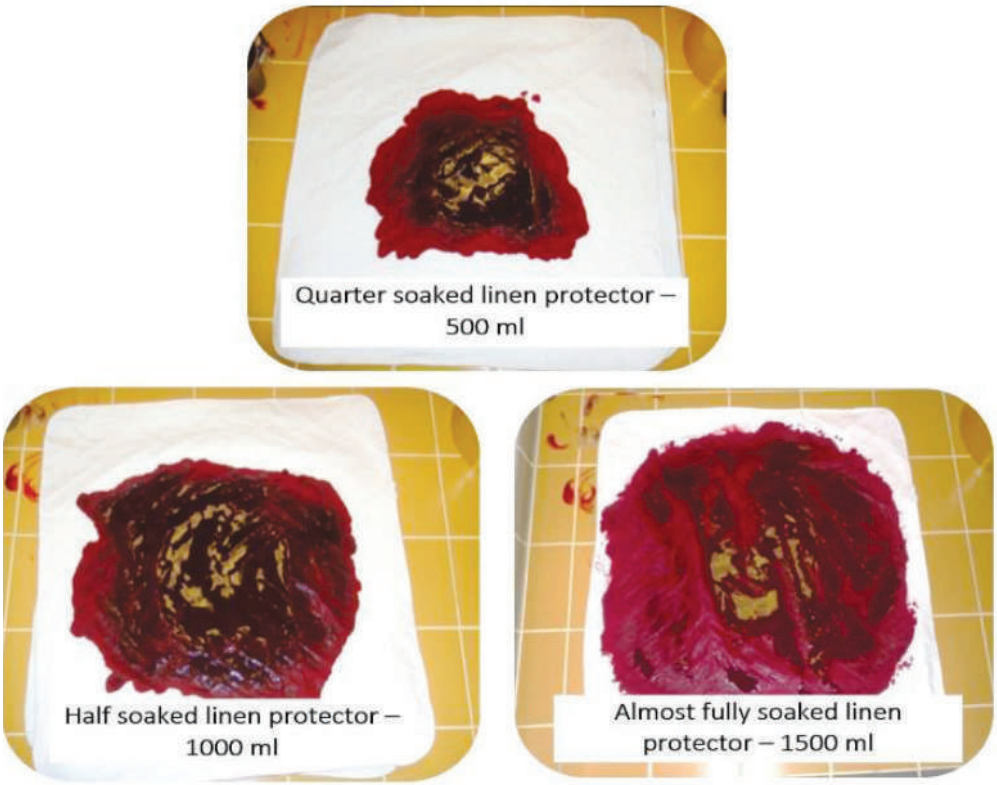
A. Sanitary pads



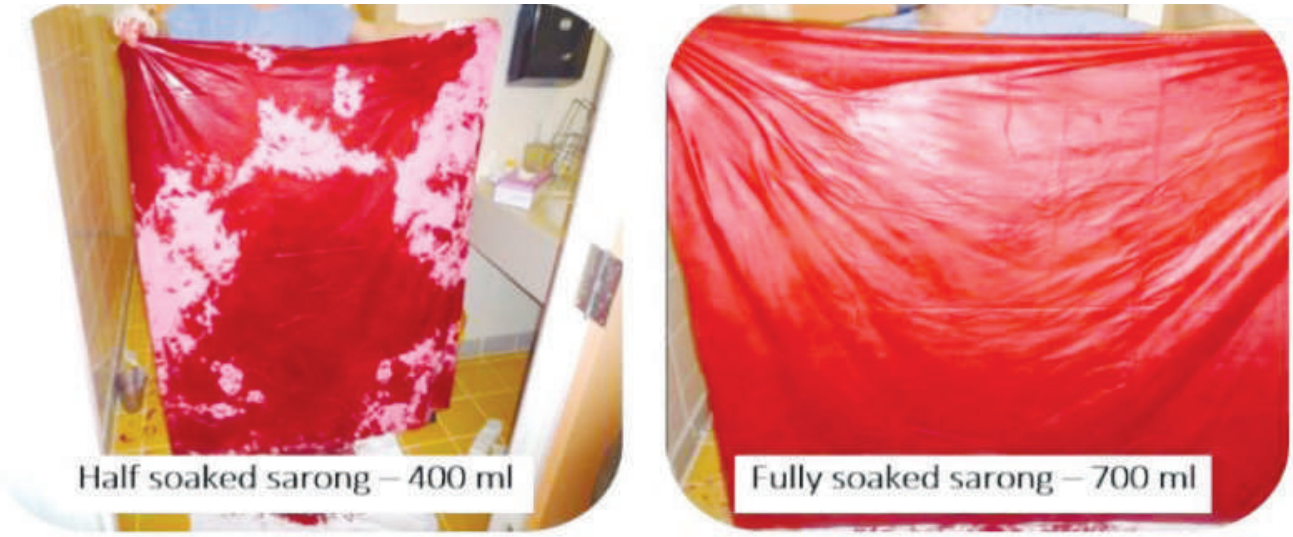
B. 500 ml kidney dish



C. Linen Protector



D. Sarong



E. Vaginal pack

Source: Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.

F3.1 ANTEPARTUM HAEMORRHAGE (APH)

<table>
<tr><td>Definition</td><td>Bleeding from genital tract occurring after 22 weeks of pregnancy</td></tr>
<tr><td>Causes of APH</td><td>1. Placental abruption
2. Placenta praevia
3. Local causes
4. Indeterminate APH
5. Vasa praevia</td></tr>
<tr><td>Clinical presentation</td><td>Refer to Table Clinical Presentation and Assessment of APH.</td></tr>
<tr><td rowspan="6">Early assessment</td><td>1. Assessment of the severity of the haemorrhage can be based on visual estimation of blood loss, clinical signs and symptoms of hypovolaemic shock and Obstetric Shock Index (OSI).
2. Visual estimation of blood loss may not be representative in concealed placental abruption.
3. Assessment to determine the cause based on the clinical presentation shown in Table Clinical Presentation and Assessment of APH.</td></tr>
<tr><td>
<table>
<tr><th colspan="2">CLASSIFICATION OF APH ACCORDING TO SEVERITY</th></tr>
<tr><td>Spotting</td><td>Staining, streaking or blood spotting noted on underwear or sanitary protection</td></tr>
<tr><td>Minor</td><td>Blood loss less than 50 ml that has settled</td></tr>
<tr><td>Major</td><td>Blood loss of 50-1000 ml with no signs of clinical shock</td></tr>
<tr><td>Massive</td><td>Blood loss > 1000 ml and/or signs of clinical shock</td></tr>
</table>
</td></tr>
<tr><td>Source: Green top guideline No. 63. Antepartum Haemorrhage. Royal College of Obstetricians and Gynaecologists. 2011.</td></tr>
</table>

Management	1. Call for help 2. Fluid resuscitation and blood transfusion as per obstetric haemorrhage 3. In non-specialist hospital, transfer patient to center with O&G specialist for further management once patient is stabilized 4. Arrest bleeding according to the causes: ➢ Placental abruption ➢ Placenta praevia ➢ Local cause • Bleeding usually stops with compression or packing • Delivery is rarely indicated • In case of suspected carcinoma of cervix, biopsy should be taken. ➢ Indeterminate APH • Diagnosis of exclusion • For in-patient care and monitoring • Expectant management as outpatient after discharge with careful monitoring of fetal growth by FMS/O&G • Delivery by 40 weeks gestation 5. Post-event monitoring in HDU or ICU depending on the severity; documentation and debriefing

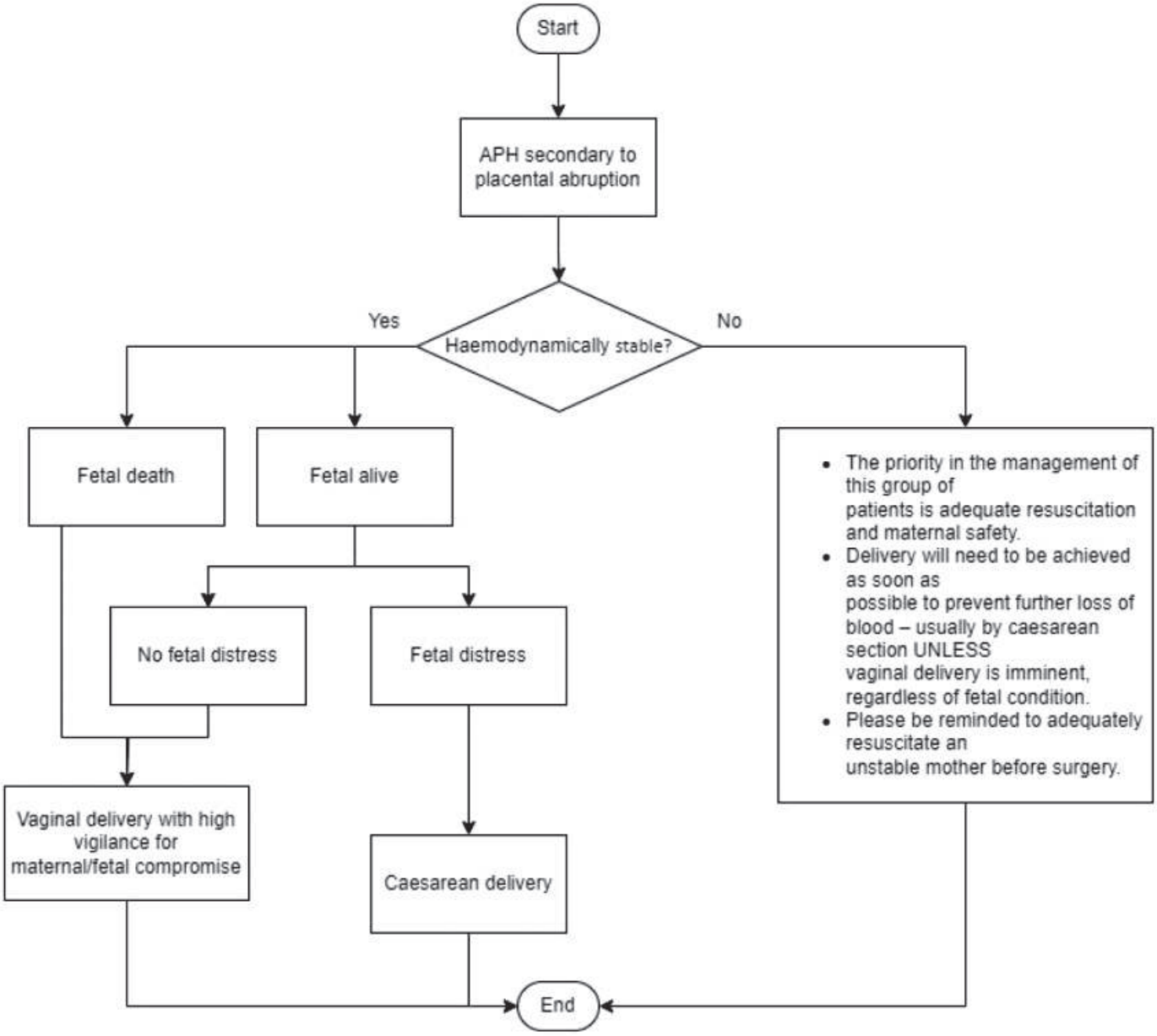
Table Clinical presentation and assessment of APH

Clinical presentation	Placenta abruption	Placenta praevia	Local causes	In-determinate
History Pattern of bleeding	- Fresh bleeding; can be spotting	- Fresh bleeding	- Ranges from fresh bleeding to spotting; foul smelling if suspected carcinoma of cervix - Haematuria in uterine rupture	- Usually spotting
Abdominal pain	- Continuous pain	- Can be associated contraction pain; usually painless	- Painless in other local cause - Severe and persistent pain in uterine rupture	- Usually no pain
Fetal movement	- Difficult to feel or absent	- Usually present	- Present - Fetal death may occur in uterine rupture	- Present
Risk factors	- Trauma - Preeclampsia - Previous history of placenta abruption - Premature rupture of membrane - Smoking - Recreational drug abuse	- History of previous caesarean section - Uterine surgery - History of placenta praevia	- Risk factors associated with carcinoma of cervix - Risk factors for uterine rupture – previous scar, obstructed labour	-
Examination Abdominal examination	- Fundal height larger than date in concealed abruption - Uterus tense/woody hard - Difficult to appreciate fetal part - Fetal heart may be absent	- - Fundal height usually corresponds to date - Uterus soft - Fetal part felt with presenting part high or abnormal lie - Fetal heart present	- Fundal height usually corresponds to date - Uterus soft - In uterine rupture, there will be sudden loss of uterine contraction - Fetal part will be easily palpable with floating presenting part	- Fundal height usually corresponds to date - Uterus soft
Speculum examination	- Cervix is normal - Cervical os can be opened or closed	- GENTLE SPECULUM IS PERMITTED BUT VE IS PROHIBITED - Cervix normal	- Cervix – mass/polyp or ectropian	- Cervix normal
Scan	- Can be normal (normal scan does not rule out placenta abruption) - Retroplacental clots in massive concealed abruption - Intrauterine death	- Placenta praevia	- Normally sited placenta - In uterine rupture, there will be free fluid and fetal parts in the peritoneal cavity	- Normally sited placenta

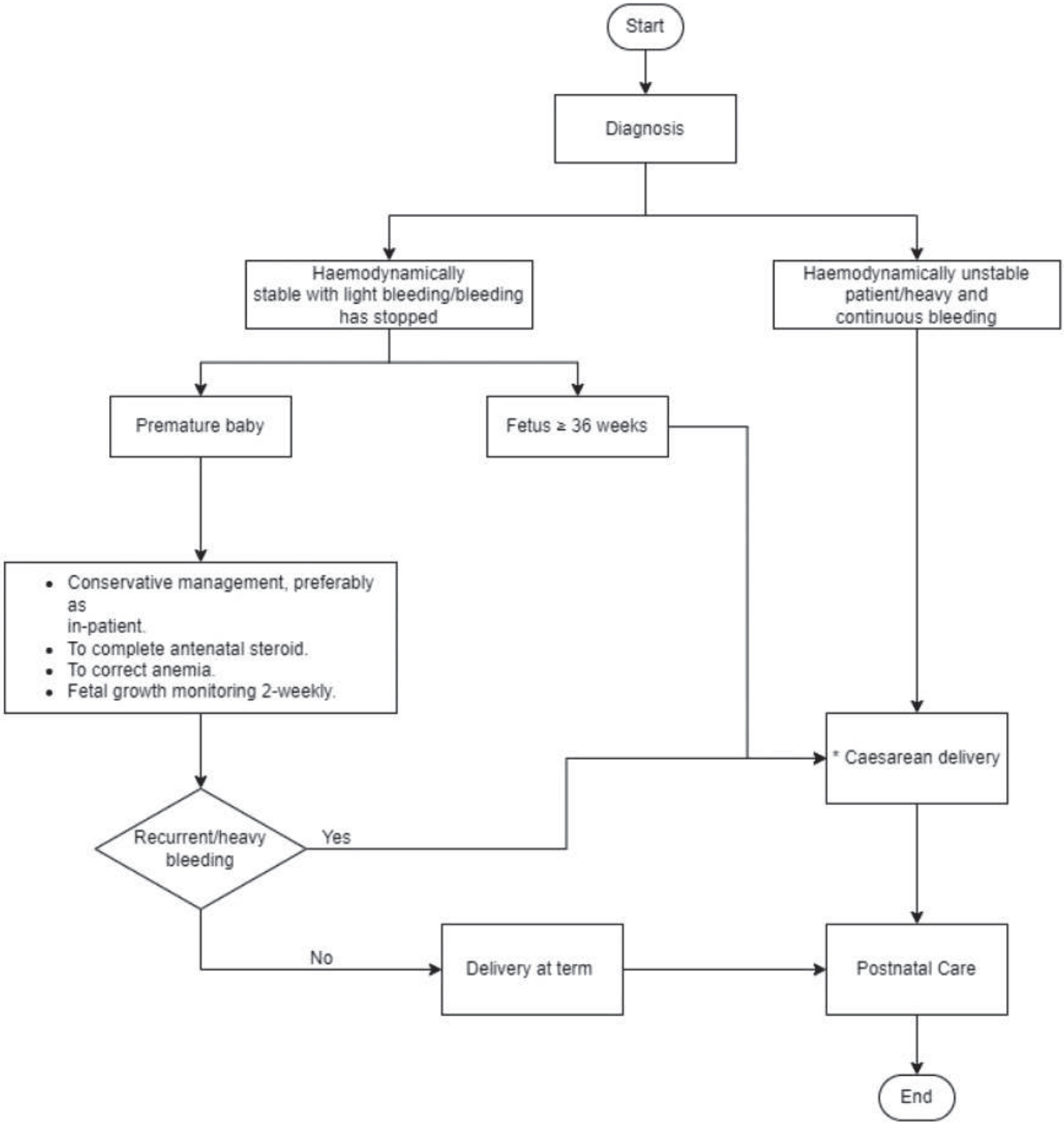
Important notes:

- *It is important to differentiate show and fresh bleeding in abruptio placenta, especially when patient presents with contraction pain.*
- *Show is usually small in amount and mixed with mucus.*

Flowchart 22: Management of APH secondary to placental abruption



Flowchart 23: Management of APH secondary to placenta praevia



*Caesarean delivery

- For caesarean section as soon as possible after adequate stabilisation of maternal condition and resuscitation.
- Caesarean section should be done by an experienced surgeon in a specialist hospital.
- There should be measures in place to minimise blood loss intraoperatively – i.e. allow spontaneous delivery of placenta, uterine massage, administration of intravenous tranexamic acid and uterotonics or insertion of uterine tamponade/B-lynch brace sutures if needed

F3.2 POSTPARTUM HAEMORRHAGE (PPH)

	PRIMARY PPH	SECONDARY PPH
Definition	Bleeding from genital tract occurring within 24 hours after delivery: • ≥ 500 ml after vaginal delivery • ≥ 1000 ml after caesarean section	Abnormal bleeding from genital tract occurring after 24 hours up to 42 days after delivery
Causes of primary PPH	4T's: 1. Tone (uterine atony) 2. Trauma (including uterine rupture) 3. Tissue (retained placenta or tissue) 4. Thrombin	1. Infection (most common) 2. Retained product of conception 3. Unrecognized genital tract trauma 4. Bleeding disorder 5. Persistent trophoblastic disease (uncommon) 6. Others – chronic subinvolution of uterus, uterine AV malformation (rare)
Clinical presentation	Refer to Table: Clinical Presentation and assessment of PPH	
Early assessment	Assessment of the severity of the haemorrhage can be based on visual estimation of blood loss, clinical signs and symptoms of hypovolaemic shock and Obstetric Shock Index (OSI). Assessment to determine the cause of PPH based on the clinical presentation shown in Table : Clinical Presentation and assessment of PPH	

Management	1. Call for help. 2. Fluid resuscitation and blood transfusion as per obstetric haemorrhage. 3. Arrest bleeding according to the causes as shown in Arrest bleeding according to the causes of Primary PPH and Table: Arrest bleeding in Secondary PPH 4. Intravenous tranexamic acid infusion can be used in management of PPH from any cause (WOMAN Trial): ➢ Dose: 1gm (100 mg/ml); infuse over 10 minutes (1 ml/min). Dose can be repeated if bleeding continues after 30 minutes or rebleeding occurs within 24 hours. ➢ It should be given early in PPH. ➢ It can be given in all causes of bleeding. 5. In district hospital, transfer patient once patient is stabilized and bleeding controlled with temporary method; anti-shock garment is recommended if available 6. Post-event monitoring in HDU or ICU depending on the severity; documentation and debriefing	

Table Clinical presentation and assessment of PPH

Assessment	Primary PPH				Secondary PPH
	Tone	Trauma	Tissue	Thrombin	
History: – Risk factors	<u>Antenatal</u> – Anaemia – Multipara – Advance age – Multiple pregnancies – Polyhydramnios – Macrosomia – Placenta praevia – Presence of fibroid <u>Intrapartum</u> – Prolonged labour (1st and 2nd Stage) – Shoulder dystocia – Chorioamnionitis – On $MgSO_4$, general anaesthesia	<u>Cervical/vaginal trauma</u> – Instrumental delivery, especially forceps delivery – Shoulder dystocia – Precipitated labour – Episiotomy <u>Uterine rupture</u> – Previous uterine scar in lower segment or upper segment – Prolonged labour – Obstructed labour	Risk factors: – Previous history of retained tissue – Abnormal implantation of placenta	– Known history of coagulopathy – Drug history of taking anticoagulapathy – Disseminated intravascular coagulopathy from placenta abruptio or preeclampsia.	– Prolonged labour – Prolonged ruptured of membrane – Chorioamnionitis – Procedure post - delivery – MRP or digital evacuation of uterus, examination of anaesthesia
Physical examination: – General condition – conscious level, pink/pale, vital signs including obstetric shock index.	To assess severity of bleeding				
– Abdominal examination: a. Assess uterine height and tone: – A normal postpartum uterus should be hard and contracted at 20 weeks (at the level of umbilicus) or less.	Uterus is lax and uterine size is more than 20 weeks	Uterus is contracted at normal size; in uterine rupture, the uterus might not be contracted	Uterus not contracted and larger than 20 weeks	-	Poor involution of uterus; tender uterus from infection
– Systemic examination of perineum with good lighting and in lithotomy position with Sim's speculum a. Clear the vagina of blood clots; dab the cervical os with roller gauze and observe for the source of bleeding b. 'Walk' the cervix with non-traumatic clamps circumferrentially. – **Postpartum cervix can be raw with ragged edge which is commonly mistaken as cervical tear.* c. Examination of vulva and vagina up to the fornices for tears and haematoma. d. Per rectal examination to assess for obstetric anal sphincter injury and button-hole tear	– Cervical os may remain open – Oozing of blood from within the cervical os – Cervix is intact	– Cervical tear – defect/discontinuity of cervix with active bleeding – Vaginal tear – evidence of vaginal tear with active bleeding – Uterine rupture – oozing of blood coming from the os	– Cervical os may remain open – Oozing of blood from within the os – Cervix is intact	Generalised oozing from everywhere	– Cervical os remains open – May have foul smelling vaginal bleeding – Take high vaginal swab for C&S
Ultrasound scan	Empty uterus or haematometra (which can be difficult to differentiate from retained tissue)	Cervical/vaginal tear – ultrasound may be normal; there may be presence of haematoma Uterine rupture – there may be presence of free fluid in the peritoneum	Thickened endometrial lining with irregular endometrium/mixed echogenicity within endometrial cavity	Normal ultrasound	Thickened ET to suggest retained product of conception or infected haematometra

Important notes:

- ***The features of PPH secondary to uterine rupture are similar to those of uterine atony; hence, there should be high index of suspicion for uterine rupture in high risk women – poor uterine contractility, bleeding from within uterus, presence of free fluid from pelvic ultrasound, haematuria, profound shock or sudden maternal collapse.***
- ***Sometimes there may be more than one cause of PPH at once – i.e. uterine atony can occur concomitantly with bleeding from vaginal wall tear.***
- ***If the woman is experiencing substantial amount of pain, or when the bleeding is profuse, EXAMINATION UNDER ANAETHESIA SHOULD NOT BE DELAYED.***
- ***Assessment of blood loss and women's condition should be a continuous process during the resuscitation.***

Causes of Primary PPH and its Management

CAUSES	URGENT MANAGEMENT
Tone	1. Perform uterine massage. 2. Empty urinary bladder with continuous bladder drainage. 3. Oxytocics (1st line uterotonics) ➢ Oxytocin – IM Pitocin bolus 10 units or IV Pitocin bolus 5 units slow bolus over 1 – 2 minutes. • Dose may be repeated after 5 minutes – up to a total dose of 10 units. • Start IV oxytocin infusion 40 units in 1 pint normal saline for 4 hours (125 ml/H). ➢ Syntometrine – IM 1 ampoule stat (5 units oxytocin and 0.5 mg ergometrine); contraindicated in hypertension and cardiac disease. 4. Carboprost (Haemabate) ➢ IM 250 µg stat; can repeat up to a maximum of 8 doses at 15 minute intervals. ➢ HOWEVER, IF THE BLEEDING CONTINUES AFTER 3 DOSES, CONSIDER SURGICAL METHODS TO STOP BLEEDING. 5. *Uterine tamponade with Bakri balloon (or Rusch balloon/modified uterine tamponade with Foley's catheter) * considered 1st line surgical intervention. ***Temporary measures while awaiting medications to work/ awaiting theater/transfer:*** - ***Bimanual uterine compression (Figure 4)*** - ***Aortic compression (Figure 5)*** - ***Anti-shock garment during transfer if available*** ****VAGINAL PACKING IS CONTRAINDICATED IN THE MANAGEMENT OF PPH SECONDARY TO UTERINE ATONY, AS IT MAY CAUSE HAEMATOMETRA WHICH MAY PERPETUATE UTERINE ATONY.***

CAUSES	URGENT MANAGEMENT
Tone	6. If uterine tamponade fails or bleeding continues, the options of surgical intervention include: ➢ Uterine preservation: • B-lynch brace suture • Uterine arteries ligation • Internal iliac arteries ligation ➢ Hysterectomy – resort to hysterectomy sooner as it is potentially lifesaving
Trauma	1. Vulval/vaginal tears ➢ Attempt immediate repair. ➢ If repair is not feasible or bleeding continues, control the bleeding temporarily with vaginal packing while awaiting transfer or definitive management. ➢ Examination under anaesthesia, repair may be indicated ➢ Embolization of bleeding vessel can be considered if service is available 2. Uterine rupture ➢ There should be a high index of suspicion for uterine rupture in PPH. ➢ Examination under anaesthesia would be necessary. ➢ Exploratory laparotomy and uterine repair/hysterectomy is required in uterine rupture; hence early referral to O&G specialist is of paramount importance and the patient should be transferred as soon as possible after resuscitation. 3. Extended uterine tear ➢ Can occur during difficult caesarean i.e., deeply engaged presenting part, deflexed fetal head, obstructed labour, fetal malposition or abnormal lie. ➢ Can result in broad ligament haematoma, bladder/ureteric injury. ➢ Requires experienced surgeons to repair. ➢ Ensure adequate exposure of tear: a. Exteriorised uterus b. Extension of incision if needed c. Good assistance and retraction d. Further deflection of bladder downward (to avoid bladder/ureteric injury) e. Use the suction catheter to clear the surgical field

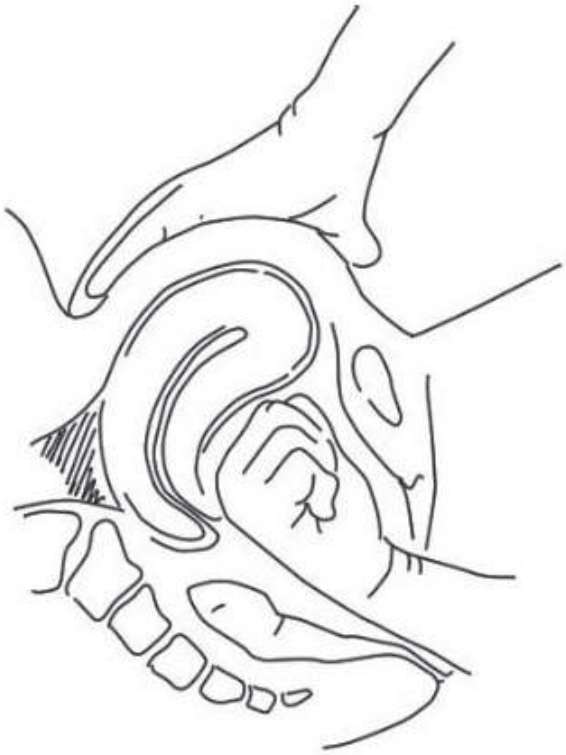
CAUSES	URGENT MANAGEMENT
Tone	➢ Identify apex of tear and suture in 2 layers; if apex cannot be identified and extends beyond the cervix, combined abdomino-perineal approach may be necessary. ➢ If the tear extends laterally, open the broad ligament to secure the apex. (Beware of potentially dangerous engorged venous plexus.) • In this process, identification of ureter is crucial to prevent ureteric injury ➢ Insert drain upon closing the abdomen. ➢ In non-specialist hospitals, haemostasis with abdominal packing may be considered as a last resort if bleeding continues. ➢ Consider activating retrieval team if theirs is difficulty in securing bleeding in such cases in non-specialist hospital ➢ Coagulopathy needs to be corrected during transfer and before relaparotomy.
Tissue	1. If there is major bleeding secondary to retained placenta/tissue, urgent manual removal of placenta/tissue (MRP) is indicated. 2. Temporary measures to control bleeding: ➢ Start IV oxytocin 40 units infusion if the patient is actively bleeding. ➢ Arrange for urgent manual removal of placenta (MRP) ➢ It should ideally be done in an OT setting. ➢ However, if the patient is haemodynamically unstable and OT not available, a bedside MRP can be done. 3. Preparation for OT ➢ Take consent. ➢ Give preoperative IV antibiotics – IV Ampicillin 2g single dose according to National Antibiotic Guideline (may vary according to local protocol) ➢ Monitor vital signs every 15 minutes. ➢ Pad charting to monitor bleeding while awaiting OT or during transfer. ➢ Ensure the patient is under spinal or general anaesthesia in OT. ➢ Ensure the patient is in a lithotomy position. ➢ Ensure bladder is being drained. ➢ Oxytocin infusion if started earlier should be stopped during the procedure.

CAUSES	URGENT MANAGEMENT
Tissue	4. Removal of placenta: ➢ Introduce the operator's hand into the uterine cavity by following the umbilical cord. ➢ Stabilize the uterus bimanually and identify a plane of cleavage. By moving the fingers from side to side (see-saw pattern), extend the plane of cleavage until the whole placenta is free from the uterine wall. Remove the placenta in one bulk. 5. Ensure uterine cavity is empty ➢ Check placenta and membrane for completeness. ➢ If not complete, digitally re-explore the uterine cavity to remove any remnants. ➢ Once empty, start IV oxytocin 40 units infusion at 125mls/H to maintain uterine contractility.
Thrombin	Transfusion of blood components is the mainstay of management in PPH secondary to coagulopathy. Uterine tamponade and vaginal packing can be done to stop the bleeding temporarily while correcting the coagulopathy.

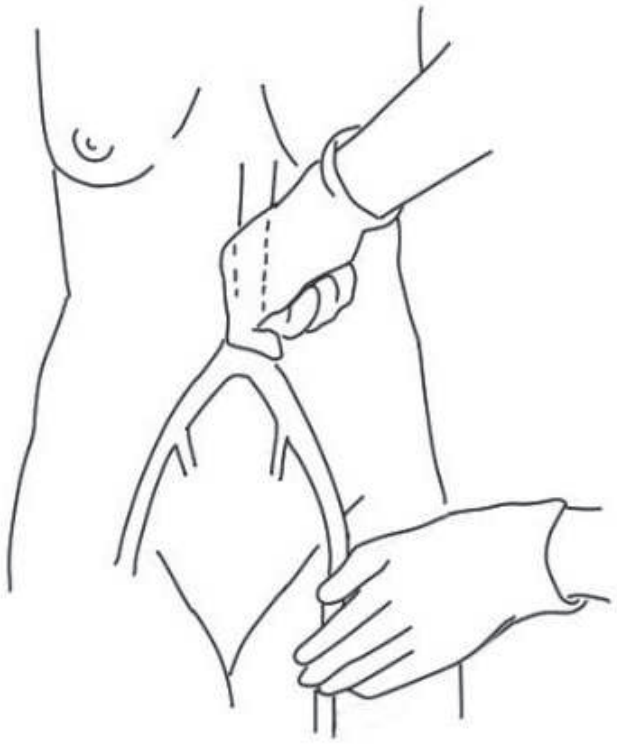
Arresting bleeding in Secondary PPH

Urgent Management	1. Intravenous tranexamic acid 1 g (10 ml) over 10 minutes. 2. Broad spectrum intravenous antibiotics – usually intravenous cefuroxime/ceftriaxone and metronidazole. 3. Give uterotonics as indicated.
Subsequent Management	1. For surgical evacuation of the uterus where retained tissue is suspected – the procedure can be done immediately in the event of massive bleeding, or after 12 hours of antibiotic cover, with the last dose of antibiotic given within an hour of the procedure. 2. Procedure should be performed by an experienced obstetrician and preferably under ultrasound guidance as the risk of uterine perforation is significantly higher. 3. In massive bleeding with an empty uterus, uterine tamponade with balloon catheter may be considered with antibiotic cover. ** When conservative measures fail, and bleeding is massive, surgical measures such as hysterectomy may be undertaken.*

Bimanual compression

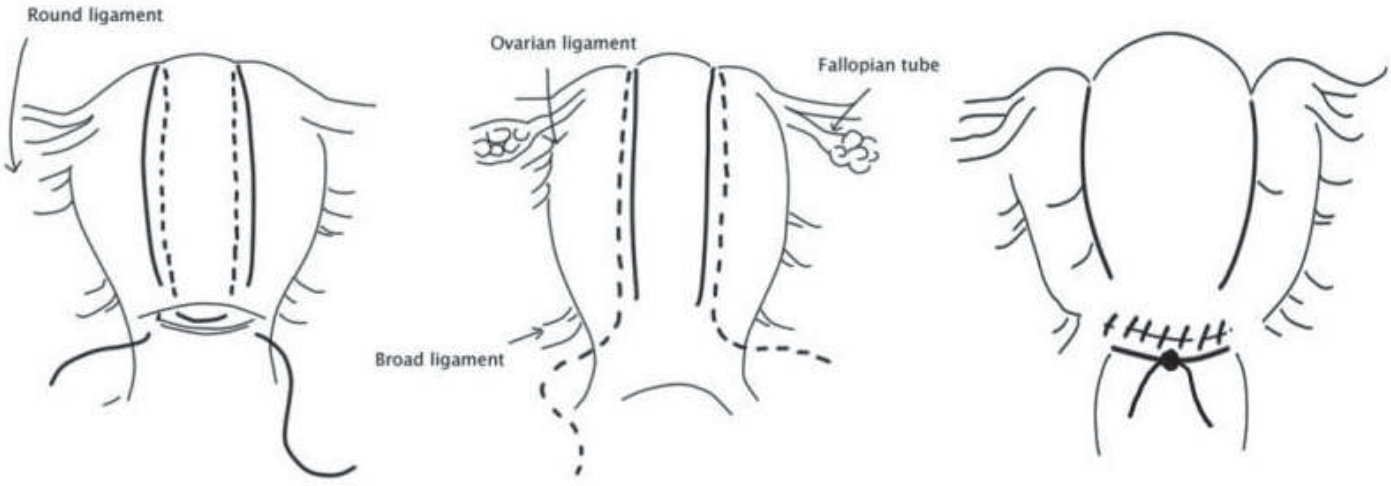


Aortic compression



Source: Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022

B-Lynch brace suture



Anterior view Posterior view Anterior view

Source: Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022

Adapted from:

1. O&G Protocol, State of Kedah, 2019
2. Penang Stage Obstetric Protocol, 2021.
3. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar, Perlis, 2020-2025.
4. A Quick Guide to Labour Room Management, Department of O&G, Hospital Tengku Ampuan Afzan, Kuantan & Department of O&G, Kulliyyah of Medicine, IIUM, Kuantan, 3rd Edition.
5. Hospital Tuanku Ja'afar, Negeri Sembilan O&G Protocol, 2018.
6. Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022.

Reference:

1. Green top guideline No. 63. Antepartum Haemorrhage. Royal College of Obstetricians and Gynaecologists. 2011.
2. Mavrides E, Allard S, Chandraharan E, Collins P Green L, Hunt Bj, Riris S, Thompson Aj on behalf of Royal College of Physicians. Prevention and management of postpartum haemorrhage. BJOG 2016.
3. National Technical Committee – Confidential Enquiries into Maternal Deaths. Training manual on management of postpartum haemorrhage. 2016.
4. WHO. WHO recommendations for the prevention and treatment of postpartum haemorrhage. Geneva: World Health Organisation. 2012.
5. WOMAN Trial Collaborators. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international randomized, double-blind, placebo-controlled trial. Lancet 2017; 389: 2105 – 16.

F4. PREECLAMPSIA WITH SEVERE FEATURES AND ECLAMPSIA

<table>
<tr><td>Definition of Preeclampsia</td><td>Hypertension (BP ≥ 140/90) developed after 20 weeks of gestation with one of the following Preeclampsia defining features:
1. Proteinuria of ≥300 mg/day or urine protein/creatinine ratio of ≥30 mg/mmol
2. Maternal organ dysfunction:
a. Renal insufficiency (creatinine ≥ 90 mmol/L)
b. Liver involvement (elevated transaminases and/or severe right upper quadrant or epigastric pain)
c. Neurological complications (eclampsia, altered mental status, blindness, stroke or more commonly hyperreflexia when accompanied by clonus, severe headaches and persistent visual scotomata)
d. Haematological complications (thrombocytopenia, DIC, haemolysis)

3. Uteroplacental dysfunction – Fetal growth restriction
4. Others – pulmonary oedema, placental abruption, oliguria, epigastric pain/RHC pain</td></tr>
<tr><td>Presentation</td><td>
<table>
<tr><th colspan="2">SEVERE FEATURES OF PREECLAMPSIA</th></tr>
<tr><td>Blood pressure</td><td>➢ Severe hypertension (SBP ≥ 160 or DBP ≥ 110)</td></tr>
<tr><td>Central nervous system</td><td>➢ Headache; blurring of vision; Eclampsia; Intracerebral haemorrhage/ Cerebrovascular accident</td></tr>
<tr><td>Cardiorespiratory system</td><td>➢ Pulmonary oedema
➢ Cardiac dysfunction/myocardial ischaemia or infarction</td></tr>
<tr><td>Renal</td><td>➢ Renal impairment</td></tr>
<tr><td>Liver</td><td>➢ Elevated liver enzymes
➢ Subcapsular haematoma</td></tr>
<tr><td>Haematological</td><td>➢ Haemolysis and low platelet
➢ DIVC</td></tr>
<tr><td>Fetal complications</td><td>➢ Fetal growth restriction/abnormal doppler/ abnormal liquor volume
➢ Intrauterine death
➢ Placental abruption</td></tr>
</table>
</td></tr>
<tr><td>Diagnosis</td><td>Patient presented with any one of the severe features listed above</td></tr>
</table>

<table>
<tr><td>Early assessment</td><td colspan="2">1. Comprehensive history to elicit the symptoms of severe features and complication of preeclampsia
2. Examination from head to toe
➢ Blood pressure and heart rate, SpO^2
➢ Systemic examination – cardiovascular, lungs and abdomen
➢ Reflexes and clonus
3. Investigation – FBC, Renal profile, LFT, Coagulation profile in suspected DIVC or in abruptio placenta, LDH in cases of HELLP Syndrome</td></tr>
<tr><td rowspan="3">Management</td><td>Preeclampsia with acute events (eclampsia, acute pulmonary oedema, abruptio placenta or maternal collapse)</td><td>Preeclampsia with severe features (but clinically stable)</td></tr>
<tr><td>1. Call for help to involve O&G Specialist/medical officers, midwives, paediatrician/ medical officers, anaesthetist, blood bank specialist if necessary.
2. Manage as per maternal collapse in maternal collapse Chapter
3. Resuscitation and stabilisation of patient including advanced airway management and fluid resuscitation in abruptio placenta
4. Definitive management done simultaneously with resuscitation:
➢ Control and prevent further seizure
➢ Control blood pressure
➢ Fluid management
➢ Monitoring of mother and fetus
➢ Delivery</td><td>Definitive management:
1. Control and prevent further seizure
2. Control blood pressure
3. Fluid management
4. Monitoring of mother and fetus
5. Delivery
➢ Delivery is indicated in ALL preeclampsia with severe features EXCEPT in cases where fetal growth restriction is the ONLY severe feature of preeclampsia especially at early gestation; In such circumstances, delay in delivery may be indicated with careful fetal surveillance to allow maturity of the fetus</td></tr>
<tr><td colspan="2">1. Post delivery monitoring in high dependency unit/intensive care unit
2. Debriefing of patient and family
3. Documentation</td></tr>
</table>

F4.1 MAGNESIUM SULFATE AS THE AGENT OF CHOICE TO CONTROL AND PREVENT SEIZURE

1) Dose and dilution of intravenous Magnesium Sulphate:

	INDICATIONS	MAINTENANCE DOSE	
		INFUSION PUMP	SYRINGE PUMP
Dose	4 g	1 g/H	1 g/H
Concentration	1 ampoule = 2.47 g/5 ml	1 ampoule = 2.47 g/5 ml	Withdraw 2 ampoules (5 g/10 ml) of $MgSO_4$ + 40 ml of normal saline = 5 g/50 ml (1 g/10 ml)
Preparation	Withdraw 8 ml (4 g) of $MgSO_4$ + 12 ml of normal saline = 20 ml	Withdraw 10 ampoules (50 ml) of $MgSO_4$ + 450 ml of normal saline	Infusion rate: 10 ml/H (1 g/H) Continue infusion of $MgSO_4$ for 24 hours after delivery or last seizure, whichever occurs later.
Administration	To give 4 g $MgSO_4$ in slow bolus over 15 – 20 minutes	Infusion rate: 21 ml/H (1 g/H) Continue infusion of $MgSO_4$ for 24 hours after delivery or last seizure, whichever occurs later.	Infusion rate: 10 ml/H (1 g/H) Continue infusion of $MgSO_4$ for 24 hours after delivery or last seizure, whichever occurs later.

In cases where seizure occurs after administration of $MgSO_4$, a further bolus of 2–4g (2 g if weight < 70 kg) $MgSO_4$ can be given with close monitoring of Mg level. Serum magnesium can be taken before the repeated bolus of $MgSO_4$ if the situation allows.

2) Dose and dilution of intramuscular Magnesium Sulphate

	LOADING DOSE	MAINTENANCE DOSE
Dose	Total of 14 g (IM 5 g each buttock + **IV 4 g)***	5 g every 4 hours (alternate buttocks)
Concentration	1 ampoule = 2.47 g/5 ml	1 ampoule = 2.47 g/5 ml
Preparation	Withdraw 2 ampoules (5 g/10 ml) of $MgSO_4$ + 1ml of local anaesthesia (for each buttock) *Refer above table for IV preparation	Withdraw 2 ampoules (5 g/10 ml) of $MgSO_4$ + 1ml of local anaesthesia
Administration	Deep intramuscular injection into each buttock *Refer above table for IV administration	Deep intramuscular injection into alternate buttock every 4 hourly until 24 hours after delivery or last seizure, whichever occurs late

In cases where seizure occurs after administration of $MgSO_4$, a further bolus of 5 g intramuscular $MgSO_4$ can be given with close monitoring of Mg level. Serum magnesium can be taken before the repeated bolus of $MgSO_4$ if the situation allows.

**Source: International Society of Study for Hypertension in Pregnancy, 2021*

F4.2 CONTROL OF BLOOD PRESSURE

There is a need to urgently control BP in severe hypertension, as BP of ≥ 160/110 mmHg is associated with risk of stroke in pregnancy.

Major considerations in controlling blood pressure in severe hypertension

1. Oral nifedipine and parenteral labetalol are the agents of choice when BP is ≥ 160/110 mmHg as both are equally effective.
   a. However, when systolic blood pressure is ≥ 180 mmHg, blood pressure should be controlled more rapidly with intravenous antihypertensive agents.
   b. Parenteral hydralazine is used when labetolol is contraindicated or fails to control BP.
   c. Intravenous glyceryl trinitrate (GTN) can be considered in cases of resistant hypertension.
2. In the acute setting of stabilisation of severe hypertension, aim to lower BP to ***non-severe level*** instead of ***normalization*** of blood pressure.
3. Target BP should be 140 – 159/90 – 109 mmHg to avoid maternal hypotension and thus, avoid compromising uteroplacental perfusion.
4. Blood pressure should be monitored regularly at interval of 5 – 10 minutes to identify maternal hypotension.
5. Close fetal monitoring is recommended while trying to control the BP. If the gestation is less than 28 weeks, fetal heart rate should be checked at 5 – 10 minutes interval with daptone.
6. The dosage and dilution of intravenous antihypertensive may differ from centres to centres.

F4.3 MATERNAL MONITORING

1. Monitoring for $MgSO_4$ toxicity
   - Therapeutic level of serum Mg – 1.7-3.5 mmol/L
   - Antidote for Mg toxicity – calcium gluconate (1g calcium gluconate (10ml of 10% solution) given over 10 minutes slow bolus)
2. Frequency and target monitoring for Magnesium toxicity:

PARAMETERS	INTERVAL OF MONITORING	TARGET
Blood pressure	15 minutes	≤135/85 mmHg
Pulse rate	15 minutes	60 - 100 bpm
Respiratory rate SpO^2	30 minutes 30 minutes	16 breaths per minute ≥95%
Urine output	Hourly	≥0.5ml/kg/hour
Deep tendon reflex of knee	Hourly	Presence of reflexes

3. Management of suspected Magnesium toxicity:

SITUATION	ASSESSMENT	MANAGEMENT
Reduced urine output (<0.5ml/kg/H for over 4 hours)	➢ Hydration status ➢ Lungs examination ➢ Review fluid balance ➢ Check deep tendon reflexes, respiratory rate, heart rate ➢ Send renal profile and serum Mg if available	➢ If tendon reflex is ABSENT, STOP $MgSO_4$ infusion ➢ If tendon reflex is present, adjust infusion rate according to serum creatinine and Mg as number 4.
Absence of deep tendon reflex	➢ Check respiratory rate and heart rate ➢ Send renal profile and serum Mg if available	➢ Stop $MgSO_4$ infusion ➢ Perform ECG for evidence of prolonged PR interval or wide QRS complex ➢ Consider restarting infusion at lower dose when reflexes return

SITUATION	ASSESSMENT	MANAGEMENT
Respiratory depression	➢ Check respiratory rate and heart rate ➢ Send renal profile and serum Mg if available	➢ Stop $MgSO_4$ infusion ➢ Maintain airway, put patient in recovery position ➢ Consider giving IV calcium gluconate
Respiratory arrest	➢ Assessment is per maternal collapse (DR CAB) ➢ Send renal profile and serum Mg if available	➢ Stop $MgSO_4$ infusion ➢ Maintain airway with intubation and ventilation ➢ Give IV calcium gluconate

4. Infusion rate of $MgSO_4$ infusion according for serum creatinine and Mg in cases with reduced urine output but presence of deep tendon reflex:

SERUM MAGNESIUM	SERUM CREATININE		
	NORMAL	ELEVATED	NOT AVAILABLE
Within therapeutic level (1.7-3.5 mmol/L)	1 g/H	0.5 g/H with VERY careful monitoring of urine output and deep tendon reflex with serial serum magnesium level every 4 – 6 hours	
Elevated	0.5 g/H	STOP	-
Not available	0.5 g/H	STOP	STOP

F4.4 FETAL MONITORING

1. Ultrasound for fetal biometry, liquor volume +/- umbilical artery Doppler if available.
2. Close fetal heart monitoring especially during control of BP. If electronic fetal monitoring is not available, fetal heart rate should be monitored with daptone at 15 minutes interval.

F4.5 FLUID MANAGEMENT

Women with pre-eclampsia are likely to have intravascular depletion due to loss of fluid into extracellular space. This is due to reduced intravascular oncotic pressure compounded by increased endothelial permeability due to endothelial injury. General principles of fluid management are as below:

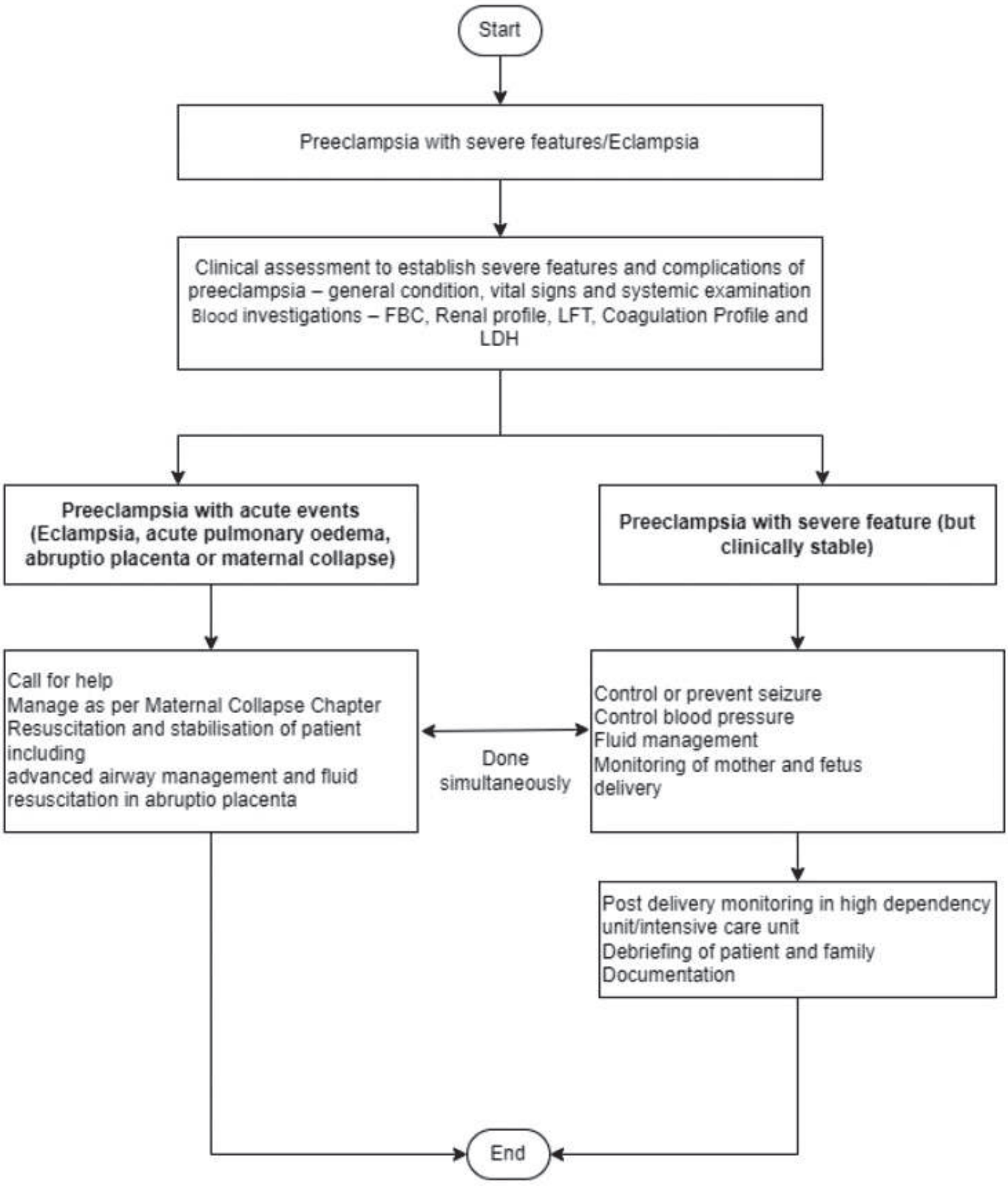
1. Total fluid given to women with severe hypertension (60-80 ml/H of crystalloid).
2. Strict input and output charting.
3. Fluid challenge, when indicated, should be done with careful assessment of the woman's hydration status and after consultation with a specialist.
4. Oral fluid restriction is not routinely practiced except in cases of proven fluid overload, i.e., in acute pulmonary oedema. Women with fluid overload should be managed in a high dependency unit/intensive care unit with co-management from anaesthetist and physician.
5. Diuretics should NOT be given in the event of oliguria unless there is evidence of acute pulmonary oedema.

F4.6 TIME OF DELIVERY

1. The definitive management of severe hypertension in pregnancy is the **delivery of the placenta**.
2. Timing of delivery in Preeclampsia with severe features/Eclampsia:

GESTATIONAL AGE	TIMING OF DELIVERY
≥ 37 weeks	Delivery is indicated; mode of delivery is dependent on maternal and fetal condition.
34 to 36^{+6} weeks	Delivery may be indicated and a decision for delivery should be made in consultation with a specialist. Antenatal corticosteroids may be considered. However, delivery should **NOT be delayed** for completion of corticosteroids if urgent delivery is indicated.
< 34 weeks	Decisions for delivery should be made in consultation with a specialist/consultant. Antenatal corticosteroids should be administered. However, delivery **should NOT be delayed** for completion of corticosteroids if urgent delivery is indicated.

Flowchart 24: Summary of the preeclampsia with severe features/Eclampsia



Adapted from:

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2. A Quick Guide to Labour Room Management, Department of O&G, Hospital Tengku Ampuan Afzan, Kuantan & Department of O&G, Kulliyyah of Medicine, IIUM, Kuantan, 3rd Edition.
3. Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022.

Reference:

1. LA Magee, P von Dadelszen, W Stones, M Mathai. The FIGO textbook of pregnancy hypertension. The Global Library of Women's Medicine. October 2016.
2. L.A. Magee et al. The 2021 International Society of the Study of Hypertension in Pregnancy classification, diagnosis & management recommendations for international practice. Pregnancy hypertension: An International Journal of Women's Cardiovascular Health 27 (2022) 148-169.
3. NICE Guideline. Hypertension in Pregnancy: Diagnosis and management. 2019.
4. National Technical Committee – Confidential Enquiries into Maternal Deaths. Training manual on hypertensive disorders in pregnancy. 3rd Edition. 2018.

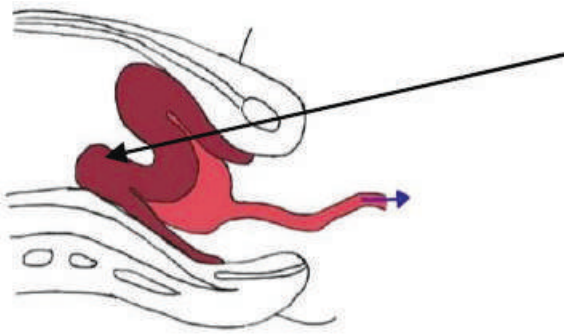
F5. UTERINE INVERSION

Definition	Inversion of the fundus of the uterus into the endometrial cavity with or without placenta being attached, turning the uterus partially or completely inside out.
Risk factors	1. Implantation of placenta at the fundus, especially in cases of placenta accreta spectrum 2. Uterine atony 3. Manual removal of placenta 4. Short umbilical cord 5. Congenital weakness of the uterus in connective tissue disorders 6. Iatrogenic – mismanagement of 3rd stage, in which there is excessive traction on the umbilical cord and excessive fundal pressure before separation of placenta
Clinical presentations	1. High index of suspicion 2. Sudden unexplained maternal collapse or hypotension with bradycardia 3. Postpartum haemorrhage 4. Severe abdominal pain 5. Absence of uterine fundus from abdominal palpation or uterine dimple palpable 6. Mass protruding from vagina 7. Polypoidal red mass in the vagina with placenta attached 8. The severity of uterine inversion is being shown in figures below.
Early assessment	1. Quick general examination for signs of hypovolaemia 2. Vital signs – hypotension and bradycardia may be present 3. Abdominal examination – uterine fundus not palpable or there may be a dimple at the fundal area 4. Perineal examination – a mass in the vagina or outside the introitus and assessment of blood loss 5. Investigations – FBC, Coagulation profile, Crossmatching for blood
Management	**1) Resuscitation:** ➢ Call for help and initiate red alert/code red - O&G specialist/ consultant, medical officers, midwives, anaesthetic team ➢ Resuscitation – check pulse, airway and breathing and CPR if necessary; resuscitate as in obstetric haemorrhage ➢ Do not remove the attached placenta when the uterus is still inverted

Management	**2) Immediate replacement of uterus:** **a. Manual replacement (Johnson Maneuver)** ➢ Replace first the part of uterus which inverted last **b. Hydrostatic repositioning (O'Sullivan's technique)** ➢ Uterine rupture must be excluded first ➢ The inverted uterus is held within the vagina by the operator and the introitus sealed with the 2 hands of an assistant ➢ 2 liters or more of warm saline is then infused into the vagina using a large rubber tube held 1-2 meters above the patient. The other end of rubber tube is place into posterior fornix of vagina (A silicone vacuum cup attached to a large rubber tube can also be used to produce a better seal)
	3) Surgery – if all other attempts fail **a. Huntington's operation** ➢ Allis forceps are placed within the dimple of the inverted uterus and gentle upward traction is applied on the clamps with a further placement of forceps on the advancing fundus. **b. Hydrostatic repositioning (O'Sullivan's technique)** ➢ Incise the cervical ring posteriorly with a longitudinal incision. This facilitates uterine replacement by Huntington's method. This is aided by an assistant from below. *Consider uterine compression suture after successful replacement of uterus
	4) Tocolytics – can be used during replacement of uterus: ➢ IV Salbutamol 75-150 mcg bolus, or ➢ S/C Terbutaline 0.25 mg **5) Maintenance of uterine contractility post reversion:** ➢ Attendant's hand should remain in the uterine cavity until a firm contraction is sustained ➢ Uterotonics are given to maintain uterine contractility and prevent re-inversion. **6) Watch out for postpartum haemorrhage** **7) Debrief the couple** **8) Proper documentation**

F5.1 SEVERITY OF UTERINE INVERSION

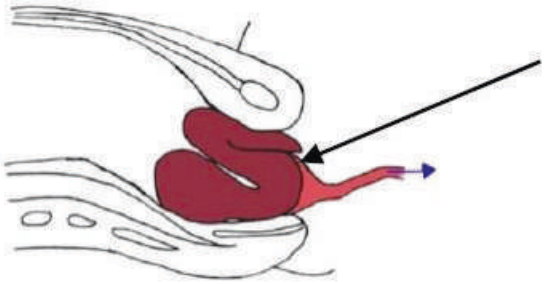
A. First degree



May feel a dimple at the top of the fundus

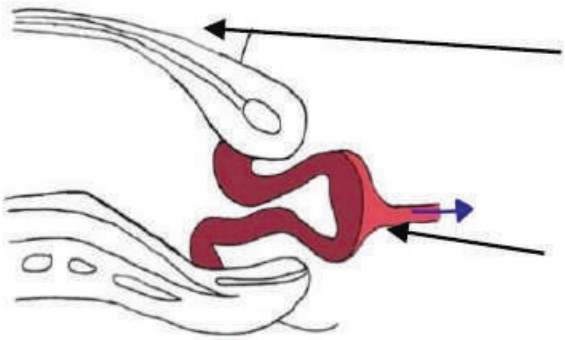
Inverted uterus might not be obvious as the fundus does not herniate through the internal os

B. Second degree



Inverted uterus herniates through the cervical os with the entire uterus still within vagina

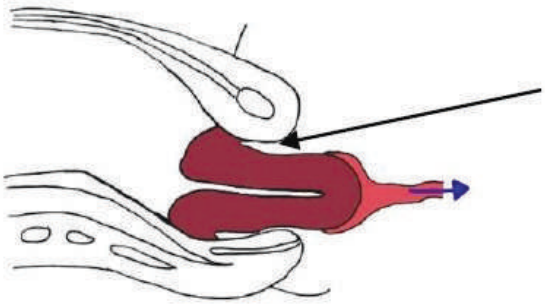
C. Third degree



Uterine fundus will not be felt per abdomen

The entire uterus is inverted and protrudes outside the vulva

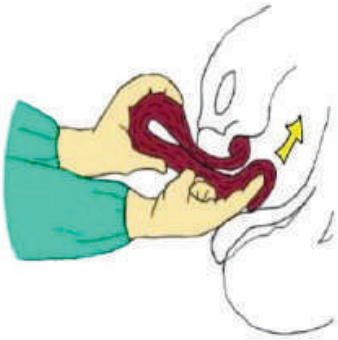
D. Fourth degree



The vagina is inverted

Source: Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022

F5.2 MANUAL REPLACEMENT (JOHNSON MANEUVER)

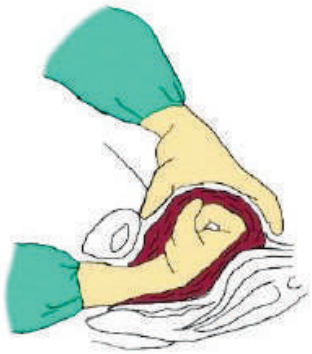


Replace the part of the uterus which inverted last, first.

The other hand is used to support the fundus of the uterus and helps in pushing the uterus in.

Note that the fundus is not yet replaced.
The lower part of the uterus is gradually replaced.

Once the uterus is in the abdomen, the supporting hand is used to support the uterus on the abdomen.



The fundus, which is the part of the uterus to invert first, is the last part that is replaced.

Keep your hand in the uterus and give oxytocics.

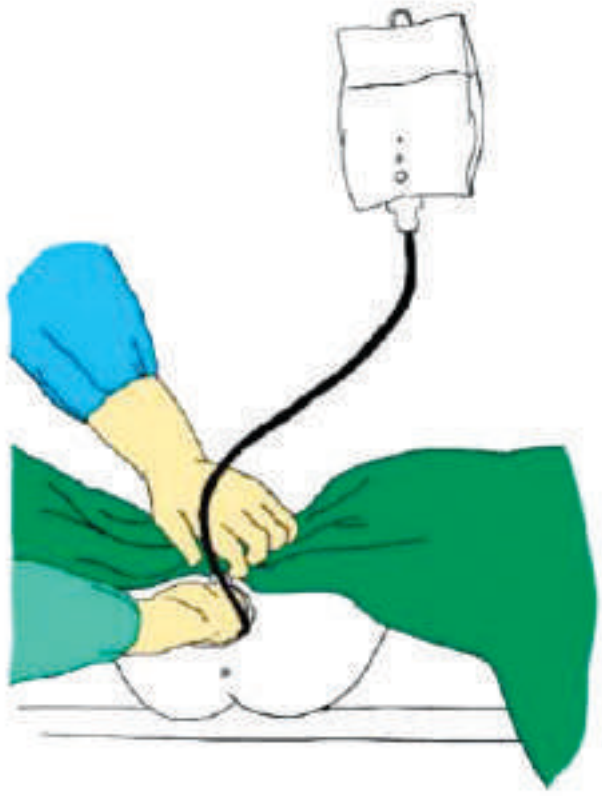
Once you feel the uterus contracting, do MRP.

Keep the hand in the uterus until the uterus is firmly contracted on your hand.

Subsequently, gradually remove your hand

Source: Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022

F5.3 HYDROSTATIC REPOSITIONING (O'SULLIVAN'S TECHNIQUE)

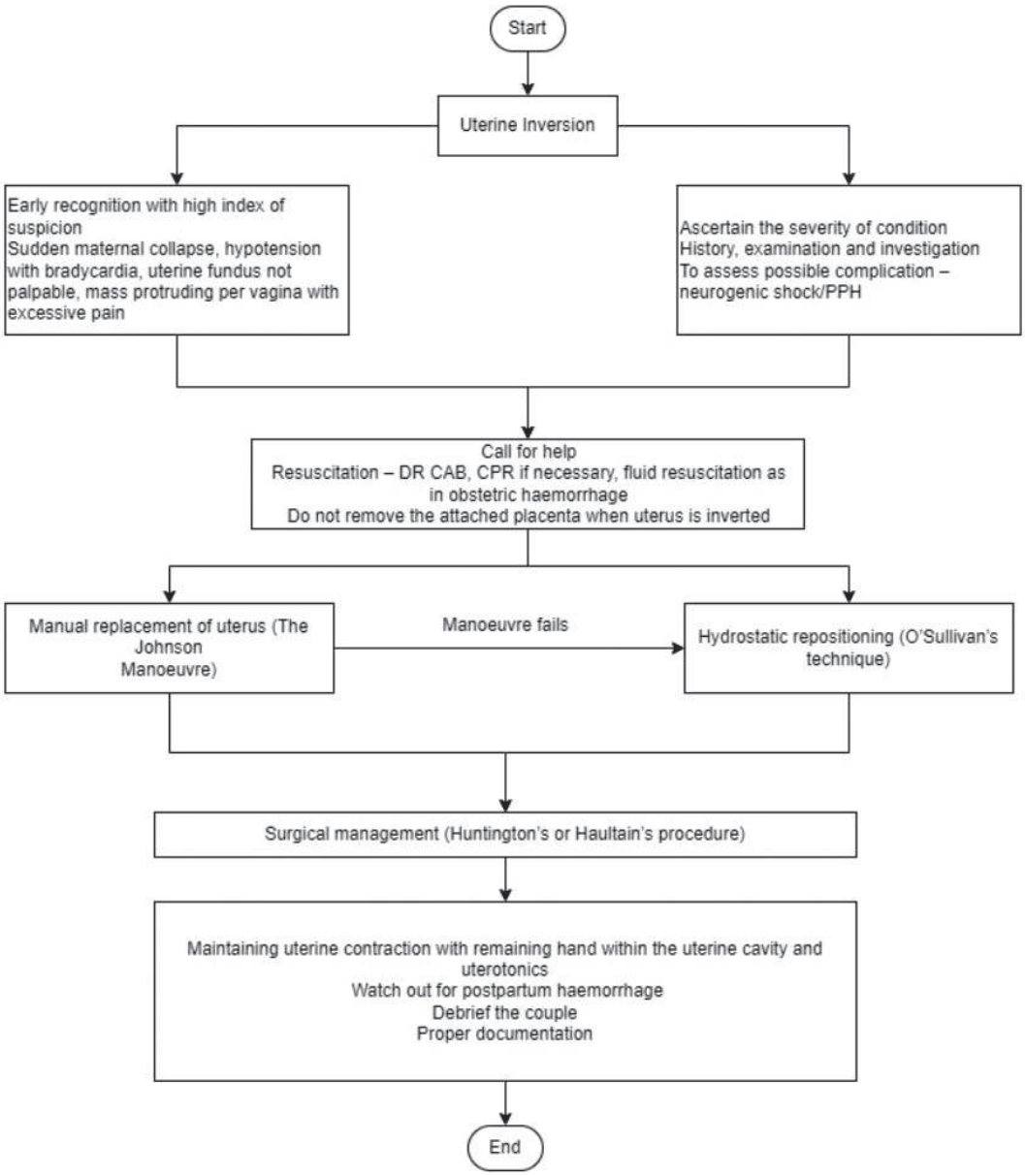


Insert one hand into introitus with the tube connected to the drip.

Seal the opening with the help of an assistant to prevent water leakage.

Source: Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022

Flowchart 25: Summary of the management of uterine inversion



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4. A Quick Guide to Labour Room Management, Department of O&G, Hospital Tengku Ampuan Afzan, Kuantan & Department of O&G, Kulliyyah of Medicine, IIUM, Kuantan, 3rd Edition.
5. Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022.

Reference:

1. Bhalla R, Wuntakal R, Odejinmi F, Khan RU. Review: Acute inversion of the uterus. *The Obstetrician & Gynaecologist.* 2009; 11: 13-18.

F6. MATERNAL SEPSIS

<table>
<tr><td>Definition</td><td colspan="3">➢ Sepsis is defined as organ dysfunction resulting from infection during pregnancy, childbirth, post-abortion or postpartum period.
➢ Septic shock is defined as persistent hypoperfusion despite adequate fluid replacement therapy.</td></tr>
<tr><td rowspan="8">Causes and presentation</td><td>SYSTEM</td><td>CAUSES</td><td>PRESENTATION</td></tr>
<tr><td>Genitourinary</td><td>Pelvic infection (Chorioamnionitis, Endometritis, abscess, retained placenta)

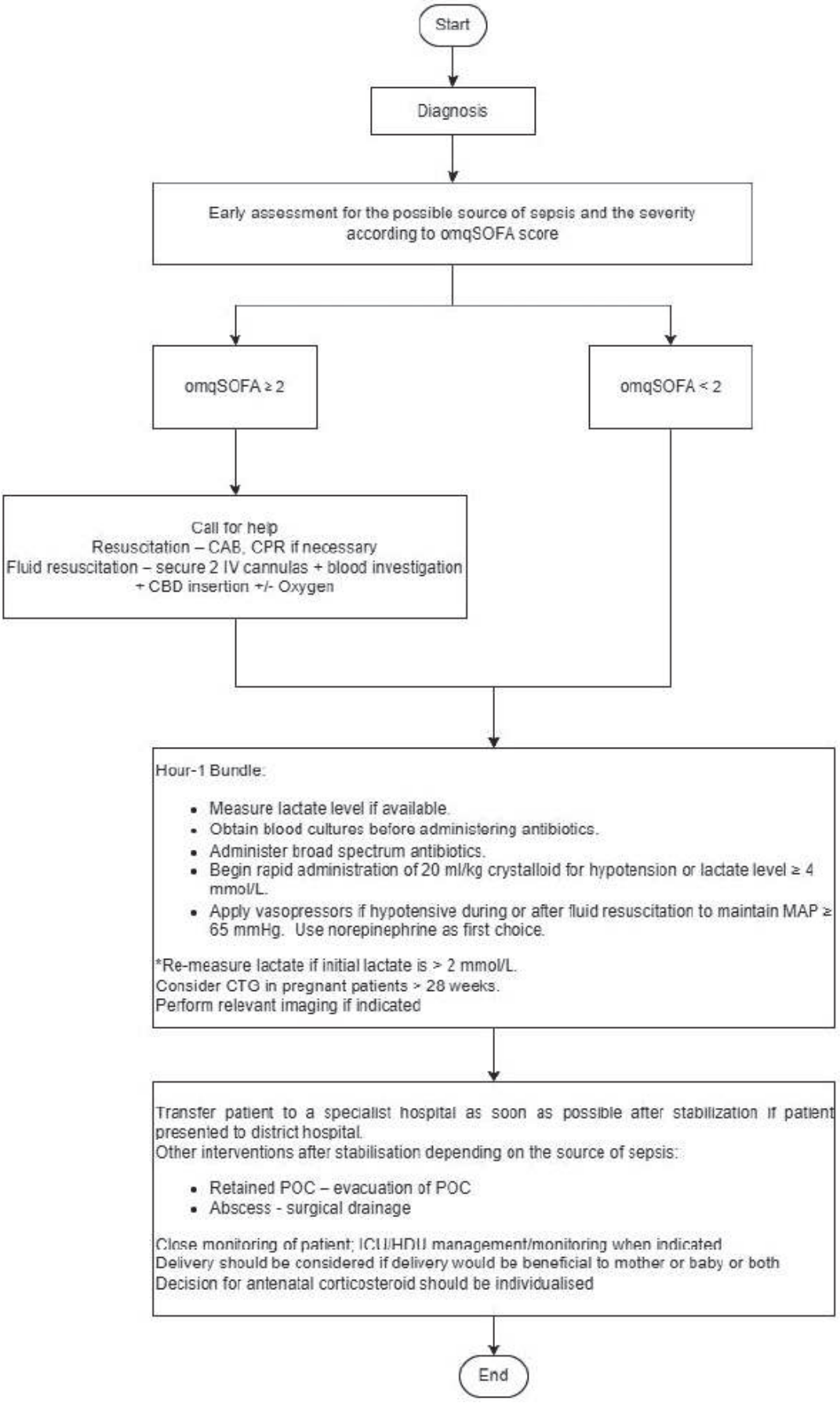
Urinary tract infection/ Pyelonephritis</td><td>Secondary PPH, pelvic pain, foul smelling vaginal discharge

Abdominal pain, dysuria, frequency,
Loin pain</td></tr>
<tr><td>Gastrointestinal</td><td>AGE</td><td>Diarrhoea/ vomiting</td></tr>
<tr><td>Respiratory</td><td>URTI/ Influenza/ Covid-19
Pneumonia</td><td>Cough, sore throat, rhinorrhea,
Shortness of breath</td></tr>
<tr><td>Central nervous System</td><td>Meningitis/ encephalitis/ Abscess</td><td>Headache, confusion, fitting</td></tr>
<tr><td>Dermatological</td><td>Surgical site infection</td><td>Pain, wound redness</td></tr>
<tr><td>Others</td><td>Mastitis</td><td>Breast pain, engorgement, redness</td></tr>
<tr><td>Diagnosis</td><td colspan="3">➢ High index of suspicion
➢ Screening for sepsis: Obstetrically Modified Quick Sequential Organ Failure Assessment Score (omqSOFA)
A. Respiratory rate ≥ 25/min
B. Altered mentation (GCS < 15)
C. Systolic blood pressure ≤ 90mmHg
➢ All patients with an omqSOFA score of ≥ 2 are considered at high risk of sepsis and should be resuscitated accordingly and referred to a specialist</td></tr>
</table>

Early assessment	➢ Screen for most likely source of sepsis by taking a focused history based on the presenting complaint and perform a quick systemic examination through all systems to ensure no other sources of sepsis ➢ Screen for sepsis with omqSOFA score as above ➢ Investigations: • Blood - FBC for raised white cell counts, thrombocytopenia or thrombocytosis - Blood cultures and sensitivity - Blood gasses and lactate if indicated - Renal profile, liver function test, coagulation profile and blood glucose level in severe cases • Urine - FEME, cultures and sensitivity ➢ High vaginal swab for cultures and sensitivity ➢ Ultrasound scan for retained product of conception, pelvic collection or haematoma
Management	➢ Call for help – if patient is unstable or unresponsive ➢ Resuscitation – Check for circulation, airway and breathing; CPR if necessary ➢ Fluid resuscitation – 2 large bore cannulas; take blood as listed above; fluid resuscitation as per Hour-1-bundle; CBD insertion with or without oxygen supplementation ➢ Hour-1 Bundle: • Measure lactate level if available • Obtain blood cultures before administering antibiotics. • Administer broad spectrum antibiotics. • Begin rapid administration of 20 ml/kg crystalloid for hypotension or if lactate level ≥ 4 mmol/L. • Apply vasopressors if hypotensive during or after fluid resuscitation to maintain MAP ≥ 65 mmHg. Use norepinephrine as the first choice.

Management	➢ Re-measure lactate if initial lactate is > 2 mmol/L. ➢ Consider CTG in pregnant patients > 28 weeks. ➢ Perform imaging if necessary ➢ Any patient with sepsis in a non-specialist hospital should be transferred to a specialist hospital as soon as possible. ➢ Other interventions after stabilisation depending on the source of sepsis: • Retained POC – evacuation of POC • Abscess - surgical drainage • Close monitoring of patients: ICU/HDU management/monitoring when indicated.
	➢ Delivery: • Should be considered if delivery would be beneficial to mother or baby or both • Decision for antenatal corticosteroid should be individualized

Flowchart 26: Summary of the management of maternal sepsis



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2. Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022.

Reference:

1. Surviving sepsis campaign. International guidelines for management of sepsis and septic shock. 2016.
2. Singer, Mervyn et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA, Vol 315, Number 8 (2016): 801-810.
3. WHO. Statement on Maternal Sepsis. 2017.
4. Greer O, Shah NM, Johnson MR. Maternal sepsis update: current management and controversies. *The Obstetrician & Gynaecologist* 2020;22:45-55. https://doi.org/10.1111/tog.12623.

F7. SHOULDER DYSTOCIA

<table>
<tr><td>Definition</td><td colspan="2">A vaginal cephalic delivery that requires additional obstetric maneuvers to deliver the fetus after the head has been delivered and gentle traction has failed.
➢ Unpredictable
➢ Overall incidence 0.58-0.70%
➢ 48% occurs in infants with birth weight < 4kg</td></tr>
<tr><td rowspan="2">Risk factors</td><td>ANTEPARTUM RISKS</td><td>INTRAPARTUM RISKS</td></tr>
<tr><td>1. Macrosomia
2. Maternal diabetes
3. Previous history of shoulder dystocia
4. Maternal obesity
5. Induction of labour
6. Maternal short stature</td><td>1. Prolonged first stage
2. Prolonged second stage
3. Oxytocin augmentation
4. Assisted vaginal delivery</td></tr>
<tr><td>Diagnosis</td><td colspan="2">Delay in delivery of shoulder with normal axial traction after delivery of head.
Other signs include:
➢ ‘Head bobbing’ – Baby’s head appears during contraction but disappears again in between contractions
➢ ‘Turtle neck’ - Baby’s head is retracted tightly against the perineum
➢ Failure of restitution of the fetal head
➢ Failure of descent of shoulders</td></tr>
<tr><td>Early assessment</td><td colspan="2">➢ Assessment for signs of shoulder dystocia as listed above
➢ Note the time of delivery of the fetal head
➢ Note the direction the fetus is facing</td></tr>
</table>

Management	➢ Call for help - O&G specialist, medical officers, midwives, paediatric team ➢ Instruct mother to stop pushing as further pushing without maneuvers will worsen the impaction ➢ Brings mother's buttock to the edge of bed and break the bed ➢ Maneuvers to be employed to deliver baby (HELPERR): **i. H – Help** • Asking for extra personnel • At least 4 persons are needed to perform the maneuvers for shoulder dystocia and another person should standby for neonatal resuscitation. **ii. E – Episiotomy** • Do a generous episiotomy if an episiotomy is not performed; may extend the wound if it is done • Episiotomy is done to provide space to carry out the maneuvers to overcome the shoulder dystocia. **iii. L – Legs (McRobert's Maneuver)** • Refer to **Figure 1** • Flex the knees, then flex and externally rotate the hips • Delivery via routine traction in an axial direction • The patient can remain in this position through the rest of the maneuvers if the dystocia is still not resolved **iv. P- Suprapubic Pressure (Rubin 1)** • Refer to **Figure 2** • Up to 90% of shoulder dystocia can be resolved with a combination of McRobert's maneuver and suprapubic pressure.

Management	**v. E – Enter the pelvis for internal maneuvers: Rubin 2 and Wood's Screw Maneuver (WSM)** a. Rubin 2 • Refer to **Figure 3** • Insert 2 fingers to the posterior aspect of anterior shoulder • Push anterior shoulder toward the fetal chest to rotate the fetal shoulder into oblique diameter • Axial traction is applied once anterior shoulder is in oblique diameter b. Wood's Screw Maneuver (WSM) • Enter the vagina for WSM; Refer to **Figure 4 and 5** **vi. R – Remove the posterior arm** • Refer to **Figure 6** • Insert your hand into the vagina in front of the fetus. Insert your left hand if the fetus is facing the maternal right and vice versa. • Identify the posterior arm and elbow. Ensure the elbow is flexed across the front of the body. Grasp the hand and wrist and deliver the arm by sweeping it across the chest and face. • This procedure can be associated with humeral fracture, maternal lacerations and third-degree perineal tears. **vii. R – Roll over** • Refer to **Figure 7** • It may be easier to remove the posterior arm when the mother is in this position, as the baby is pulled by gravity, creating more space for you to put your hand in and deliver the posterior arm. • This procedure may not be feasible for obese mothers or when the delivery bed is small. **viii. R – Repeat the above procedures from McRobert's maneuver** • If the above maneuvers are unsuccessful, all maneuvers may be tried again. • The order in which each maneuver is attempted may be revised.

Management

ix. Other maneuvers

a. Posterior axillary sling traction (PAST)
- Fold a suction tubing in half and use your index finger to pass the folded end through the baby's posterior axilla.
- Use your other hand to pull the loop through and clamp both ends of the tubing using an artery forceps.
- Use the tubing to track upwards and outwards. Once the posterior shoulder is delivered, the baby should be able to be delivered with routine axial traction.

b. Symphysiotomy
- Cut the symphysis pubis to allow delivery of the anterior shoulder.

c. Cleidotomy
- Purposefully break one or both clavicles using your thumb to reduce the biacromial diameter.

d. Zavanelli maneuver
- Push the baby's head back into the uterus and proceed with an emergency caesarean section

Active management of 3rd stage and management of complications:

MATERNAL COMPLICATIONS	FETAL COMPLICATIONS
1. Postpartum haemorrhage – 11% a. Uterine atony b. Genital tract trauma c. Uterine rupture 2. 3rd and 4th degree tear – 3.8% 3. Litigation	1. Prolonged first stage 2. Prolonged second stage 3. Oxytocin augmentation 4. Assisted vaginal delivery

- Proper documentation – timing of events; sequence of maneuver; personnel involved and baby condition
- Debriefing of patient and partner
- Arrange follow-up for patient and baby postnatally

Figure 1: McRobert's Maneuver

Hyperflex the hips

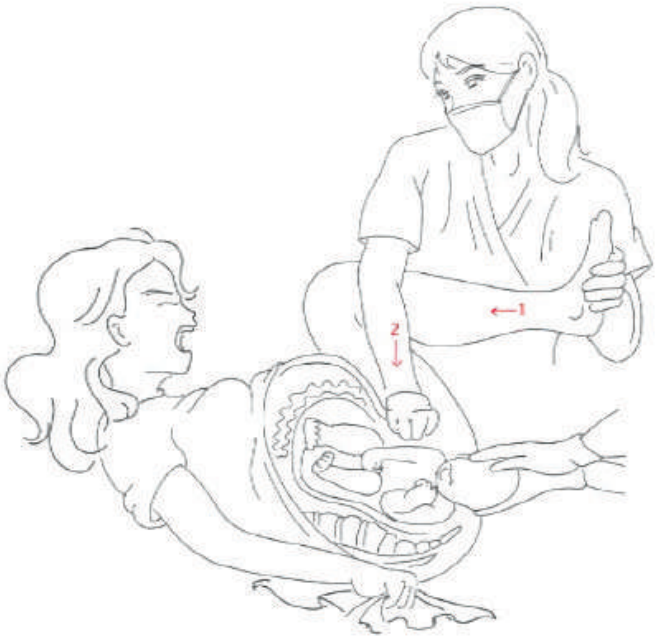
Externally rotate the hips

Flex the knees

Preferably done with 2 assistants, one at each side of the patient.

Increases the inlet diameter by straightening the lumbosacral lordosis thereby removing the sacral promontory as an obstruction.

Figure 2: Suprapubic Pressure (Rubin 1)



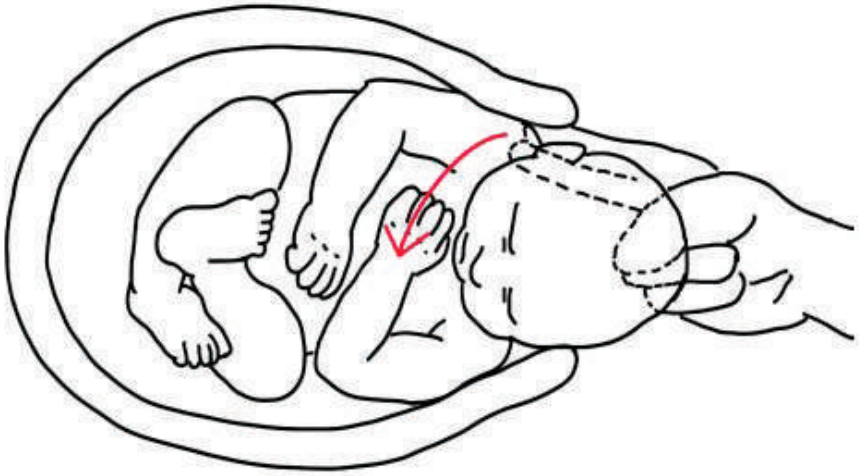
Assistant should stand on a platform

Pressure is applied at the suprapubic region, and not on the symphysis pubis/ pubic bone with a "CPR" hand over the fetus's anterior shoulder to rotate it to an oblique position

Either continuous pressure or a rocking motion can be used.

The direction of pushing should be in the direction of where the baby is facing. Attempt routine axial traction while doing this manoeuvre

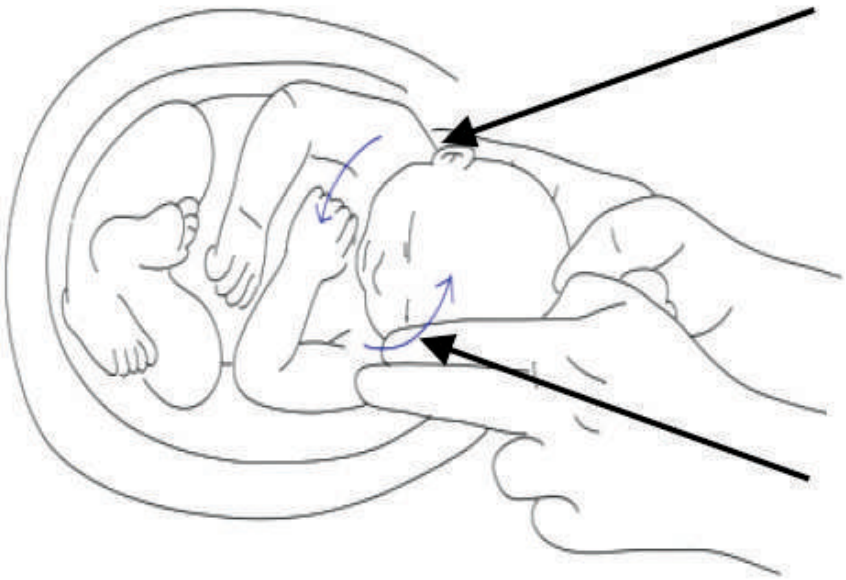
Figure 3: Rubin 2



Anterior shoulder

Insert 2 fingers and apply pressure on the posterior aspect toward fetal chest
Rotate anterior shoulder to an oblique diameter

Figure 4: Wood's Screw Maneuver



Anterior shoulder

Apply pressure on the posterior aspect

Posterior shoulder

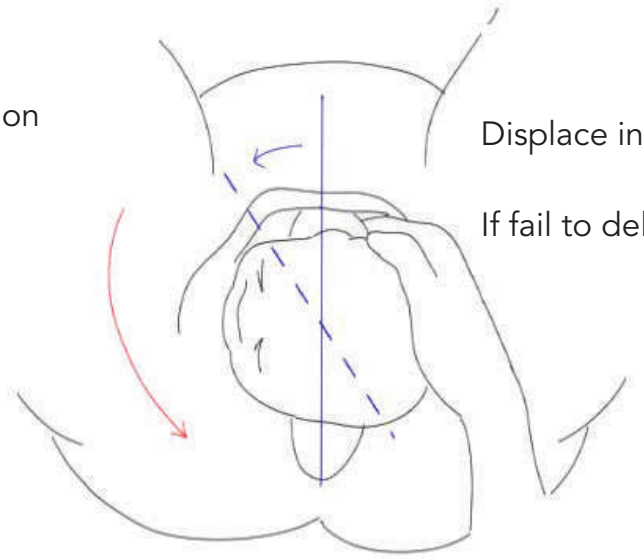
Apply pressure on the anterior aspect

Use two fingers to apply pressure to the posterior aspect of the anterior shoulder while the other hand applies pressure to the anterior aspect of the posterior shoulder.

Attempt to displace the shoulder into an oblique diameter, thereby reducing the impacted anterior shoulder. If this fails, the procedure is completed by continuing the rotation a full 180 degrees, making the anterior shoulder the posterior shoulder, allowing the delivery to be accomplished.

Figure 5: Direction of WSM

Oblique position



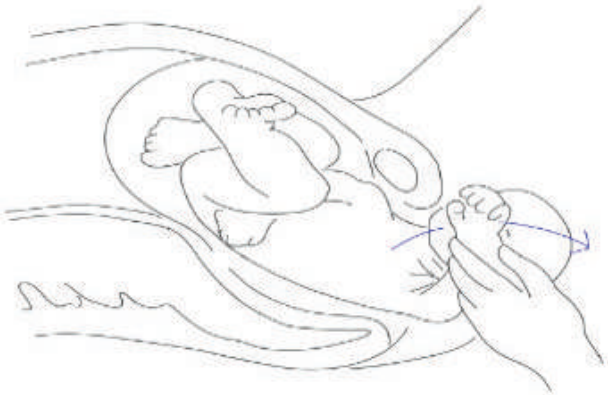
Displace into an oblique position.

If fail to deliver, rotate a full 180o.

Rotate 180^{o}

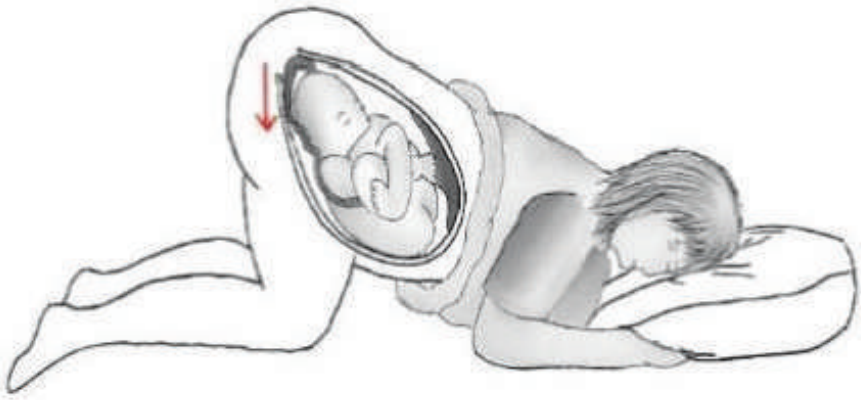
Figure 6: Removal of Posterior Arm

Flex the forearm at the elbow if the forearm is extended



Deliver the arm by grasping the wrist and sweeping it across the chest and face

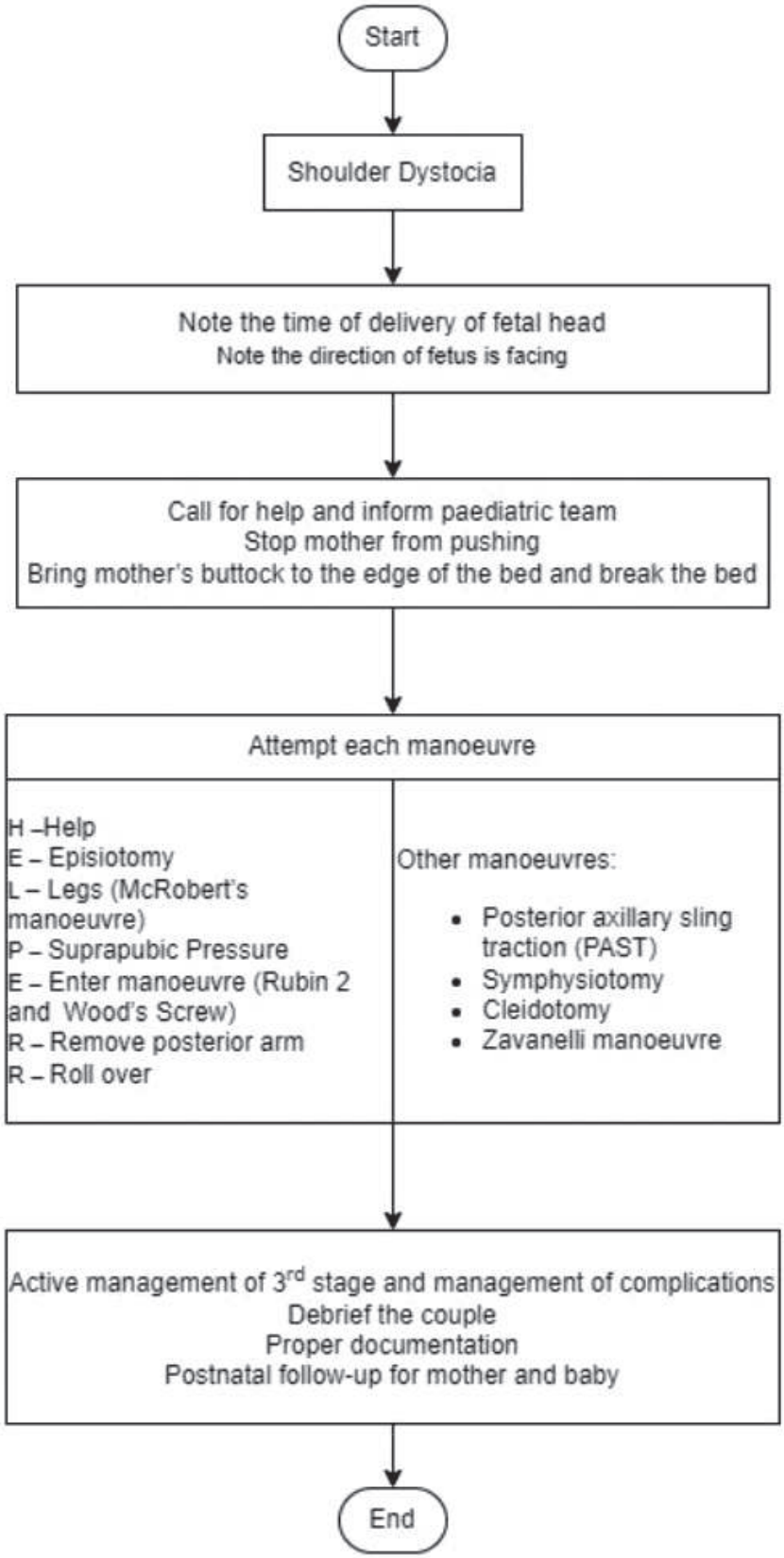
Figure 7: All-Four Position in Roll Over Maneuver



This position is called "on all-fours", knee-chest position or hands-and-knee position.

Source: Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022

Flowchart 27: Summary of the management of shoulder dystocia



Adapted from:

1. O&G Protocol, State of Kedah, 2019.
2. Penang Stage Obstetric Protocol, 2021.
3. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar, Perlis, 2020-2025.
4. A Quick Guide to Labour Room Management, Department of O&G, Hospital Tengku Ampuan Afzan, Kuantan & Department of O&G, Kulliyyah of Medicine, IIUM, Kuantan, 3rd Edition.
5. Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022.

Reference:

1. Green-top guideline No. 42: Shoulder dystocia. Royal College of Obstetricians and Gynaecologists. 2012.
2. Hoek J, Verkouteren B, Can Hamont D. BMJ Case Rep 2019;12:226882. doi:10.1136/bcr-2018-226882.

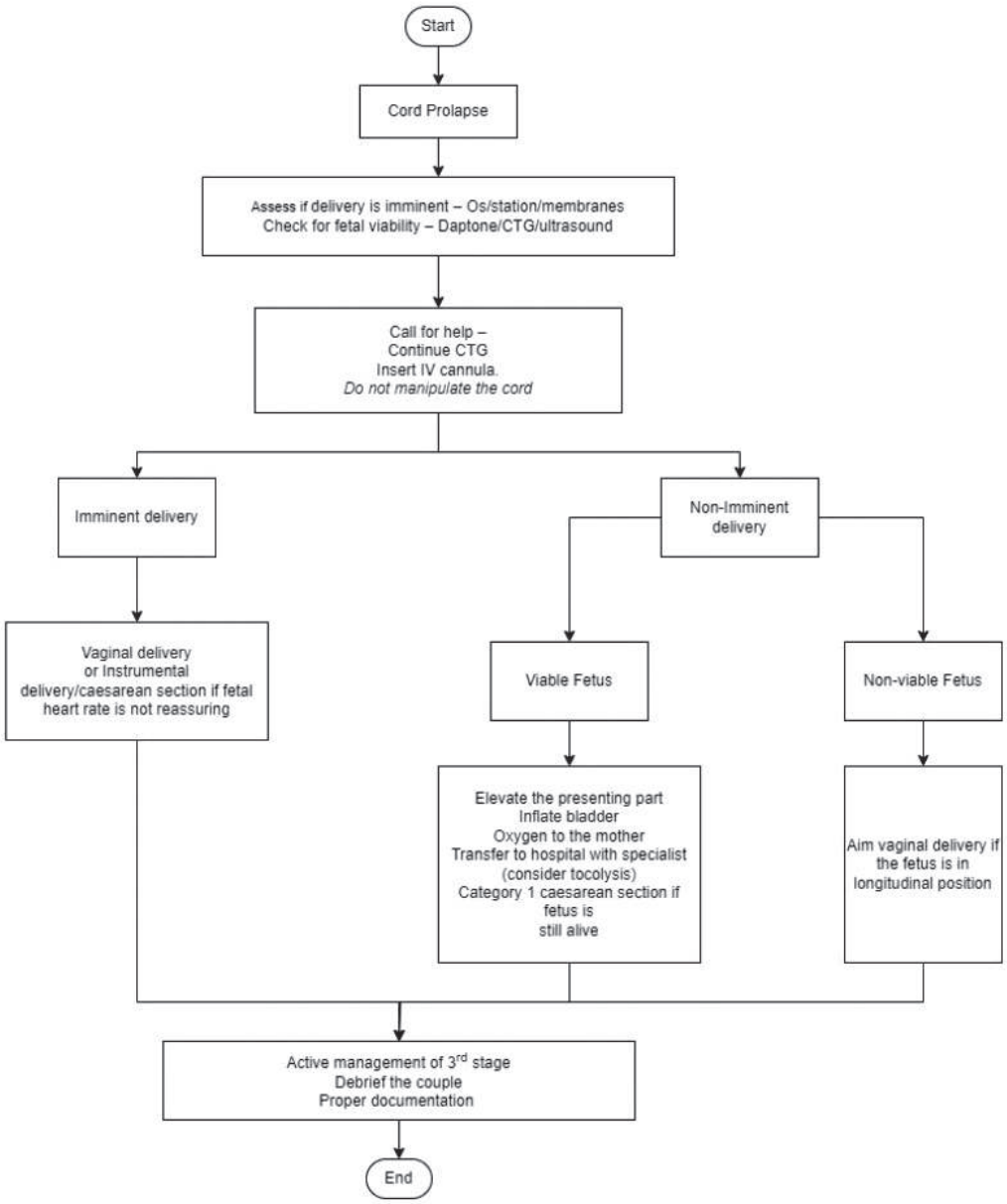
F8. CORD PROLAPSE

Definition	Descent of the umbilical cord through the cervix alongside (occult) or past the presenting part (overt) in the presence of ruptured membranes.		
Risk Factors	**FETUS**	**MATERNAL**	**IATROGENIC/ PROCEDURE RELATED**
	➢ Prematurity or low birthweight ➢ Multiple pregnancies ➢ Fetal anomaly -anencephaly ➢ Malpresentation ➢ Unengaged presenting part ➢ Abnormal lie – transverse, oblique and unstable lie	➢ Multiparity ➢ Pelvic tumour ➢ Contracted pelvis ➢ Polyhydramnios ➢ Prelabour rupture of membranes	➢ Artificial rupture of membrane with high station of presenting part ➢ Vaginal manipulation during ARM ➢ Cervical ripening balloon (large balloon catheter) ➢ External cephalic version (during procedure) ➢ Internal podalic version ➢ Placement of fetal scalp electrode/ fetal scalp sampling/ intrauterine pressure transducer
Diagnosis	➢ Pulsating tubular structure felt during vaginal examination with/ without fetal bradycardia ➢ Loop of cord seen outside vagina. ➢ Abnormal fetal heart rate pattern soon after membrane rupture, either spontaneous or artificial.		
Early assessment	➢ Immediate assessment if the delivery is imminent – Vaginal examination to determine: cervical dilatation/ station/presenting part ➢ Check fetal heart rate/determine if the fetus is alive.		

<table>
<tr><td rowspan="4">Management</td><td colspan="2">➢ Call for help - O&G specialist, medical officers, midwives, paediatric team
➢ Continue CTG
➢ Secure IV cannula
➢ Do not manipulate the cord</td></tr>
<tr><td>IMMINENT DELIVERY</td><td>NON-IMMINENT DELIVERY</td></tr>
<tr><td>➢ Drain bladder
➢ Expedite delivery
➢ Vaginal delivery if fetal heart rate is reassuring
➢ Prepare for instrumental delivery or caesarean delivery if fetal distress</td><td>Fetus is viable:
➢ Elevate the presenting part by placing 2 pillows under mother's buttocks
➢ An assistant to insert two fingers into vagina and maintain fingers in the vagina to elevate presenting part
➢ Inflate bladder with normal saline
➢ Arrange transfer to hospital with specialist (consider tocolysis during transfer)
➢ Arrange for category 1 caesarean section if the fetus is still alive
➢ To empty the bladder upon caesarean section
➢ Assistant may withdraw the fingers upon delivery of baby

Fetus is not viable:
➢ Aim vaginal delivery if the fetus is in longitudinal position</td></tr>
<tr><td colspan="2">➢ Active management of 3rd stage
➢ Debrief the couple
➢ Proper documentation</td></tr>
</table>

Flowchart 28: Summary of the management of cord prolapse



Adapted from:

1. O&G Protocol, State of Kedah,2019.
2. Penang Stage Obstetric Protocol, 2021.
3. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar, Perlis, 2020-2025.
4. A Quick Guide to Labour Room Management, Department of O&G, Hospital Tengku Ampuan Afzan, Kuantan & Department of O&G, Kulliyyah of Medicine, IIUM, Kuantan, 3rd Edition.
5. Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022.

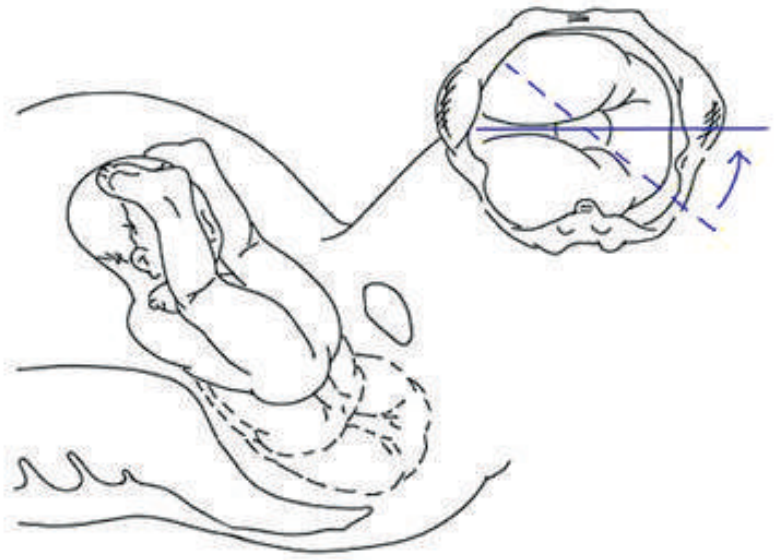
Reference:

1. Green-top Guideline No. 50. Umbilical Cord Prolapse. Royal College of Obstetrician & Gynaecologist. November 2014.

F9. ASSISTED VAGINAL BREECH DELIVERY

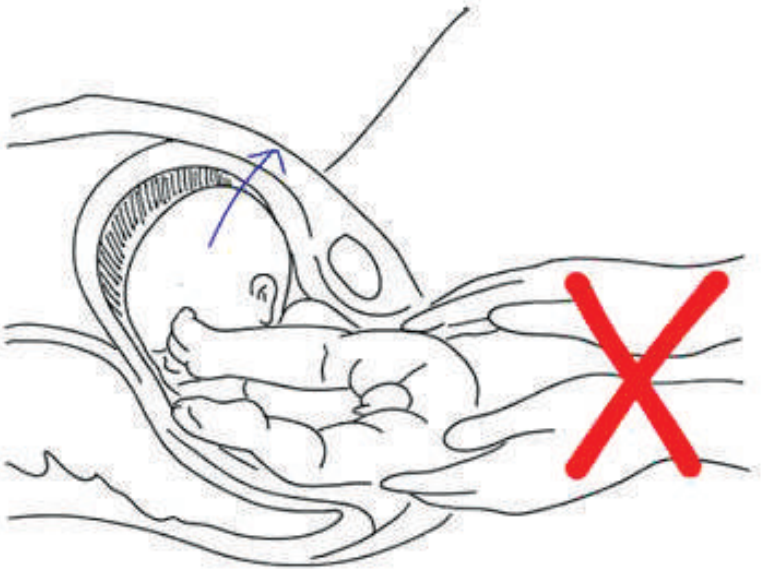
Definition	Fetal buttock +/- feet felt during vaginal examination
Early assessment	➢ Assess if delivery is imminent – cervical dilatation/station/ membrane intact or ruptured ➢ Ensure no cord presentation/prolapse or footling breech, which is contraindicated for assisted vaginal breech delivery ➢ If delivery is not imminent, assess suitability for assisted vaginal delivery; otherwise, caesarean section is indicated
Management	**i. Call for help** – O&G medical officers or specialist, paediatric team, midwife ➢ Delivery should be conducted by the most experienced personnel ➢ Paediatric team should be standby for neonatal resuscitation **ii. Delivery in lithotomy position with maternal buttocks at the end of the bed** **iii. Drain bladder** **iv. Ensure continuous fetal heart rate monitoring** **v. Vaginal breech delivery:** ➢ "Hands-off" technique ➢ Keep fetal spine facing up during delivery ➢ Deliver legs using Pinard's maneuver once knees are visible ➢ Hold baby over bony pelvis with towel ➢ Deliver baby's arms once scapulae are visible (Lovset's maneuver only needed for extended arms) ➢ Deliver head using Mauriceau-Smellie-Veit (MSV) maneuver once posterior hairline is visible ➢ Forceps can be used for after-coming head *Additional maneuvers for head entrapment:* ➢ Suprapubic pressure ➢ Forceps ➢ Dührssen's cervical incision **vi. Active management of 3rd stage** ➢ Watch out for PPH and check for perineal trauma ➢ Debrief mother and partner ➢ Proper documentation

Delivery of the buttocks



Allow breech to descend with contractions and maternal effort.

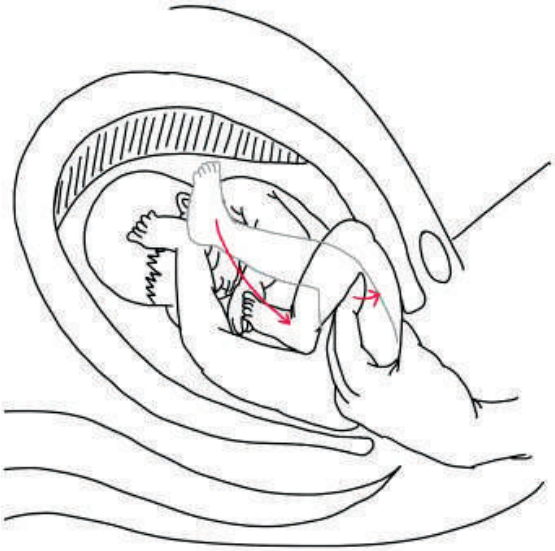
Encourage active pushing ONLY when the breech has descended to the pelvic floor and is visible.

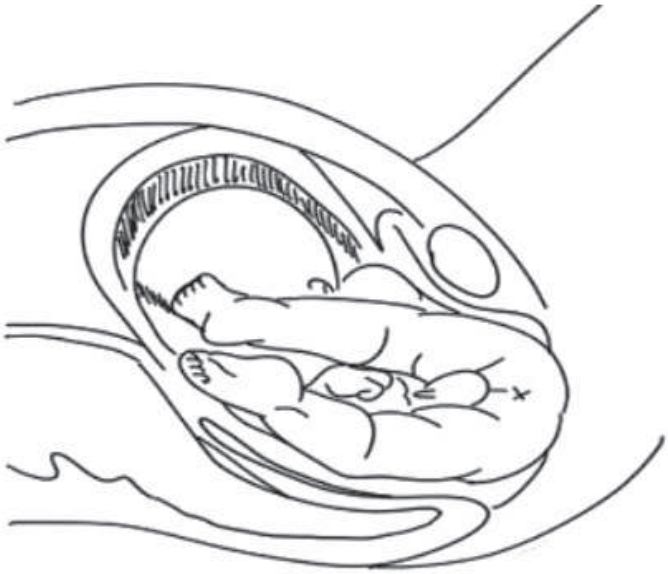


Do not pull the baby out.

Traction will lead to extension of the fetal head as well as fetal arms and further complicate the delivery.

Delivery of the legs





- Wait until the anus is visible over the fourchette before carrying out an episiotomy.
- Protect the fetal bottom from being cut with your left hand.
- The breech will usually be delivered with the sacrum to the right or left of the mother. Do not allow the sacrum to turn posteriorly.
- Insert two fingers at the hip to guide the sacrum anteriorly as the mother pushes the baby out.
- Keep the sacrum anterior while awaiting delivery of the fetal legs.
- Extended legs can be "walked" out by the 'Pinard manoeuvre' – apply gentle pressure on the popliteal fossa to encourage flexion of the knee and lateral rotation of the thigh.
- Grasp the fetal foot and deliver the leg.
- Deliver the anterior leg first, then rotate the baby slightly to deliver the opposite leg.
- Conventionally, a loop of cord is brought down if the cord is tight. If the cord is loose, do not manipulate the cord as this may lead to vasospasm.
- Very rarely, a short cord will prevent descent of the body. This will require cord division and quick delivery.

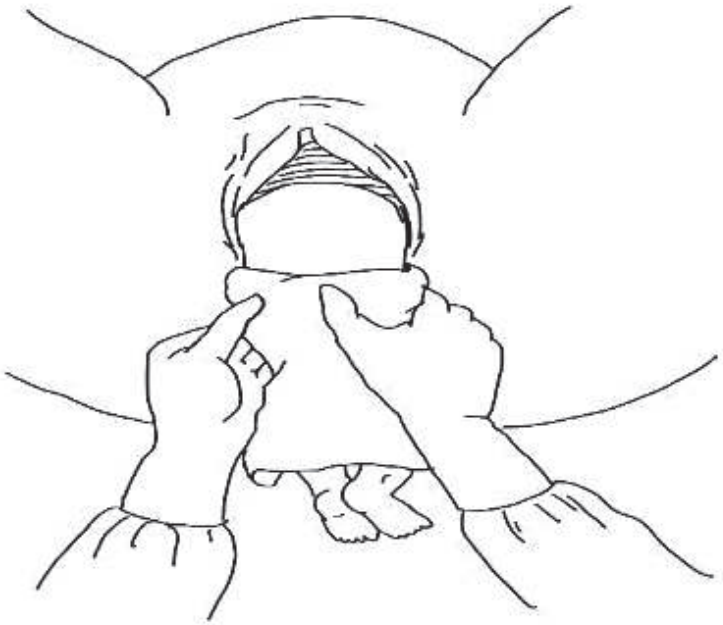
Delivery of the body

Once the baby is partially out, wrap the baby in a warm clean towel. This is to keep the baby warm as well as to prevent the baby from slipping out of your hands!

Hold the baby only at the pelvic bony regions and legs.

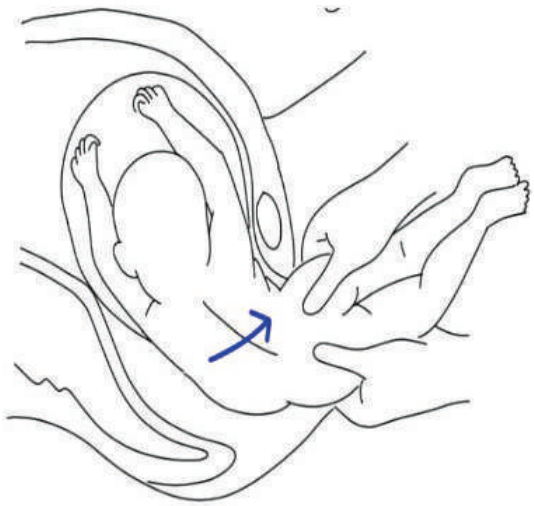
Thumbs on sacrum
Index fingers on ASIS
Last 3 fingers on thigh

DO NOT hold the abdomen (soft tissue) or chest.



Delivery of the arms

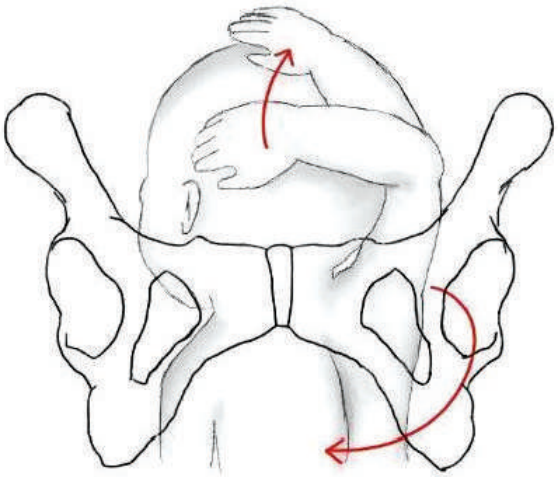
- Allow the baby to descend with maternal effort.
- Once the scapula is visible, you can expect the arms to deliver spontaneously.
- If the arm does not deliver spontaneously, suspect nuchal arm/extended arms and proceed with ***Lovset's maneuver***.



Nuchal arm/Extended arm

Lovset's manoeuvre is done by holding the baby at the hips and applying **downward traction while rotating** the baby 90 degree to bring one shoulder anteriorly under the pubic arch.

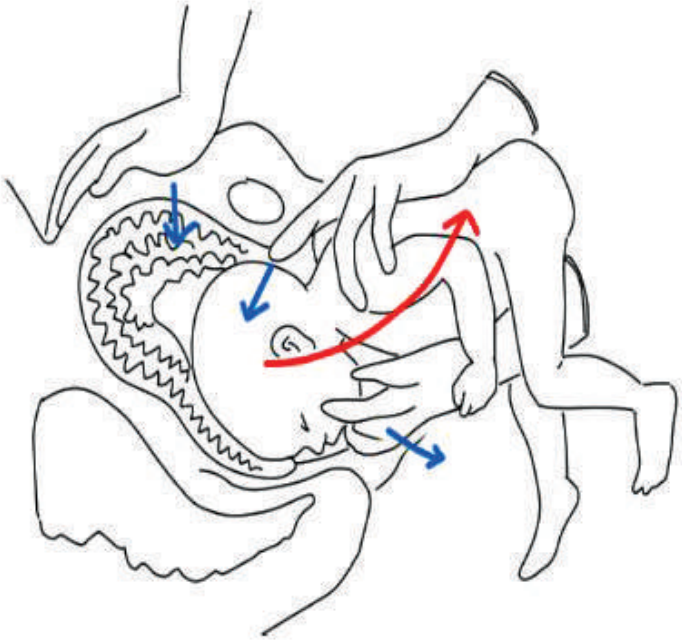
Insert two fingers and sweep over the anterior shoulder until you reach the elbow. Flex the elbow to sweep the hand over the baby's face and deliver the hand.



Subsequently, laterally flex the baby and maintain downward traction while turning the baby 180° in the opposite direction. Make sure the baby's back is facing upwards during turning. Deliver the other arm in a similar manner.

The action of turning the baby helps to bring the nuchal arm in front of the baby's head, allowing delivery of the arms.

Delivery of the head



Mauriceau-Smellie-Veit method

- Allow baby to hang down with support until the posterior hairline can be seen.
- Place your index and middle finger on baby's maxillary prominence while supporting the baby on your forearm.
- Do not to insert finger into baby's mouth! (Risk of jaw fracture & TM joint dislocation.)
- Place your other hand over the baby's shoulders with your middle finger over the occiput.
- Use both hands to flex the baby's head and deliver in the direction of the birth canal.
- You can also ask an assistant to apply suprapubic pressure to help flex the baby's head.
- Burns-Marshall technique is no longer advised due to risk of over-extension of the fetal neck.

Source: Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022

Adapted from:

1. O&G Protocol, State of Kedah, 2019.
2. Penang Stage Obstetric Protocol, 2021.
3. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar, Perlis, 2020-2025.
4. Hospital Tuanku Jaafar, Negeri Sembilian O&G Protocol, 2018.
5. Sarawak Advanced Life Support in Obstetric (SALSO) Course Manual 2022.

Reference:

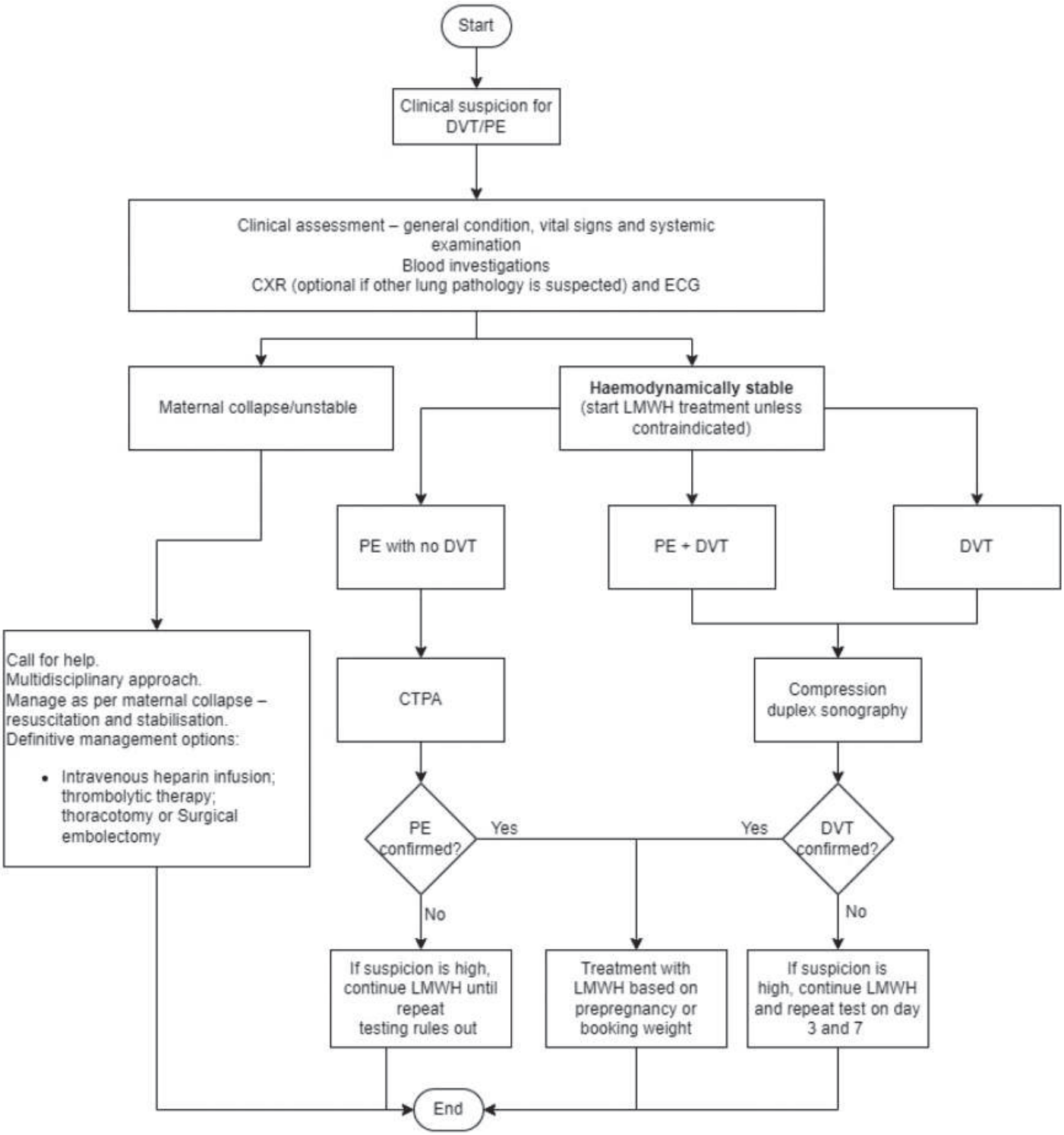
1. Green-top guideline No. 20b: Management of breech presentation. Royal College of Obstetricians and Gynaecologists. 2017.

F10. ACUTE MANAGEMENT OF OBSTETRIC THROMBOEMBOLISM

<table>
<tr><td>Definition</td><td colspan="2">The blockage of blood vessels by a thrombus carried through the bloodstream from its site of formation</td></tr>
<tr><td rowspan="2">Presentation</td><td>DVT
(DEEP VENOUS THROMBOEMBOLISM)</td><td>PE
(PULMONARY EMBOLISM)</td></tr>
<tr><td>➢ Severe pain and oedema of the leg and thigh
➢ Warm, tender and swollen leg
➢ Pale, cool extremity with diminished pulsation (phlegmasia alba dolens)</td><td>➢ Sudden maternal collapse
➢ Dyspnoea, chest pain, haemoptysis,
➢ Tachypnoea, tachycardia, fever, cyanosis</td></tr>
<tr><td>Diagnosis</td><td colspan="2">DVT – Compression duplex sonography showing filling defects in deep veins
PE – Presence of filling defect in Computed Tomography of Pulmonary Angiography (CTPA) or presence of ventilation-perfusion mismatch on Ventilation/Perfusion scan (V/Q scan)</td></tr>
<tr><td>Early assessment</td><td colspan="2">1. Assessment of general condition to see whether patient is haemodynamically stable:
➢ Conscious level
➢ Vital signs
➢ Systemic examination of lungs, cardiovascular system and bilateral lower limbs
2. Blood investigations: FBC, coagulation profile, renal profile and liver function test (D-dimer is not recommended)
3. ECG – sinus tachycardia, S1Q3T3, right axis deviation
4. CXR – can be omitted in strong suspicion for pulmonary embolism unless there is suspicion for other lung pathology
5. Imaging (depending on presentation)
➢ DVT – Compression duplex sonography
➢ PE with signs and symptoms of DVT – Compression duplex sonography +/- CTPA or V/Q scan (if compression duplex sonography is positive, CTPA or V/Q scan can be avoided)
➢ PE without signs and symptoms of DVT – CTPA or V/Q scan (CTPA is preferred if CXR showed abnormality.</td></tr>
</table>

	MATERNAL COLLAPSE OR HAEMODYNAMICALLY UNSTABLE (IN MASSIVE PE)	HAEMODYNAMICALLY STABLE
Management	1. Call for help ➢ Multidisciplinary approach – obstetrician, physician, haematologist, anaesthetist, interventional radiologist 2. Manage as per Maternal Collapse Chapter. 3. Resuscitation and stabilisation of patient including advanced airway management . 4. Definitive management options: ➢ Intravenous heparin infusion ➢ Thrombolytic therapy ➢ Thoracotomy or Surgical embolectomy.	1. Low molecular weight heparin (LMWH) should be started upon suspicion of VTE until the diagnosis is excluded by the objective testing, unless treatment is strongly contraindicated. 2. If compression duplex sonography is negative but clinical suspicion of DVT is high, anticoagulants can be continued but repeated compression duplex sonography should be done on day 3 and 7. 3. In suspicion of PE, if the objective testing is negative but the suspicion remains high, LMWH treatment should be continued until repeated objective testing rules PE out. 4. LMWH dosage should be based on booking or prepregnancy weight.

Flowchart 29: Summary of the acute management of obstetric thromboembolism



Adapted from:

1. Penang Stage Obstetric Protocol, 2021.
2. Obstetrics Protocol, O&G Department, Hospital Tuanku Fauziah, Kangar, Perlis, 2020-2025.
3. A Quick Guide to Labour Room Management, Department of O&G, Hospital Tengku Ampuan Afzan, Kuantan & Department of O&G, Kulliyyah of Medicine, IIUM, Kuantan, 3rd Edition.

Reference:

1. Green-top guideline No. 37b: Thromboembolic disease in pregnancy and the puerperium: Acute Management. Royal College of Obstetricians and Gynaecologists. 2015.
2. National Technical Committee Confidential Enquiries into Maternal Death. A Training Manual: Prevention & Treatment of Thromboembolism in Pregnancy and Puerperium.. 2nd Edition. January 2018.

SECTION

G

POSTPARTUM CARE

G1. ROUTINE POSTPARTUM CARE

All postpartum women should receive routine postpartum care which include the following:

1. Vitals sign checks half hourly for 2 times, if normal then 4 hourly (frequency of monitoring should be tailored from case to case basis).
2. Analgesia administration tailored based on the pain score system.
3. Documented venous thromboembolism score assessment.
4. Assessment of woman's bladder function by ensuring that she is able to pass urine normally within 4-6 hours after delivery or after removal of urinary catheter for caesarean section case.
5. Support and help they need to start breastfeeding (which should include observing at least 1 effective feed).
6. Assessment of the baby's health (including physical inspection and observation-by paediatric team).
7. Discussion on various types of contraception which is suitable for them.
8. Perineal check or caesarean section wound check before discharge from hospital.
9. Advise on Cervical Cancer Screening Programme.
10. Advise on interpregnancy interval (IPI) of less than 12 months between childbirth and conceiving again is associated with an increased risk of preterm birth, low birthweight and small for gestational age (SGA) babies. WHO recommends a 24-month IPI after childbirth.
11. Discussion on the discharge plans and medications and what to expect in the subsequent postnatal review at the maternal-child healthcare clinic.
12. Proper communication with maternal-child healthcare clinics on postnatal care plans especially in high risk patients.

G2. CONTRACEPTION

1) Introduction

Birth control, also known as contraception and fertility control, is a method or device used to prevent pregnancy. Planning, making available, and use of birth control is called family planning. Family planning is a key intervention in reducing maternal, newborn and child mortality and morbidity through preventing unintended pregnancies, as well as those that are spaced too closely together.

Information on methods of contraception should be offered to women during both antenatal and postnatal periods. This would allow them to have time to think and discuss with their partner regarding what form of contraception they would like to use after delivery.

Decision-making regarding contraceptive methods usually requires the need to make trade-offs among the advantages and disadvantages of different methods, and these vary according to individual circumstances, perceptions and interpretations. Factors to consider when choosing a particular contraceptive method include the characteristics of the potential user, the baseline risk of disease, the adverse effects profile of different products, cost, availability and patient preferences.

Prior to Day 21 postpartum, no contraception method is required. In non-breastfeeding women, ovulation may occur as early as Day 28. As sperm can survive for up to 7 days in the female genital tract, contraceptive protection is required from Day 21 onwards if pregnancy is to be avoided.

2) Medical Eligibility Criteria of Contraceptive Use (UKMEC/WHOMEC)

Medical Eligibility Criteria (MEC) offers guidance to providers of contraception regarding who can use contraceptive methods safely. These evidence-based recommendations do not indicate a best method for a woman nor do they consider efficacy (and this includes drug interactions or malabsorption). The recommendations allow for consideration of the possible methods that could be used safely by individuals with certain health conditions (e.g. hypertension) or characteristics (e.g. age) to prevent an unintended pregnancy.

Most contraceptive users are medically fit and can use any available contraceptive method safely. However, some medical conditions are associated with potential or theoretical increased health risks when certain contraceptive methods are used, either because the method adversely affects the condition or because the condition or its treatment affects the safety of the contraceptive.

Definition of MEC

MEC	DEFINITION OF CATEGORY
Category 1	A condition for which there is no restriction for the use of the method.
Category 2	A condition where the advantages of using the method generally outweigh the theoretical or proven risks.
Category 3	A condition where the theoretical or proven risks usually outweigh the advantages of using the method. The provision of a method requires expert clinical judgment and/or referral to a specialist contraceptive provider, since use of the method is not usually recommended unless other more appropriate methods are not available or not acceptable.
Category 4	A condition which represents an unacceptable health risk if the method is used.

Where resources for clinical judgment are limited, such as in community-based services, the four-category classification framework can be simplified into two categories. With this simplification, a classification of Category 1 or 2 indicates that a woman can use a method, and a classification of Category 3 or 4 indicates that a woman is not medically eligible to use the method.

3) Types of contraception

Women should be informed during pregnancy about the effectiveness of different contraceptives, including the superior effectiveness of long-acting reversible contraception (LARC), when choosing an appropriate method to use after pregnancy.

Percentage of women experiencing an unintended pregnancy within the first year of use with typical use and perfect use (modified from Trussell, 2011).

METHOD	TYPICAL USE (%)	PERFECT USE (%)
No method	85	85
Fertility awareness-based methods	24	0.4–5
Female diaphragm	12	6
Male condom	18	2
Combined hormonal contraception*	9	0.3
Progestogen-only pills	9	0.3
Progestogen-only injectables	6	0.2
Copper intrauterine device	0.8	0.6
Levonorgestrel-releasing intrauterine system	0.2	0.2
Progestogen-only implant	0.05	0.05
Female sterilization	0.5	0.5
Vasectomy	0.15	0.1

**Includes combined oral contraception, transdermal patch and vaginal rings. Long-acting reversible contraceptive methods have been highlighted in gray*

Summary of UK Medical Eligibility Criteria for Contraceptive Use (UKMEC) categories applicable to women after childbirth.

CONDITION	CU-IUD	LNG-IUS	IMP	DMPA	POP	CHC
Postpartum (in breastfeeding women)						
a) 0 to <6 weeks	**See below**		1	2	1	4
b) ≥6 weeks to <6 months (primarily breastfeeding)			1	1	1	2
c) ≥6 months			1	1	1	1
Postpartum (in non-breastfeeding women)						
a) 0 to <3 weeks	**See below**					
(i) With other risk factors for VTE*			1	2	1	4
(ii) Without other risk factors			1	2	1	3
b) 3 to <6 weeks						
(i) With other risk factors for VTE*			1	2	1	3
(ii) Without other risk factors			1	1	1	2
c) ≥6 weeks			1	1	1	1
Postpartum (in breastfeeding or non-breastfeeding women, including post-caesarean section)						
a) 0 to <48 hours	1	1	**See above**			
b) 48 hours to <4 weeks	3	3				
c) ≥4 weeks	1	1				
d) Postpartum sepsis	4	4				

** In the presence of other risk factors for VTE, including immobility, transfusion at delivery, body mass index ≥30 kg/m2, postpartum haemorrhage, post-caesarean delivery, pre-eclampsia or smoking, use of CHC may pose an additional increased risk for VTE.*

Healthcare providers should discuss with the woman any personal characteristics or existing medical conditions, including those that have developed during pregnancy, which may affect her medical eligibility for contraceptive use.

Summary of UK Medical Eligibility Criteria for Contraceptive Use (UKMEC) categories applicable to a woman with a history of pregnancy-related conditions.

CONDITION	CU-IUD	LNG-IUS	IMP	DMPA	POP	CHC
History of high blood pressure during pregnancy	1	1	1	1	1	2
History of cholestasis (pregnancy-related)	1	1	1	2	1	2
Diabetes (history of gestational disease)	1	1	1	1	1	1

Requirements for abstinence or additional contraception when a method of contraception (which the woman is medically eligible to use) is initiated after childbirth.

METHODS OF CONTRACEPTION THE WOMAN IS MEDICALLY ELIGIBLE TO USE	INITIATION <21 DAYS AFTER CHILDBIRTH	INITIATION ≥21 DAYS AFTER CHILDBIRTH
	NUMBER OF DAYS OF ADDITIONAL CONTRACEPTIVE PRECAUTIONS REQUIRED (DAYS)	
Copper intrauterine device	None for insertion 0 to <48 hours	None
Levonorgestrel-releasing intrauterine system	Insertion between 48 hours and <4 weeks may not be appropriate (UKMEC 3)	7
Progestogen-only pill (traditional/ desogestrel)	None	2
Diabetes (history of gestational disease)	None	7
Combined hormonal contraception	Use not recommended	7*

**Except Qlaira® which requires 9 days of additional contraceptive precautions*

4) Other forms of contraception

a. Barrier methods

Male and female condoms can be safely used by women after childbirth. Women choosing to use a diaphragm should be advised to wait at least 6 weeks after childbirth before having it fitted because the size of diaphragm required may change as the uterus returns to normal size.

b. Lactational amenorrhoea method (LAM)

LAM is over 98% effective in preventing pregnancy. Only effective in patients who:

- Breastfeed exclusively (no other liquids or solids given to the baby).
- Remain amenorrhoea after delivery.
- Within 6 months postpartum period.

c. Fertility awareness method (FAM)

Fertility awareness methods (FAM) can be used by women after childbirth. However, women should be advised that because FAM relies on the detection of the signs and symptoms of fertility and ovulation, its use may be difficult after childbirth and during breastfeeding.

d. Female sterilisation

Female sterilisation is a safe option for permanent contraception after childbirth. Women should be advised that some LARC methods are as, or more, effective than female sterilisation and may confer non-contraceptive benefits. However, women should not feel pressured into choosing LARC over female sterilization. Procedure should be done after the postpartum period ideally, so that uterus is fully involute and allow women to have adequate time to make decisions (risk of regret if done immediately after childbirth). Failure rate is 1:200.

e. Male sterilisation

Male sterilisation is also a safe option for permanent contraception. Vasectomy- Interrupting the vas deferens with an intention to provide permanent contraception. Procedure done by urologist under local anaesthesia in an outpatient setting. Need additional contraception until semen analysis shows no more sperm, usually after 12 weeks. Failure rate is 1:2000.

f. Emergency contraception (EC)

Emergency contraception (EC) is indicated for women who have had unprotected sexual intercourse (UPSI) from 21 days after childbirth, but is not required before this. Oral EC levonorgestrel 1.5 mg (LNG-EC) and ulipristal acetate 30 mg (UPA-EC) are safe to use from 21 days after childbirth. Women who breastfeed should be advised not to breastfeed and to express and discard milk for a week after they have taken UPA-EC. The copper intrauterine device (Cu-IUD) is safe to use for EC from 28 days after childbirth.

G3. POSTPARTUM PLACEMENT OF INTRAUTERINE CONTRACEPTIVE DEVICE (PPIUD)

1) Overview

a. Immediately following childbirth represents a valuable opportunity for the woman or couple to learn about and take advantage of family planning services available. Information regarding various types of contraception should always be readily available and easily accessible to a woman.

b. The postpartum IUD (PPIUD), inserted within 10 minutes or up to 48 hours after birth:
   - Is readily accessible for women who deliver at health care facilities/ hospitals.
   - Has no effect on the amount or quality of breast milk.
   - Is reversible and can be removed at any time (with immediate return to fertility)—should the woman's contraceptive or reproductive desires change.
   - Does not require any daily action on the part of the user to be effective
   - Is safe for use by women living with HIV (but not as prevention of HIVtransmission).

c. The intrauterine contraceptive device (IUCD) is a highly effective, long-acting, reversible family planning method that is safe for use by most postpartum women—including those who are breastfeeding. It is also relatively inexpensive and convenient and has a very low rate of complications.

d. Associated complications: Rate of uterine perforation: 2 in 1000. Rate of expulsion: 1 in 20. In the context of PPIUD, Copper IUCD are recommended now. Types of Copper IUCDs: 3 years- Cu250 and 5 years- Cu375.

e. Mechanism of action: Copper IUCDs act by preventing fertilization. Copper ions decrease sperm motility and function by altering the uterine and tubal fluid environment, thus preventing sperm from reaching the fallopian tube and fertilizing the egg.

f. Copper ions also produce an inflammatory reaction that is toxic to sperm and eggs (ova), preventing pregnancy. These actions are largely local with no measurable increase in the woman's serum copper level.
g. The most common side effects associated with the copper-bearing:
   - A change in the amount and duration of menstrual flow and an increase in the amount of menstrual cramping (this is the most common reason for removal).
   - Changes in bleeding patterns, such as spotting/light bleeding (between periods), in the first few weeks.
   - Discomfort or cramping during IUD insertion and for the next several days.

2) Timing of PPIUD insertion

a. PPIUD insertion refers only to those IUDs placed during the immediate or early postpartum period (within 10 minutes or up to 48 hours after birth*).
b. IUDs inserted during the immediate postpartum period (postplacental and intra-caesarean) have the highest rates of retention, but the IUD can be safely inserted at any time during the early postpartum period, that is, within the first 48 hours after the birth.
c. The three types of PPIUD insertion are:
   - Postplacental: Immediately following the delivery of the placenta in a vaginal birth, the IUD is inserted before the woman leaves the delivery room.
   - Intra-caesarean: Immediately following the removal of the placenta during a cesarean section, the IUD is inserted before closure of the uterine incision, before the woman leaves the operating theater.
   - Early postpartum: Not immediately following the delivery/removal of the placenta but within 2 days/48 hours of the birth (preferably within 24 hours, such as on the morning of postpartum Day 1), the IUD is inserted during a separate procedure.

**The IUD should not be inserted between 48 hours and 4 weeks postpartum because of an overall increase in the risk of complications, especially infection and expulsion. IUDs inserted at 4 weeks postpartum and beyond are considered interval IUDs, rather than PPIUDs, because the same technique and services are required.*

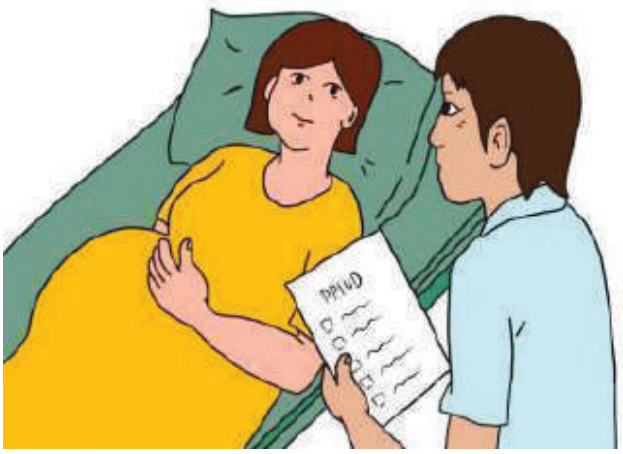
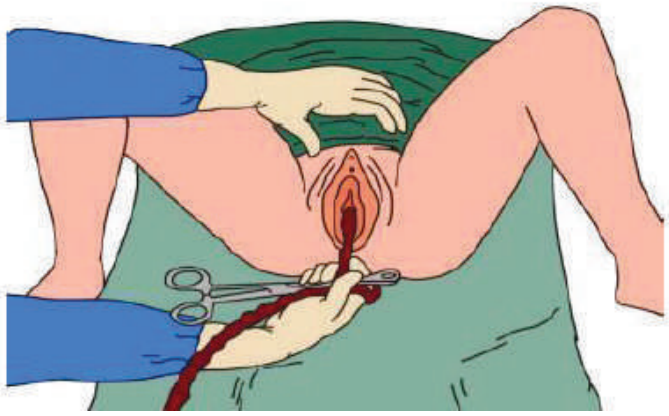
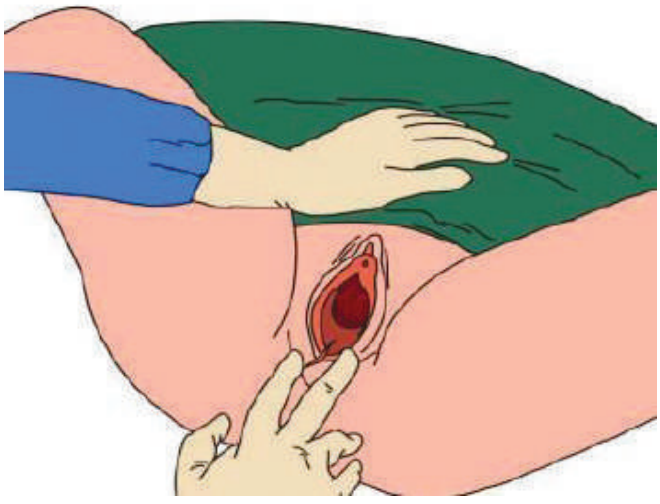
3) Medical eligibility criteria for PPIUD

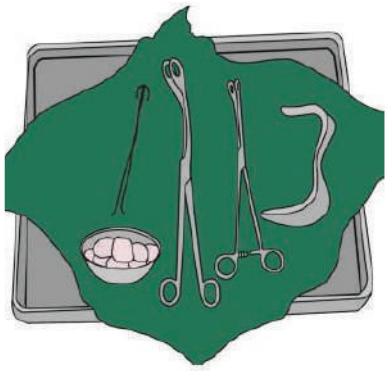
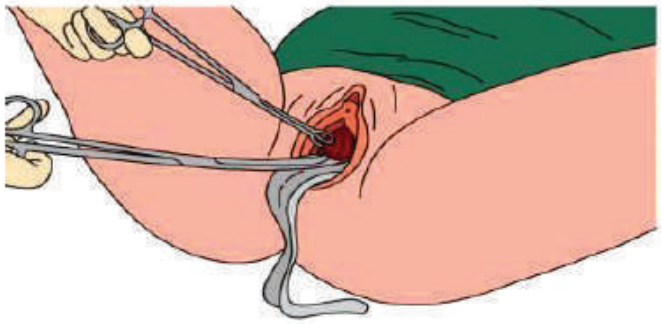
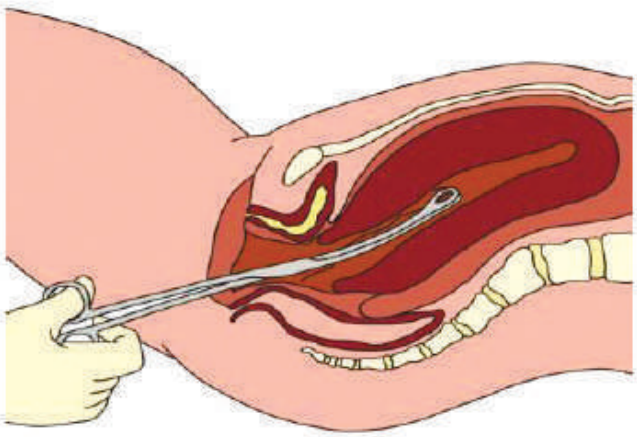
Below listed are Category 3 and Category 4 MEC for PPIUD and if a woman has one of the conditions listed below, PPIUD should not be offered to that woman.

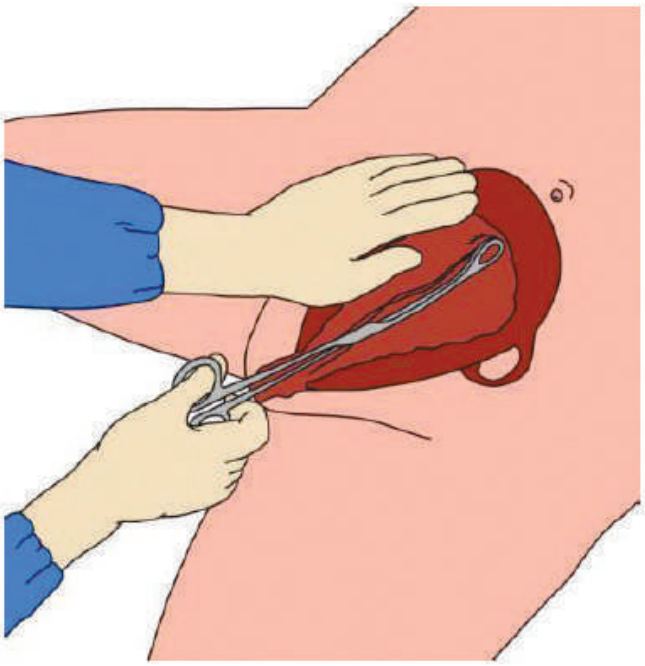
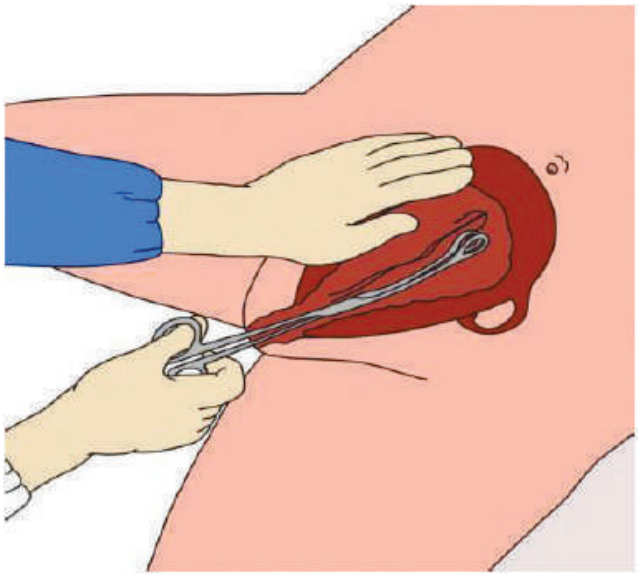
CATEGORY 3	CATEGORY 4
➢ Between 48 hours and 4 weeks postpartum. ➢ Chorioamnionitis. ➢ Prolonged rupture of membranes (PROM) >18 hours. ➢ Extensive genital trauma where insertion may disrupt the repair. ➢ High individual risk of chlamydia and gonococcal infection (partner has current purulent discharge or STI). ➢ Benign trophoblastic disease. ➢ Lupus with severe thrombocytopenia.	➢ Puerperal sepsis. ➢ Postpartum endometritis. ➢ Unresolved postpartum haemorrhage. ➢ Pregnancy (known or suspected). ➢ Unexplained vaginal bleeding. ➢ Current PID, gonorrhea, or chlamydia. ➢ Acute purulent (pus-like) discharge. ➢ Distorted uterine cavity. ➢ Malignant trophoblastic disease. ➢ Known pelvic tuberculosis. ➢ Genital tract cancer (cervical or ➢ endometrial).

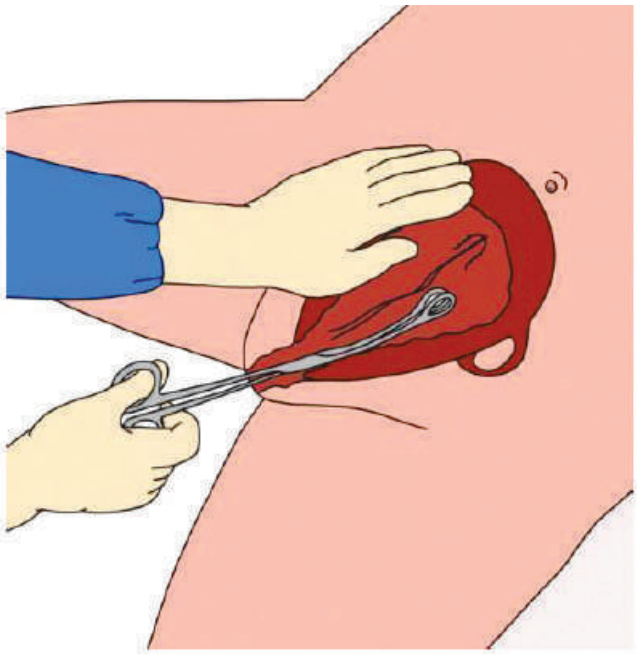
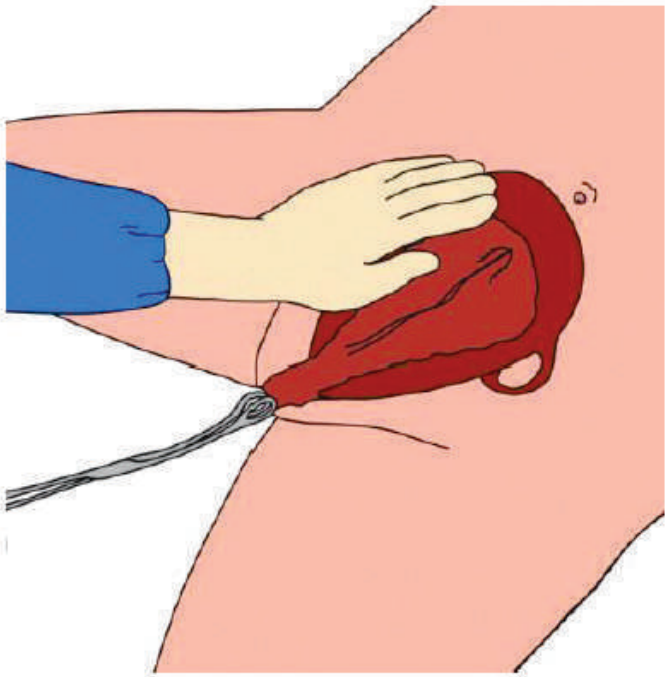
4) PPIUD insertion techniques

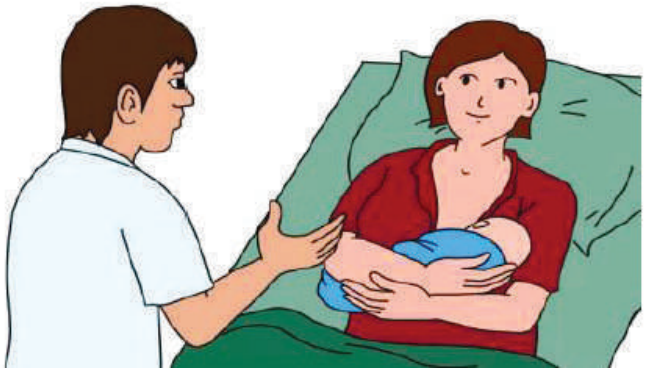
Post placental/Early postpartum insertion of the IUD using forceps:

STEPS	PICTORIAL GUIDANCE
Ensure counseling regarding PPIUD was done appropriately and the patient signed the consent for PPIUD insertion if she agrees.	
Manage the labour and delivery as usual, taking extra precautions to minimize the risk of postpartum haemorrhage.	
Before inserting the PPIUD, check for perineal tears and repair them if needed.	

STEPS	PICTORIAL GUIDANCE
Prepare the PPIUD Tray and the IUCD. • Antiseptic solution (Chlorhexidine) • Gauzes • Sterile green towels • Long ring forceps/ placental forceps • Sims speculum	
The IUCD should be held just at the edge of the placental forceps so that the IUCD will be easily released from the forceps when they are opened at the uterine fundus.	
Clean the vulva and also vagina with the antiseptic solution. Gently grasp the anterior lip of the cervix with the ring forceps. (The speculum may be removed at this time, if necessary.) Let the forceps out of your hand, keeping them attached to the cervix.	
While avoiding touching the walls of the vagina, insert the placental forceps—which are holding the IUCD—through the cervix and into the lower uterine cavity. Gently move the IUCD further into the uterus, toward the point where slight resistance is felt against the back wall of the lower segment of the uterus. Be sure to keep the placental forceps firmly closed.	

STEPS	PICTORIAL GUIDANCE
"Elevate" the uterus: • Place the base of your nondominant hand on the lower segment of the uterus (midline, just above the pubic bone with the fingers toward the fundus). • Through the abdominal wall, push the entire uterus superiorly (in the direction of the woman's head). • Maintain this position to stabilize the uterus during insertion. • Gently move the IUCD upward toward the fundus, in an angle toward the umbilicus. • Lowering the dominant hand (the IUCD/forceps-holding hand), so that the forceps can pass easily through the vagino-uterine angle.	
Continue gently advancing the forceps until the uterine fundus is reached, when you will feel a resistance. Confirm that the end of the forceps has reached the fundus. The broad ring at the distal end of the placental forceps makes it extremely unlikely that the forceps will perforate the uterine fundus. While continuing to stabilize the uterus, open the forceps, tilting them slightly toward midline, to release the IUCD at the fundus.	

STEPS	PICTORIAL GUIDANCE
Keeping the forceps slightly open, slowly remove them from the uterine cavity, being careful not to dislodge the IUCD. Do this by: • Sweeping the forceps to the side wall of the uterus. • Sliding the instrument against the side of the uterine wall. If the forceps close and/or catch the strings of the IUCD, the forceps can inadvertently pull the IUCD down from its fundal position, and increase the risk of expulsion.	
Slowly remove forceps—keeping them slightly open. Check for the IUCD strings. If the IUCD strings are visible at the lower part of the vagina or reached out from the introitus, the IUCD has not been adequately placed at the fundus and the chance of spontaneous expulsion is higher. Can use a scan to see placement of the IUCD: • If IUCD is correctly placed at the fundus and strings are long, then the strings can be trimmed off using a suture scissor. • If placement of IUCD is not at the fundus, the IUCD needs to be removed and the same IUCD can be used for reinsertion at the same setting.	

STEPS	PICTORIAL GUIDANCE
Tell the woman that the IUCD has been successfully placed and provide her with post-insertion counseling, including IUCD instructions.	
IUCD-Card to be produced and attached the card to her antenatal book and an appointment must be given 4-6 weeks later for trimming of the IUCD strings and also scan for IUCD location.	**PPIUD Card:** Name of user: Identification number: Place of IUCD insertion: Type of IUCD: Date of IUCD inserted: Next clinic appointment: Date for IUCD removal/replacement: Phone number to get further help:

Pictures by: Dr. Vivian Chong Sin Yue

Intra Caesarean insertion.

For intra caesarean insertion, the woman has been counseled and prepared prior to the start of the operation, preferably during the antenatal period. Typically, manual insertion is sufficient (as opposed to instrumental insertion) because the provider can easily reach the uterine fundus. After the placenta is removed, the provider:

- Holds the IUCD between the index and middle fingers of the hand, passes it through the uterine incision and places it at the uterine fundus.
- Slowly withdraws the hand, ensuring that the IUCD remains properly placed.
- Closes the uterine incision, taking special care not to incorporate the IUCD strings into the suture.
- The IUCD strings can be pointed toward the cervix but should NOT be pushed through the cervical canal. This helps prevent both uterine infection (caused by contamination of the uterine cavity with vaginal flora) and displacement of the IUCD from the fundus (caused by drawing the strings downward toward the cervical canal).

5) Take-Home Information/Advice for PPIUD User

Provide reassurance and advise the woman to:

1. Expect lochia but note heavy bleeding or blood clots.
2. Be aware that postpartum symptoms, such as intermittent vaginal bleeding and cramping, are normal for the first 4 to 6 weeks postpartum—and may be hard to distinguish from IUCD side effects.
3. Take paracetamol or other pain relievers as needed.
4. Regarding possible IUCD expulsion:
   - Spontaneous expulsion is most likely to occur during the first 3 months postpartum.
   - Check the bed sheets in the morning and your undergarments when you change clothes.
   - At 4-6 weeks postpartum, you may be able to feel the IUCD strings. It is not necessary to check for them, but if you do, do not pull on them.
   - Your provider will check for the strings when you return for your postpartum visit. That is why it is important for you to return to see the same provider, or at least someone in the same clinic, who is aware of PPIUD services.
5. Continue to exclusively breastfeed your baby, as appropriate; the IUCD and breastfeeding do not interfere with each other.
6. Remember that the IUCD does not protect against STIs and HIV.
7. Resume intercourse at any time you feel ready; the IUCD offers full protection against pregnancy immediately upon insertion.
8. Return for removal of the IUCD anytime you wish or depending on the duration of coverage of that particular IUCD. After the IUCD is removed, fertility will return immediately.
9. Return for assessment if heavy menstrual bleeding, severe lower abdominal discomfort, unusual vaginal discharge, fever or not feeling well.

References:

1. FSRH UKMEC April 2016 (Amended September 2019).
2. FSRH Contraception After Pregnancy Jan 2017.
3. WHO MEC Book 2015 5th Edition.
4. Postnatal Care NICE Guideline NG194 April 2021.
5. Global PPIUD Reference Manual USAID (Amended Oct 2013).

SECTION

H

APPENDIX

COMPILATION OF RECOMMENDATIONS FOR ANTENATAL CORTICOSTEROIDS TO REDUCE NEONATAL MORBIDITY AND MORTALITY

Whilst the use of antenatal or prenatal corticosteroids (ACS) has established benefit, recent evidence on long term neurodevelopmental outcomes has resulted in additional concerns in its use in late term and term babies. Several organizations have issued statements or guidelines and three of these are extracted below; from the World Association of Perinatal Medicine & Perinatal Medicine Foundation (WAPM), International Federation of Gynaecology & Obstetrics (FIGO) and Royal College of Obstetricians & Gynaecologists (RCOG).

It is hoped that this will be useful for individual units to draft their local guidelines based on the neonatal support available to them.

1) Gestational age for use

WAPM	➢ A single course of ACS should be administered between 24^{+0} and 33^{+6} weeks of gestation in women at high-risk of PTB within the next 7 days. It should be considered between 22^{+0} and 23^{+6} weeks of gestation. ➢ The decision should be based on local standards regarding periviable neonatal support and availability of neonatal facilities, following appropriate consultation to the parents.
FIGO	➢ For women with singleton pregnancies where active neonatal care is appropriate, for whom preterm birth is anticipated between 24^{+0} and 34^{+0} weeks of gestation, prenatal corticosteroids should be offered to improve outcomes for the baby.
RCOG	➢ Corticosteroids should be offered to women between 24^{+0} and 34^{+6} weeks' gestation in whom imminent preterm birth is anticipated (either due to established preterm labour, preterm prelabour rupture of membranes or planned preterm birth) ➢ Before 24^{+0} weeks, the obstetric and neonatal team should discuss the administration of ACS in the context of her individual circumstances and preferences

2) Timing of anticipated preterm birth

W A P M	➢ Women at high-risk of PTB within the next 7 days.
F I G O	➢ Prenatal corticosteroids should ideally be given 18 to 72 hours (and certainly no more than 1 week) before preterm birth is anticipated. However, if preterm birth is expected within 18 hours, prenatal corticosteroids should still be administered.
R C O G	➢ A course of antenatal corticosteroids given within the 7 days prior to preterm birth reduces perinatal and neonatal death and respiratory distress syndrome.

3) Dosage

W A P M	➢ Either betamethasone (2 doses of 12 mg IM in a 24 hr interval) or dexamethasone (4 doses of 6 mg IM at 12 hr intervals) may be administered for fetal lung maturation.
F I G O	➢ Where prenatal corticosteroids are given to improve fetal outcomes, appropriate regimens include two doses of betamethasone acetate/ phosphate 12 mg (=one course) IM 24 hr apart, or two doses of dexamethasone phosphate 12mg (=one course) IM 24 hr apart.
R C O G	➢ It is recommended that 24mg dexamethasone phosphate is given intramuscularly in two divided doses of 12 mg 24 hr apart or four divided doses of 6 mg 12 hr apart ➢ An alternative is 24 mg betamethasone sodium phosphate/acetate mix given intramuscularly in two divided doses of 12 mg 24 hours apart

4) Repeating doses

W A P M	➢ Repeated doses of ACS following an initial course of ACS are not recommended. ➢ A single rescue course of ACS is not routinely recommended. It may be administered up to 33+6 weeks of gestation in women at high-risk of PTB within the next 7 days when a course of ACS has been administered at least 14 days before.
F I G O	➢ In women in whom preterm birth is expected within 72 hours and who have had one course of corticosteroids more than a week ago, one additional course of prenatal corticosteroids could be given to improve outcomes for the baby.
R C O G	➢ No reduction in serious morbidity or long-term benefits have been seen with repeat corticosteroids but babies who receive repeat doses of antenatal corticosteroids are smaller (lower birth weight and reduced length). ➢ There is limited evidence to recommend repeat courses of antenatal corticosteroids if a woman remains at imminent risk of preterm birth seven days after administration of antenatal corticosteroids. However, a further course may reduce the need for neonatal respiratory support. ➢ The maximum number of corticosteroid courses given in any one pregnancy should not exceed three.

5) Late preterm

W A P M	➢ A single course of ACS is not routinely recommended between 34^{+0} and 36^{+6} weeks of gestation in women at high-risk of PTB within the next 7 days because of the current uncertainty regarding the benefit to risk ratio.
F I G O	➢ Prenatal corticosteroids should not be offered routinely to women in whom late preterm birth is anticipated. Instead, the use of prenatal corticosteroids should be considered in light of the balance of risks and benefits for individual women.
R C O G	➢ Clinicians and women should consider the balance of risks and benefits of corticosteroids in women in whom imminent preterm birth is anticipated from 35^{+0} to 36^{+6} weeks' gestation

6) Term prelabour caesarean section

WAPM	➢ ACS are not routinely recommended before scheduled cesarean section at term because of the current uncertainty regarding the benefit to risk ratio. In the absence of other indications, a scheduled cesarean section should not be performed before 39^{+0} weeks of gestation.
FIGO	➢ Prenatal corticosteroids should not be given routinely before cesarean section at term.
RCOG	➢ For women undergoing planned caesarean birth between 37^{+0} and 38^{+6} weeks an informed discussion should take place with the woman about the potential risks and benefits of a course of ACS. Although ACS may reduce admission to the neonatal unit for respiratory morbidity, it is uncertain if there is any reduction in respiratory distress syndrome, transient tachypnoea of the newborn or neonatal unit admission overall, and ACS may result in harm to the neonate which includes hypoglycaemia and potential developmental delay.

7) Fetal Growth Restriction (FGR)

WAPM	➢ In cases complicated with FGR, ACS should be administered at the same dosage and indications as in appropriate for gestational age (AGA) fetuses.
FIGO	➢ None
RCOG	➢ If imminent preterm birth is likely, a course of antenatal corticosteroids should be offered to women whose babies are thought to be either small-for-gestational age (SGA) or to have fetal growth restriction, but women should be counseled about the lack of evidence to guide care. ➢ Women with a SGA fetus between 24^{+0} and 35^{+6} weeks of gestation where delivery is being considered should receive a single course of antenatal corticosteroids.

8) Glucose monitoring in women with diabetes

WAPM	➢ After the administration of ACS, screening with glucose tolerance tests should be delayed for at least one week. ➢ Close monitoring of the maternal blood glucose levels is recommended for women with diabetes in the following days after the administration of ACS
FIGO	➢ None
RCOG	➢ Diabetes is not an absolute contraindication. Additional insulin should be given according to an agreed protocol and close monitoring should be undertaken. ➢ Maternal blood glucose levels rise shortly after administration of corticosteroids and can remain elevated for up to 5 days.

OXYTOCIN INDUCTION/AUGMENTATION REGIME

Infusion should be accurately and precisely administered via a ***Syringe Driver*** or ***Volumetric Infusion Pump***. Infusion via a Syringe Driver is preferred due to safety reasons and in cases where fluid management needs to be monitored more strictly.

Infusion via Syringe Driver

Dilution:

Dilute 10 units (1 ml) of Oxytocin (Pitocin®) in 49 ml of Normal Saline 0.9% or Hartmann's Solution.

Hence, 1 milliunit (mU)/min of Oxytocin = 0.3 mls/hr.

Rate:

Start at 1 mU/min (0.3 mls/hr) and increase at 30 minutes intervals with the following incremental regime. Titrate against the uterine contraction aiming for a maximum of 4 in 10 minutes.

INCREMENTAL REGIME USING SYRINGE DRIVER	
OXYTOCIN DOSE (MU/MIN)	**INFUSION RATE (ML/HR)**
1	0.3
2	0.6
4	1.2
6	1.8
8	2.4
10	3.0
12	3.6
If requirement exceeds 12 mU/min or 3.6 ml/hr, consult a Medical Officer.	
14	4.2
16	4.8
18	5.4
20	6.0
Maximum recommended dose by the manufacturer is 20 mU/min. **A dose greater than this can only be administered after review by a Specialist/Consultant.**	
22	6.6
24	7.2
26	7.8
28	8.4
30	9.0
Maximum 30 mU/min	

Note: Dilutions of oxytocin regime may vary according to local hospital standard operating procedure. Caution must be taken not to exceed safety limits of oxytocin induction/augmentation regime.

OXYTOCIN INDUCTION/AUGMENTATION REGIME

Infusion via Volumetric Infusion Pump (only when Syringe Driver is not available)

Dilution:
Dilute 10 units of Oxytocin (Pitocin®) in 500mls of normal saline 0.9% or Hartmann's solution.

Rate:
Start at 1 mU/min (3 ml/hr) and increase at 30 minutes intervals with the following incremental regime. Titrate against the uterine contraction aiming for a maximum of 4 in 10 minutes.

INCREMENTAL REGIME USING VOLUMETRIC INFUSION PUMP	
OXYTOCIN DOSE (MU/MIN)	**INFUSION RATE (ML/HR)**
1	3
2	6
4	12
6	18
8	24
10	30
12	36
If requirements exceed 12 mU/min or 36 ml/hr, consult a Medical Officer.	
14	4.2
16	4.8
18	5.4
20	6.0
Maximum dose by the manufacturer is 20mU/min. **A dose greater than this can only be administered after review by a Specialist/Consultant.**	
22	66
24	72
26	78
28	84
30	90
Maximum 30 mU/min	

Note: Dilutions of oxytocin regime may vary according to local hospital standard operating procedure. Caution must be taken not to exceed safety limits of oxytocin induction/augmentation regime.

ANTIBIOTICS PROPHYLAXIS IN LABOUR AND DELIVERY

CONDITION	TYPES OF ANTIBIOTICS (DOSAGE AND ROUTE)	REMARKS
Caesarean Section	A single dose of IV broad-spectrum antibiotics (e.g. IV Cefazolin 2 g).	Timing of administration should be within 60 minutes before the skin incision. If the woman is already on antibiotics, then the most recent dose should have been administered within 60 minutes prior to the skin incision. BMI > 30 kg/m^2 may require a weight-adjusted dose. In a complicated caesarean section with massive PPH, a second dose of IV Cefazolin 1g can be given after 4 hours. Preferred antibiotics may change from time to time.
Manual removal of placenta	A single dose of IV Ampicillin 2 g.	May vary according to local hospital protocol.
3rd & 4th degree perineal tears	A single dose of IV broad-spectrum antibiotics (e.g. IV Cefuroxime 1.5g)	Antibiotics can be continue up to 1 week if there is concerns of fecal contamination (T. Cefuroxime 500mg BD and T. Metronidazole 400mg TDS) May vary according to local hospital protocol.
Instrumental deliveries	A single dose of IV Augmentin 1.2 g or IV Clindamycin 900 mg stat can be given instead in women with penicillin allergy.	Timing should be within one hour of delivery in women without any contraindications.

CONDITION	TYPES OF ANTIBIOTICS (DOSAGE AND ROUTE)	REMARKS
Preterm labour	IV Ampicillin 2 g stat and 1 g 4 hourly until delivery or IV Benzylpenicillin 3 g stat and 1.5 g 4 hourly until delivery or IV clindamycin 900 mg stat then 8 hourly in women with penicillin allergy)	In established preterm labour, antibiotics should be started to cover for Group B streptococcus as the rate of GBS infection in preterm labour is much higher.
Pre-labour Rupture of Membranes (PROM)	IV Ampicillin 2 g stat and 1 g 4 hourly or IV Benzylpenicillin 3 g stat and 1.5 g 4 hourly until delivery or IV Clindamycin 900 mg stat then 8 hourly in women with penicillin allergy.	Antibiotics are started after 12 hours of leaking liquor if the woman is still undelivered. Different hospitals may have different thresholds for starting antibiotics in women with leaking liquor, depending on their paediatric counterparts.
Preterm Pre-labour rupture of membranes (PPROM)	Conservative: T.Erythromycin Ethylsuccinate 400 mg BD for 10 days. Intrapartum: IV Ampicillin 2 g stat then 1 g 4 hourly till delivery.	Consider delivery if the woman is still leaking after 36 weeks.
Ragged membranes	Antibiotics are not routinely required.	The woman should be advised regarding the slight risk of endometritis and counseled about the signs & symptoms of endometritis.

CONDITION	TYPES OF ANTIBIOTICS (DOSAGE AND ROUTE)	REMARKS
Prophylaxis against Infective Endocarditis	IV Ampicillin 2g and IV Gentamicin 1.5 mg/kg (max 120 mg) stat.	Timing of administration should be within 60 minutes to caesarean section or at the onset of ruptured membranes. Give a second dose 6 hours after the first dose.
	IV Vancomycin 1 g over 1 hour plus IV Gentamicin 80 mg stat.	For patient with allergies to penicillin or if there is enterococcus concern. Give a second dose 6 hours later.
Cervical cerclage	No role for antibiotics.	-
Recurrent UTI or pyelonephritis (more than 2 episodes)	Consider prophylactic antibiotics with T. Cephalexin 250 mg OD.	Prophylactic antibiotics continued until delivery.

Note: The preferred or suitable antibiotics may change from time to time based on hospital-based antibiotics resistance surveillance.

COMMON DRUGS AND DOSAGES IN PREGNANCY

1. Timing of exposure
   a. Pre embryonic phase (*from conception to day 17 post conception*)
      All or nothing phenomenon". Insult could lead to death, miscarriage/resorption or intact survival.

   b. Embryonic phase (*day 18 post-conception to day 55*)
      Crucial period of organogenesis. The earlier the insult, the greater the effect. Insults could lead to congenital malformations.

   c. Fetal phase (*from 8 weeks to term*)
      Impact depends on placental transfer. No association with structural malformations.

2. Basic principles:
   a. Medications should only be prescribed for clear indications when the benefit outweighs the risk.
   b. Medications should be used in the smallest effective dose for the shortest period of time.
   c. If possible, try to avoid medications in the first trimester.
   d. Only use medications that have been proven to be safe in pregnancy.
   e. If unsure, contact the pharmacist or specialist for clarification.

Avoid polypharmacy where possible!

3. Drugs to Be Avoided in Pregnancy

ABSOLUTE CONTRAINDICATION
Antifungal drugs
Griseofulvin
Ketoconazole
Itraconazole
Fluconazole
Terbinafine
Anti-inflammatory drugs
NSAIDS (3rd trimester)
COX-2 inhibitors
Colchicines
Antihelminthic drugs
Mebendazole
Cardiovascular drugs
ACE inhibitors
Angiotensin II receptor inhibitors
Spironolactone
Cytotoxic drugs
Methotrexate
Cyclophosphamide
Busulphan
Vitamin A analogues
Acitretin
Isotretinoin
Endocrine drugs
Radioactive Iodine
Sex hormones
Octreotide
Other drugs
Thalidomide
Mefloquine
Bisphosphonates
Statins and fibrates
Tamoxifen
Nicotine
Mycophenolate mofetil
Live vaccines
MMR, Sabin, Varicella

RELATIVE CONTRAINDICATION
Antibiotics
Tetracycline
Ciprofloxacin
Aminoglycosides
Chloramphenicol
Trimethoprim (1st trimester)
Nitrofurantoin (near term)
Dapsone (3rd trimester)
Endocrine drugs
Carbimazole
Chlorpropamide
Psychotropic drugs
Lithium
Cardiovascular drugs
Beta blockers
Minoxidil
Diuretics
All diuretics
Anticoagulant
Warfarin
Anticonvulsants
Phenobarbitone
Phenytoin
Sodium valproate
Carbamazepine
Lamotrigine

4. Dosage of Medications in Obstetrics

A. Uterotonic agents

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
Oxytocin (1 amp = 10 IU/ml)	**Augmentation for Labour** **IV Infusion** Standard dilution (10 IU / 50 ml of NS) Start at 1 mIU/min or 0.3 ml/ hour (Titrate every 30 minutes – maximum 9 ml/hour or 30 mIU/min) **Management of PPH** **Bolus** IM 10 IU / IV 5 IU (may repeat every 5 minutes – maximum 10-20 IU) **IV Infusion** Standard dilution (40 IU / 500 ml of NS) Start at 125 ml/hour (infusion over 4 hours)	Fetal compromise, Uterine hypertonicity, Cephalopelvic disproportion, Hypersensitivity to oxytocin	Water intoxication, hyponatremia, nausea, vomiting, arrhythmias, anaphylaxis
Oxytocin/ Ergometrine (1 amp = 5 IU oxytocin + 0.5 mg ergometrine/1 ml	IM 1 ampoule (Repeat every 5 minutes, maximum of 5 ml (5 amp)/24 hours IV not recommended	Cardiac diseases Hypertensive crisis PET	Nausea, vomiting, headache, dizziness, tinnitus, abdominal pain.
Carboprost (1 amp = 250 µg/1ml)	Deep IM 250 µg *(Repeat every 15 min – max dose 2 mg (x8))*	Cardiac, renal or hepatic disease, caution in glaucoma, asthma, hypertension, Epilepsy	Nausea, vomiting, diarrhoea, hyperthermia, flushing, bronchospasm
Carbetocin (1 amp = 100 µg/1ml) Long-acting synthetic oxytocin	IV 1 ampoule administered via bolus injection over 1 minute.	Hepatic,renal disease Hypersensitivity to oxytocin or carbetocin.	Nausea, vomiting, flushing, abdominal pain, pruritus, headache

B. Prostaglandins

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
Gemeprost (1 pessary = 1 mg) *Cessation of production by the manufacturer globally in 2022.*	1 mg vaginally x 3 hourly (Maximum 5 pessaries per day)	Unexplained bleeding, previous caesarean, placenta praevia, obstructive airway disease, cardiovascular insufficiency, raised intraocular pressure	Bleeding, pain, nausea, vomiting, diarrhoea, headache, weakness, chills, flushing
Prostin E2 (1 tab = 3 mg)	3 mg vaginally x 6 hourly (Maximum 2 pessaries per day)	Use with caution in cases with underlying: Cardiac diseases Hypertensive crisis PET, CPD, previous uterine surgery	Nausea, vomiting, headache, dizziness, tinnitus, abdominal pain
Misoprostol (1 tab = 200 ug) *Approved to be used as Ubat Kelulusan Khas (UKK) circa November 2022. (Individual unit/ department need to apply for approval to import the drug)*	Dosing depends on indication. It can be administered orally or as a vaginal pessary. *Please refer "Appendix: Use of misoprostol in the medical management of miscarriage and termination of pregnancy" available in this guideline.*		

C. Hypertensive crisis

1. IV labetalol should be the first-line management provided there are no contraindications.
2. A small subgroup of the population is resistant to labetalol; if there is no response after 3 bolus doses, consider conversion to hydralazine.
3. Avoid sublingual nifedipine.

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
Labetalol (1 amp = 25 mg/ 5ml)	**Bolus** 1st dose: 25 mg (5 ml); given in 2 minutes. 2nd dose: 50 mg; given in 2 minutes if BP is ≥ 160/110 mmHg 30 minutes after the 1st bolus. 3rd dose: 50 mg may be given if SBP is ≥ 180 mmHg 30 minutes after the 2nd bolus and rapid BP control is desired. **IV Infusion** Use pure labetalol (25 mg/5 ml) and start infusion at 4 ml/ hr (20 mg/hr). Titrate every 30 minutes by 4 ml. Maximum 32mls/hr (160mg/hr)	Bronchial Asthma, congestive cardiac failure, AV heart block	Hypotension, sweating, headache, ankle oedema, nasal congestion, dizziness, tiredness
Hydralazine a) Nepresol (1 amp = 25 mg/2 ml)	**Bolus** Dilute 1 amp + 8 ml water (1 ml = 2.5 mg) Give 5 mg (2 ml) slow bolus Repeat at 30 minutes interval (Maximum of 2 boluses) **IV infusion** Infusion pump 2 amp Nepresol (50 mg) + 46 ml NS (1 ml/1 mg) Start at 1 ml/hour and titrate by 1 ml/hr every 30 minutes (Maximum 10 ml/hr)	Idiopathic SLE, Heart failure, tachycardia, thyrotoxicosis, dissecting aneurysm, aortic or mitral stenosis	Tachycardia, palpitations, flushing, angina symptoms, headache, dizziness, GI disturbances

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
b) Apresoline (1 amp = 20 mg/1 ml)	**Bolus** Dilute 1 amp + 9 ml water (1 ml =2 mg) Give 5mg (2.5 ml) slow bolus Repeat at 30 minute intervals (Maximum of 2 boluses) **IV infusion** Syringe pump 2 amp Apresoline (40 mg = 2ml) + 38 ml NS (1 ml/1 mg) Start at 1 ml/H and titrate by 1 ml/hr every 30 minutes (Maximum 10 ml/hr)		
Nifedipine (1 tab = 10 mg)	PO 10 mg STAT Repeated dose of 10mg can be given 30 minutes later if BP is ≥ 160/110mmHg Total dosage should not exceed 20mg (a total of 2 doses)	Hepatic dysfunction, GI obstruction, inflammatory bowel disease.	Headache, flushing, heat sensation, tachycardia, palpitations, hypotension, dizziness
Glyceryl trinitrate (1 amp = 50 mg/10 ml)	**IV Infusion** Syringe pump 2 mls (10 mg) + 48 mls NSD5% to get 200 mcg/ml OR Infusion pump 10 mls (50mg) + 240 mls NSD5% to get 200 mcg/ml Starting dose of 5 – 10 mcg/min (1.5 – 3 ml/hr). Titrate at a rate of 5 – 10 mcg/min (1.5 – 3 ml/hr) every 5 – 10 minutes (maximum 200 mcg/min or 60 ml/hr)	Cardiomyopathy, aortic or mitral stenosis, conditions with increased intracranial pressure, closed angle glaucoma, hepatic or renal dysfunction.	Headache, flushing, dizziness, nausea, tachycardia.

D. Eclampsia

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
Magnesium Sulphate (1 amp = 2.47 g/5 ml)	**Loading dose** **IV** : IV 4 g $MgSO_4$ (8 ml) + 12 ml of NS given over 15 – 20 min OR **IM** : IM 5 g (10 ml) + 1 ml LA each buttock (Total 10 g) + IV 4 g $MgSO_4$ (8 ml) + 12 ml of NS given over 15 – 20 min **Recurrent fits** **IV** – Repeat IV 2 g $MgSO_4$ (4 ml) + 8 ml NS over 15 min OR **IM** – Repeat IM 5 g $MgSO_4$ + 1 ml LA **Maintenance** **IV** - 24.7 g (10 amp = 50 ml) + 450 ml NS run at 21 ml/H (1 g /H) (**Volumetric infusion**) OR **IV** - 5 g (2 amp = 10 ml) + 40 ml NS run at 10 ml/H (1 g /H) (**Syringe Driver**) OR **IM** – 5 g $MgSO_4$ (10 ml) + 1 ml LA every 4 hours in alternate buttock	Heart block, renal failure, myasthenia gravis	Nausea, vomiting, flushing, hypotension, muscle weakness, blurring of vision, diplopia, loss of reflexes, CNS depressions, respiratory depression, cardiac arrest, coma
Diazepam (1 amp = 10 mg/2 ml) (1 tab = 5mg/10mg)	**Bolus** IV 10 mg over 2 min **Rectal** 10 mg (Tablet)	Myasthenia gravis, severe liver disease, narrow- angle glaucoma, severe breathing problem, or sleep apnea	Drowsiness, feeling tired, muscle weakness
Calcium gluconate (1 amp = 10 ml = 1g) $MgSO_4$ Antidote	1 g Calcium gluconate (10 ml of 10% solution = 1 amp) Slow bolus over 10 min	Hypercalcemia disorders	Constipation, dry mouth, increased thirst

E. Tocolysis

Salbutamol and ritodrine infusions are not recommended as first-line for tocolysis in view of the adverse effects.

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
Nifedipine (1 tab = 10 mg)	**Loading** 20mg every 30 minutes x 3 doses **Maintenance** 20 mg TDS for 48 hours	Hepatic dysfunction, GI obstruction, inflammatory bowel disease	Headache, flushing, heat sensation, tachycardia, palpitations, hypotension, dizziness, paraesthesia
Salbutamol sulphate (1 amp = 0.5 mg/1 ml) *For hyperstimulation/ External Cephalic Version (ECV)*	Dilute 1 ampoule in 9 ml of normal saline. Label syringe as 50 µg per ml. Inject 2 ml (100 µg) by slow IV.	Placenta praevia, abruption, antepartum haemorrhage	Tachycardia, hypotension, nausea, vomiting, headache, hyperglycaemia, hypokalemia
Atosiban (1 vial = 37.5mg/5mls)	A minimum of 4 vials of atosiban is required for one course of treatment. To be given in 3 steps: **Step 1: Slow bolus over 1 minute.** Dose: 6.75mg Preparation: Withdraw 0.9mls of undiluted atosiban = 6.75mg **Step 2: High dose loading infusion over 3 hours.** Dose: 54mg Preparation: Withdraw 4mls (balance from the 1st vial) + 5mls (2nd vial) = 9mls. Add this 9mls of atosiban to 81 mls of normal saline in a microchamber. Withdraw 18mls of the solution and put aside for Step 3 later. Then now give the remaining 72mls at 24mls/H(18mg/H)	Use with caution in women with liver disease	Hyperglycaemia, headache/ dizziness, tachycardia, hypotension, nausea, vomiting, fever(rare), rash(rare)

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
	Step 3: Low dose maintenance infusion over 15 hours. Dose: 88.5mg Preparation: Add 18mls of the solution from Step 2 just now to 10mls of undiluted atosiban (3rd vial and 4th vial) =28mls of solution. Add in 62mls of normal saline in a microchamber = 90mls of solution. To give this solution infusion at 6mls/H(6mg/H). Low dose atosiban infusion can be prolonged up to 45 hours if continuous suppression is needed.		

F. Anticoagulant

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
1. Heparin (1000 units/ml)	1)Bolus – SC 5000 IU (75 units/kg) followed by BD dosing 2) Infusion (IV) Start at 1000 IU/H (25000 IU heparin in 50 ml 5% Dextrose or NS (500 IU/ml) – titrate based on APTT levels	Bovine-based Relatively inexpensive Advantages: Shorter half life (4 hours) and more complete reversal of activity with protamine sulphate. Contraindicated in: Haemophilia, haemorrhagic disorders, thrombocytopenia, recent cerebral haemorrhage, liver disease, peptic ulcer disease, major trauma	Allergic reactions, thrombocytopenia, osteoporosis, haemorrhage, hyperkalemia, alopecia, urticaria, rebound hyperlipidaemia
2. Low molecular weight heparin a) Enoxaparin Sodium 100 mg/ml 40 mg = 0.4 ml 60 mg = 0.6 ml	**Prophylactic dose** S/C 20 mg OD (below 50 kg) S/C 40 mg OD (50 – 90 kg) S/C 60 mg OD (91 – 130 kg) S/C 80 mg OD (131 – 170 kg) S/C 0.6 mg/kg/day (> 170 kg) **High prophylactic dose** S/C 40 mg BD **Treatment dose** 1 mg/kg 12 hourly (antenatal) & 1.5 mg/kg/daily (postnatal)	Porcine-based Relatively high cost Advantages: Effective and safer than unfractionated heparin. Anti-Xa monitoring is not required. Contraindicated in: Known hypersensitivity to Enoxaparin, active major bleeding event.	Haemorrhage, bruises, allergic reactions

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
b) Nadroparin Calcium 9500 IU/mL 2850 IU = 0.3ml 3800 IU = 0.4ml 5700 IU= 0.6ml 9500 IU = 1.0ml	**Prophylactic dose** S/C 2850 IU OD (<100kg) S/C 3800 IU OD (>100kg) **Treatment dose** 86 IU/kg BD or 171 IU/kg OD	Porcine-based Relatively high cost Advantages: Effective and safer than unfractionated heparin. Anti-Xa monitoring is not required. Contraindicated in Known hypersensitivity to nadroparin, haemorrhagic cerebrovascular accident, severe renal impairment (creatinine clearance less than 30 ml/min)	Haemorrhage bruises, allergic reactions
c) Fondaparinux (5 mg/ml)	**Prophylactic dose** S/C 2.5 mg OD **Treatment dose** S/C 5.0 mg OD	Synthetic pentasaccharide Safety/efficacy in pregnancy is not proven. Long half life (18 hours). No antidote available. To be considered in cases with heparin hypersensitivity or heparin induced thrombocytopenia cases. Fondaparinux use in pregnancy should be in conjunction with a consultant haematologist with expertise in haemostasis and pregnancy.	Haemorrhage, bruises, allergic reactions

G. Medical disorders in pregnancy

1. Hypertension/Pregnancy Induced Hypertension (PIH)

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
Methyldopa (1 tab = 250 mg)	PO 250 mg – 1g TDS (Maximum dose 3 g/day)	Active/acute liver disease, To be discontinued after delivery (can potentially cause postpartum blue)	Sedation, headache, asthenia, haemolytic anaemia, drug fever, rash
Labetalol (1 tab = 100 mg or 200 mg)	PO 100 – 400 mg TDS (Maximum dose 2400 mg/ day)	Bronchial Asthma Congestive cardiac failure AV heart block	Headache, dizziness, tiredness, nasal congestion, sweating, ankle oedema
Nifedipine (1 tab = 10mg)	PO 10 mg TDS (Maximum dose 20 mg TDS)	Hepatic dysfunction, GI obstruction, inflammatory bowel disease	Headache, flushing, heat sensation, tachycardia, palpitations, hypotension, dizziness, paraesthesia
Prazosin (1 tab = 1mg)	PO 1 mg TDS (Maximum dose 5mg TDS) *Other antihypertensive medications with better safety profile should be used first in pregnancy before resorting to Prazosin.*	Angina pectoris	Headache, drowsy, nausea, palpitations, orthostatic hypotension
Aspirin (1 tab = 300 mg) Weight: >40kg	PO 150 mg ON	Active peptic ulcer disease, haemophilia	Bronchospasm, asthmatic attack, GI haemorrhage
Cardiprin (1 tab = 100mg) Weight: <40kg	PO 100mg ON	Active peptic ulcer disease, haemophilia	Bronchospasm, asthmatic attack, GI haemorrhage
Calcium carbonate* (1 tab = 500 mg)	PO 1 g BD – QID	Conditions associated with hypercalcaemia & hypercalciuria	GI disturbances, bradycardia, arrhythmias

** Calcium lactate has a bioavailability of only 9%, and the usual dosage will never achieve the desired levels.*

2. Hypertension in Postnatal Period

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
Amlodipine (1 tab = 10mg)	PO 5-10 mg OD (Max 10 mg/day)	Heart failure	Nausea, dizziness, headache, upset stomach, swelling of lower limbs
Enalapril (1 tab = 10mg)	PO 5-10mg (Maximum 40mg/day)	Aortic valve stenosis, renal artery stenosis, renal impairment	Dizziness, cough, palpitations
Captopril (1 tab= 12.5mg)	PO 12.5-25 mg TDS (Maximum 450 mg/day)	Aortic valve stenosis, renal artery stenosis,renal impairment, hyperkalemia	DIzziness, cough, palpitations
Atenolol (1 tab = 50mg)	PO 25-50 mg OD (Maximum 100mg/day)	Heart block, asthma, sinus bradycardia, sinus node dysfunction, pulmonary edema	Nausea, vomiting, dizziness, upset stomach
Metoprolol (1 tab = 50mg)	PO 50mg BD (Maximum 450 mg/day)	Heart block, asthma, sinus bradycardia, sinus node dysfunction, pulmonary edema	Dizziness, tiredness, depression, diarrhea

3. Cardiac

Adenosine, verapamil, propranolol and atenolol are safe while amiodarone is contraindicated in pregnancy.

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
Warfarin (1 tab = 1, 2, 5 mg) *Antidote: Oral/parenteral Vitamin K*	PO based on target INR	Hemorrhagic tendencies, recent surgery	Warfarin embryopathy (2%), haemorrhage, hypersensitivity

4. Diabetes

Metformin and Glibenclamide are considered safe in pregnancy although there is a paucity of data on the possible long-term implications.

NAME	DOSAGE & ROUTE	MECHANISM OF ACTION	SIDE EFFECTS
Insulin **Ultra short-acting**	Administer immediately before meals	Onset: 12 – 30 min Peak: 0.5 – 3 H Duration: 3 – 5 H	Hypoglycaemia Localized allergic reaction
Short-Acting	Administer 30 minutes before meals (used for sliding scale)	Onset: 30 min Peak: 2.5 – 5 H Duration: 4 – 24 H	
Intermediate-acting	Administer once or twice a day	Onset: 1 – 2 H Peak: 4 – 12 H Duration: 4 – 24 H	
Long-acting	Administer once or twice a day	Onset: 3 – 4 H Peak: Not seen Duration: ≥ 24 H	
Metformin (1 tab = 500 mg/850 mg)	PO 500 mg OD/BD/TDS (Max 2 g daily)	Diabetic coma, impaired renal/liver function, recent MI, lactic acidosis	Insulin Ultra short-acting
Glibenclamide (1 tab = 5 mg)	PO 2.5 – 5 mg/day (Max 10 mg bd)	Renal/liver impairment, type 1 DM, diabetic ketoacidosis, use with Bosentan	GI disturbances, lactic acidosis, weight loss

5. SLE & Connective tissue diseases

- Mycophenolate Mofetil (MMF), cyclophosphamide, methotrexate and chlorambucil are **contraindicated** in pregnancy.
- Azathioprine is **safe** in pregnancy. Maternal white cell count may be used for monitoring.
- Cyclosporine and tacrolimus are also **safe** in pregnancy.

6. Respiratory
   - "Aspirin sensitivity" – women with asthma should be asked regarding aspirin sensitivity.
   - Prostaglandin E2 should be avoided in severe acute asthma.

NAME	DOSAGE & ROUTE	SIDE EFFECTS
Prednisolone (1 tablet = 5 mg)	PO 1 mg/kg Up to 60 mg daily	Dyspepsia, peptic ulceration, abdominal distension, ulceration, candidiasis, musculoskeletal effects, Cushing's syndrome, euphoria, striae, bruising
Hydrocortisone (1 ml = 100 mg)	IV 200 mg stat & 100 mg 3 – 4 times in 24 hours	Similar as above
Salbutamol sulphate (1 amp – 1 ml = 0.5 mg)	IV/SC bolus 0.5 mg Repeat every 4 hours Aerosol 100 – 200 µg up to 2 hourly	Tachycardia, hypotension, nausea, vomiting, headache, hyperglycaemia, hypokalemia

7. Thyroid diseases
   - Women with thyroid diseases should continue their pre-existing medications until they are reviewed by a physician.
   - L-Thyroxine is safe in pregnancy, and the dose may need to be increased in pregnancy due to increased demands.
   - Both PTU and carbimazole have potential teratogenic effects (2 – 4%).
   - In the first trimester, PTU is preferred over carbimazole. However, the decision to switch between medications should be made by a physician on a case by case basis.
   - Thyroid function tests should be done 6 – 8 weekly throughout pregnancy (those on treatment, TFT may be done 4 weekly)
   - Women must be informed that the benefits of anti-thyroid medications outweigh the risks of thyrotoxicosis/thyroid storm in pregnancy.
   - It is safe to breastfeed on PTU, carbimazole and thyroxine.

NAME	DOSAGE & ROUTE	SIDE EFFECTS
Propylthiouracil *(D)* (1 tablet = 50 mg)	PO 200 – 400 mg daily in 2 – 3 divided doses then titrate accordingly.	Neonatal goiter and hypothyroidism, face and neck cysts, urinary tract abnormalities in male babies. Maternal hepatitis, neutropenia, vasculitis, aplastic anemia, thrombocytopenia, lupus-like syndrome.
Carbimazole *(D)* (1 tablet = 5 mg, 10 mg)	PO 20 – 60 mg in 2 – 3 divided doses (during initiation). PO 5 – 15 mg daily for maintenance.	Neonatal goiter and hypothyroidism, aplasia cutis, choanal/esophageal atresia, abdominal wall defects, eye, urinary system and VSD. Maternal neutropenia, agranulocytosis, urticaria rash.
Propranolol *(C) & (D) in the 2nd & 3rd trimester* (1 tab = 40 mg)	PO 40 mg TDS. Discontinue once there is clinical improvement.	No harm to the fetus in short term use. Maternal bradycardia, hypotension.
Thyroxine *(A)* (1 tablet = 50 µg, 100 µg)	PO 100 – 200 µg /day.	Tachycardia, tremor, headache, flushing, sweating.

8. Neurological

- Never stop anti-epileptic drugs without consulting a physician/neurologist.
- The risk of congenital abnormalities in the fetus depends on the type, number and dose of AEDs (Anti-epileptic drugs).
- Phenytoin, phenobarbital, carbamazepine, lamotrigine, sodium valproate, topiramate all cross the placenta and are potentially teratogenic.
- Newer anticonvulsants such as levetiracetam and gabapentin are not teratogenic in animals.
- Women with epilepsy who are planning to get pregnant should inform their doctors to allow switching to a pregnancy-friendly anti-epileptic drug prior to conceiving. Aim for monotherapy and the lowest dose with adequate seizure control.
- Phenytoin, primidone, carbamazepine and phenobarbitone are hepatic enzyme inducers. COCP may not be suitable for women on these drugs.

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
Hepatic enzymes inducer: **Phenytoin (D)** (1 tablet = 100 mg)	PO 300 – 400 mg daily in 3 or 4 divided doses	AV block, hepatic disease	Nystagmus, ataxia, slurred speech, confusion, gingival hyperplasia, nausea, vomiting, fetal hydantoin syndrome
Carbamazepine(D) (1 tablet = 200 mg)	PO 600 mg/day		Dizziness, dry mouth, GI disturbance
Sodium Valproate (D) (1 tablet = 200 mg)	PO 1000 – 2000 mg/day	Active liver disease	Liver dysfunction, GI disorders, weight gain
Lamotrigine (C) (1 tablet = 100 mg)	PO 100 – 200 mg daily in 1 or 2 divided doses	Avoid abrupt withdrawal. Renal & liver failure.	Rash, GI disturbances, headache, nausea, dizziness, hallucination
Folic Acid (A)	5 mg preconception up to 12 weeks of pregnancy		

9. Dermatology

- Topical steroid, emollients and coal tar are safe in pregnancy.
- Tetracycline and retinoids are contraindicated in pregnancy.

10. HIV

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
Zidovudine (AZT) (1 tab = 100 mg) (Retrovir) (1 amp = 200 mg/20 ml) **Combivir** (1 tablet = 300 mg Zidovudine + 150 mg lamivudine)	PO 500 – 600 mg daily in divided doses <u>Infusion (prior to LSCS)</u> 2 mg/kg infusion 3 hours prior to LSCS	Anaemia, abnormal liver function	Anaemia, taste disturbances, chest pain, influenza like symptoms
Didanosine (1 tablet = 200 mg)	PO 250 – 400 mg in 1 – 2 divided doses	Pancreatitis, peripheral neuropathy, lactic acidosis, lipodystrophy	Pancreatitis, diabetes, liver failure, anaphylactic reactions, rhabdomyolysis
Lamivudine (3TC) (1 tablet = 150 mg)	PO 150 mg BD or 300 mg OD	Hepatitis	Peripheral neuropathy, rhabdomyolysis, nasal symptoms
Kaletra (1 tab = 133.3 mg of lopinavir & ritonavir 33.3 mg)	3 capsules BD	Pancreatitis, prolong QT interval	Electrolyte disturbances
Efavirenz (1 tab = 50 mg/600 mg)	PO 200 – 600 mg daily	Chronic hepatitis, history of seizures, renal impairment	Rash, Steven-Johnson Syndrome, GI symptoms, fatigue, sleep disturbances, impaired concentration
Nevirapine (1 tab = 200 mg)	PO 200 mg OD/BD 400 mg OD	Chronic hepatitis, liver impairment	Rash, Steven-Johnson Syndrome, nausea, hepatitis, toxic epidermal necrolysis, headache

11. Gastrointestinal

Proton pump inhibitors are safe in pregnancy.

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
Antihistamines: **Promethazine** (1 tab = 10 mg) **Cyclizine** (1 tab = 50 mg)	PO 10 – 20 mg BD/TDS PO 50 mg TDS	Epilepsy, urinary retention, glaucoma, renal impairment, heart failure	Drowsiness, headache, dry mouth, urinary retention, GI disturbances
Phenothiazines: **Chlorpromazine** (1 tab = 25 mg) **Prochlorperazine** (stemetil) (1 tab = 5 mg)	PO 10 – 25 mg TDS PO 5 – 10 mg BD/TDS	Epilepsy, urinary retention, glaucoma, renal impairment, heart failure	Sedation, hypotension extrapyramidal symptoms (dystonia), respiratory depression
Metoclopramide (1 tab = 10 mg)	PO 5 – 10 mg TDS IM/IV 5 – 10 mg 8 hourly	GI obstruction, perforation or haemorrhage	Extrapyramidal side effects, hyperprolactinemia, tardive dyskinesia, drowsiness, rash
Pyridoxine (Vit B6) (I tab = 10 mg)	PO 10 – 25 mg TDS	Allergy to pyridoxine	Headache, nausea, drowsiness, numbness, tingling of arms/legs
Thiamine (Vit B1) (1 tab = 10 mg)	PO 10 – 25 mg OD	Allergy to thiamine	Anaphylactic shock if given IV
Ondansetron (5HT3 antagonist) (1 tab = 4 mg) (1 amp – 2 ml = 4 mg)	PO 8 mg BD IV 8 mg bolus	Prolonged QT interval, hepatic dysfunction	Constipation, headache, hiccups, hypotension, arrhythmia, movement disorders

12. Analgesia

NAME	DOSAGE & ROUTE	CONTRAINDICATIONS	SIDE EFFECTS
Epidural medications: **A) Bupivacaine** (8 – 10 ml of 0.25% solution) **B) Ropivacaine** (10 – 20 ml of 2 mg/ml solution) **C) Lidocaine/ Lignocaine** (8 – 10 ml of 1.5% solution)	20 – 25 mg 20 – 40 mg Continuous infusion: 6 – 14 ml/H of 2 mg/ml solution Dosage : 12 – 28 mg/H 120 – 150 mg	Systemic infections, bleeding tendencies, spinal deformities	Postdural puncture headaches, restlessness, tremors, convulsions, perioral numbness, paraesthesia, hypotension, bradycardia, arrhythmia, hypersensitivity
Local anaesthetic agents: Lidocaine/Lignocaine (1% solution-1ml=10mg)	Local infiltration, pudendal block Max dose: 3 mg/kg E.g: 70 kg patient. 70kg x3mg =210mg.	Heart block, heart failure, arrhythmia, myasthenia gravis	Toxicity
Opioids: **1) Pethidine** (1 amp = 50 mg/ml) **2) Tramadol** (Tramal) (1 tab = 50 mg) (1 vial = 50mg)	1) 50 – 100 mg IM/SC every 4 – 6 hours 2) 20 – 50 mg IV PO 50 mg TDS IV /IM/SC 50 mg TDS	Hypothyroidism, asthma, renal or hepatic failure Hypersensitivity, alcohol intoxication	Constipation, drowsiness, confusion, headache, hypotension, tachycardia, pruritus, flushing Nausea, vomiting, dizziness, dry mouth
NSAIDS: **Diclofenac Sodium** (Voltaren) (1 tab = 25 mg, 50 mg, 75 mg) (1 amp = 50 mg/2 ml) **Mefenamic Acid** (Ponstan) (1 tab = 250 mg)	PO 50 mg/75 mg TDS IM 50 mg TDS Supp 100 mg BD PO 500 mg TDS	Third trimester, severe PET, upper GI bleed, renal impairment, asthmatic	Nausea, vomiting, abdominal cramps, diarrhoea, GI bleed, bronchospasm

13. Antibiotics

- The Penicillin and Cephalosporin group of antibiotics are generally safe in pregnancy.
- Aminoglycosides, chloramphenicols, quinolones, tetracyclines and antifungal medications are best avoided in pregnancy.
- Antibiotics should only be initiated if there are clear indications and benefits, especially in women with intact membranes.

NAME	DOSAGE & ROUTE	SIDE EFFECTS
Erythromycin Ethyl Succinate (1 tablet = 400 mg)	PO 400 mg BD	GI side effects Abnormal liver function
Cefalexin (1 tab = 250 mg)	PO 250 – 500 mg BD Prophylaxis dose 250 mg OD	GI disturbances
Cefuroxime (1 tab = 250 mg) (1 vial = 750 mg)	PO 250 – 500 mg BD IV 750 mg – 1.5 g TDS	GI disturbances, diarrhoea, vomiting, nausea, rash, drug fever, anaphylaxis
Cefoperazone (1 vial = 1 g)	IV 1 – 2 g BD	Hypersensitivity, Vit K deficiency, neutropenia
Ampicillin (1 capsule = 250 mg) (1 vial = 500 mg)	PO 250 – 500 mg TDS IV 500 mg – 2 g 4/6 hourly	Nausea, vomiting, diarrhoea, rash, colitis
Metronidazole (I tab = 200 mg) (1 vial – 100 ml=500 mg)	PO 200 – 400 mg TDS IV 500 mg TDS	Avoid alcohol or in porphyria patients, GI & taste disturbances, mucositis
Clavulanic Acid/ Amoxicillin (1 tab = 625 mg) (1 vial = 600 mg)	PO 625 mg BD/TDS IV 1.2 g TDS	Diarrhoea, nausea, vomiting, colitis, rash
Sulbactam/Ampicillin (1 tab = 375 mg) (1 vial = 0.75 g/1.5 g)	PO 375 mg – 750 mg BD IM/IV 1.5 g TDS	Diarrhoea, abdominal cramps, nausea, rash, itching
Doxycycline (1 tab = 100 mg)	PO 100 mg BD	GI effects, rash, hypersensitivity
Ceftriaxone (1 vial = 1 g)	IV/Deep IM 1 – 2 g daily	Urine & gall bladder precipitates, pancreatitis, prolongation of PT
Azithromycin (1 tab = 250 mg)	PO 1g STAT (STD) PO 500 mg OD x 3/7	GI disturbances, hearing impairment, taste disturbances, dizziness, vertigo, rash

14. Antiviral

NAME	DOSAGE & ROUTE	SIDE EFFECTS
Aciclovir (1 tab = 200 mg/400 mg)	Varicella infection PO 800 mg 5 times daily x 5/7 Herpes PO 200 mg 5 times daily or PO 400 mg TDS x 5/7	GI side effects, abdominal pain, rash, pruritus
Oseltamivir (1 tab = 75mg)	Influenza A and B PO 75mg BD x 5/7	GI side effects, abdominal pain, nausea and vomiting

15. Supplements

NAME	DOSAGE & ROUTE
Folic acid (1 tab = 5 mg)	Low-risk pregnancies 400 µg OD - oral High-risk pregnancies 5 mg OD - oral *(Periconception and up to 12 weeks of pregnancy)*
Vitamin D (1 tab = 10 µg/400IU)	PO 10 µg/day for all women PO 20 µg/day for women at high risk of PE
Calcium Carbonate (1 tab = 500 mg)	PO 1 g BD/QID
Ferrous Fumarate (1 tab = 200 mg)	PO 200 mg – 400 mg OD/BD
Ferrous Sulphate (1 tab = 200 mg)	PO 200 mg – 400 mg OD/BD

16. Other important medications

NAME	DOSAGE & ROUTE	SIDE EFFECTS
Cabergoline *(1 tablet = 0.5 mg)*	Lactation prevention – 1 mg x 1 dose Lactation suppression - 0.25 mg BD for 2 days (Total of 1mg)	Hypotension, dizziness, vertigo, headache, abdominal pain
Recombinant activated factor VII (Novo7) *(1 vial = 1 mg)*	IV infusion 60 – 120 µg/ kg over 3 – 5 min (consider repeating after 30 – 60 min)	Nausea, thrombotic events (MI or CVA), fever, pain, rash, allergic reaction
Dexamethasone *(1 amp = 8 mg/2 ml)*	IM 12 mg 12 hourly x 1/7 or IM 6 mg 12 hourly x 2/7	Hyperglycaemia, headache, dizziness, nausea, pain over injection site
To induce lactation **Metoclopramide** *(1 tab – 10 mg)* **Domperidone** *(1 tab – 10 mg)*	PO 10 mg TDS PO 10 mg TDS	GI obstruction, perforation or haemorrhage GI disturbances

H. Drug interactions

1. Drugs that decrease the effectiveness of COCP

Antibiotics Chloramphenicol Co-trimoxazole Penicillins Tetracyclines Sulphonamides Rifampicin	Anticonvulsants Phenobarbitone Phenytoin Carbamazepine
Antifungal Griseofulvin	Antiviral Nevirapine Ritonavir
Herbal remedies St John's wort	

2. Drugs whose clearance can be increased by COCP

Alprazolam Diazepam	Beta-blockers
Corticosteroids	Cyclosporin
Tricyclic antidepressants	Xanthines

3. Drugs whose effect can be decreased by COCP

Anticoagulants	Benzodiazepines
Lamotrigine	

USE OF MISOPROSTOL IN THE MEDICAL MANAGEMENT OF MISCARRIAGE AND TERMINATION OF PREGNANCY

Gemeprost (Cervagem) has previously been used for medical evacuation of missed miscarriage, medical termination of pregnancy and cervical preparation prior to instrumentation of the uterus. With the cessation of its production by the manufacturer globally, misoprostol, a synthetic analogue of prostaglandin E1 is now the alternative, having been approved to be used as ***Ubat Kelulusan Khas (UKK)*** by Ministry of Health's circa November 2022.

Indications

Medical management of miscarriage/fetal loss (up to 23+6 weeks of gestation)
Termination of pregnancy (<22+0 week of gestation)

Contraindications

- Hypersensitivity to Misoprostol or any other prostaglandin agent
- Underlying coagulation disorders
- Pelvic infection or sepsis
- Uncertainty about pregnancy viability
- Suspected or confirmed ectopic pregnancy
- Molar pregnancy
- Presence of uterine scar niche in women with one previous uterine scar

Caution in

- Previous caesarean section (risk of uterine rupture <0.3%)
- Conditions that exacerbate hypotension ex. Cardiovascular or cerebrovascular disease

Adverse effects

- nausea, vomiting, diarrhoea, abdominal pain
- frequent painful uterine contractions
- vaginal bleeding
- headache and dizziness

Prerequisite

- Decision for use by specialist
- Usage in a Ministry of Health Facility
- Usage on a named-patient basis

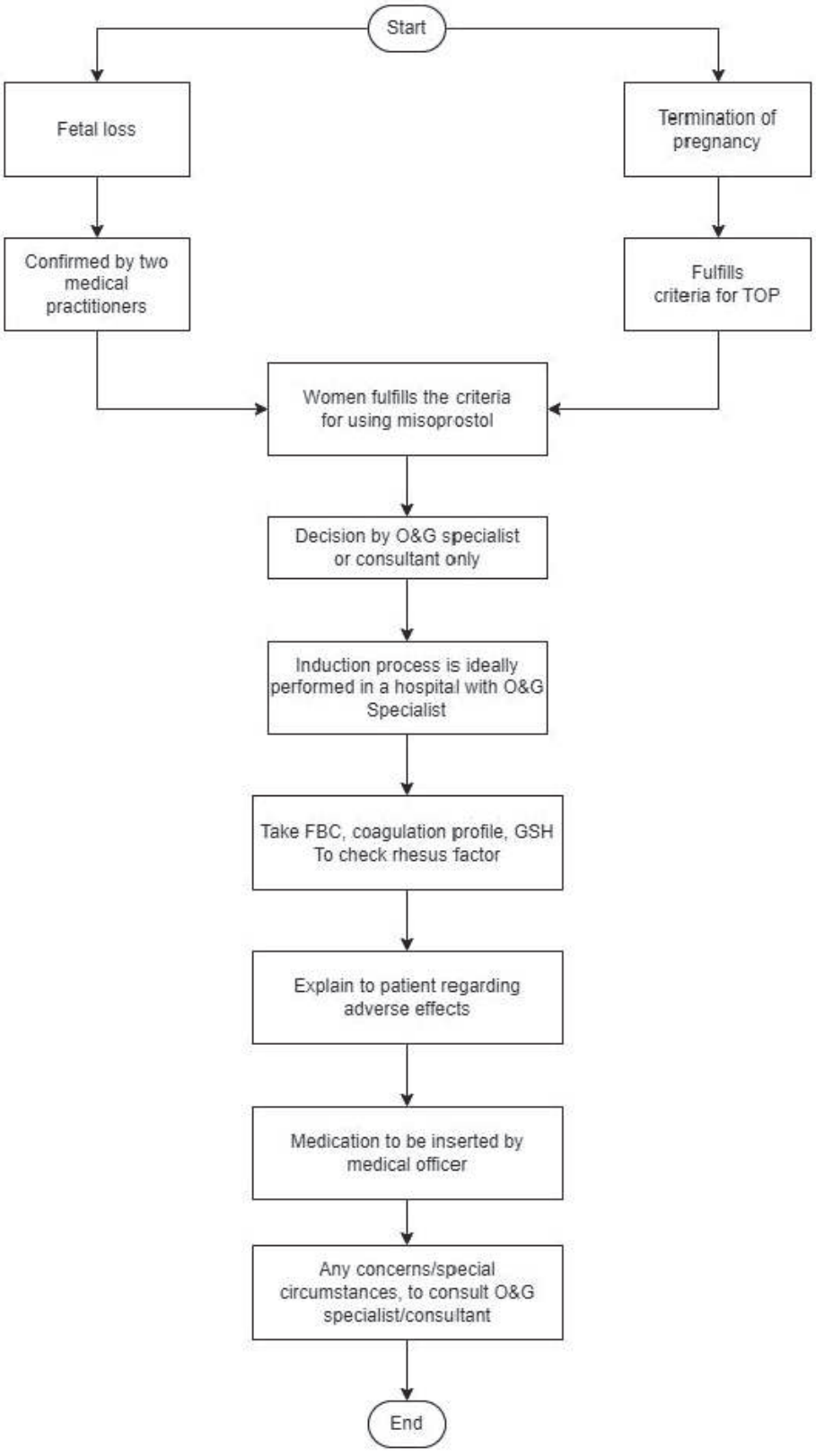
Induction regime for first trimester

	MISSED MISCARRIAGE (UP TO 12+6 WEEKS)	TERMINATION OF PREGNANCY (UP TO 12+6 WEEKS)
Dose	Misoprostol 800 mcg 3 hourly	Misoprostol 800 mcg 3-12 hourly
Route	Vaginal route preferable due to lower incidence of side effects.	
Max dose	2 times per course	
Repeated course	If is required, consider the next day and at least 3 hours from last dose	
During review	Reassess if the patient is suitable for next dose of Misoprostol, avoid if contracting, os open or excessive bleeding	
Generally no changes of Misoprostol dosage is required for women with previous uterine scar.		

Induction regime for second trimester

	FETAL LOSS 13+0 TO 23+6 WEEKS	TERMINATION OF PREGNANCY (UP TO 21+6 WEEKS)
Dose	Misoprostol 400 mcg 4-6 hourly	
Route	Vaginal route preferable due to lower incidence of side effects.	
Max dose	Up to 5 doses per course	
Repeated course	If is required, discuss with consultant and rest for at least 24 hours after the last dose	
During review	Reassess if the patient is suitable for next dose of Misoprostol, avoid if contracting, os open or excessive bleeding	
Additional precautions	- Perform ultrasound to exclude uterine niche in women > 20 weeks of gestation AND a uterine scar before induction - Women with two or more previous scars - Women requiring a repeat course - Uterus beyond 24 weeks	

Flowchart 29: Procedure for misoprostol usage



Reference:

1. Morris JL, Winioff B, Dabash R, et al. FIGO's updated recommendations for misoprostol used alone in gynecology and obstetrics. Int J Gynecol Obstet, 138:362-366

PPH BOX CHECKLIST

Suggested PPH Box Checklist
(Please ensure all items are replenished after use)

Items	Quantity
IV Cannula size 14, 16, 18 gauge	3 of each size
IV drip set	3 units
Micropore/Plaster to secure cannula	3 rolls
Gelafundin 500 ml	1 pint
Normal saline 500 ml	2 pints
Oxytocin 10 IU/ml (Fridge Item- Retrieve when needed) or alternatively Heat-stable Carbetocin	10 ampoules 1 ampoule
Syntometrine	2 ampoules
Carboprost/ Haemabate 250 µg/ml (Fridge Item- Retrieve when needed) Tranexamic Acid (1 g/10 ml)	4 ampoules 1 ampoule (room temperature)
Water for injection 10 ml	5 ampoules
Sterile vaginal pack	3 packs
Syringe 5 ml, 10 ml	3 of each size
Hypodermic Needle 21 (green), 23 (blue) gauge	3 of each size
Bakri Balloon with manual	1 unit
Foley catheter size 24 F	2 units
Urine bag	2 unit (1 for Urine drainage, 1 for Bakri system drainage)

PPH MANAGEMENT CHECKLIST

PPH Management Checklist

Hospital/Clinic : _____
Date : _____

Patient's name : _____
Age : _____

IC No : _____
Time of call for help : _____AM/PM

Called by : _____

Initial Management	Time
Oxygen given	
Head bed down	
Branula No. 1	
Branula No. 2	
Branula No. 3	

Team Member	Name	Time arrived
On-call O&G Specialist		
On-call MO		
On-call Anaesthetic MO		
On-call Anaesthetist		

Observations				**Fluids/blood/blood products**		
Time	HR	BP	Obstetric Shock Index	Type	Volume	Time
				Blood sent		**Time**
				FBC		
				GXM _____units		
				PT/PTT		
				Placenta delivered ☐ Yes ☐ No		
				Urinary catheter		

Drug	Dose	Time
Syntometrine	IM 1 ampoule	Time
Ergometrine	IM/IV 500 µg / 1 amp (if normal BP)	
Oxytocin	40 units in 500ml NS at 125 ml/H	
Carbetocin	IM/IV 100 mcg/ 1 amp	
Tranexamic acid	IV 1g	
Haemabate (Carboprost)	IM 250 µg / 1 amp	
Haemabate (Carboprost)	IM 250 µg / 1 amp	
Haemabate (Carboprost)	IM 250 µg / 1 amp	
Haemabate (Carboprost)	IM 250 µg / 1 amp	

Name O&G specialist called (If from non-specialist hospital) : _____ Time: _____ AM / PM

Form filled by: _____ Signature: _____

"PPH management Checklist" should be filled for every case of PPH"

RESUSCITATIVE HYSTEROTOMY INSTRUMENT CHECKLIST

Every hospital has its very own Resuscitative Hysterotomy Box. An example of Resuscitative Hysterotomy Box is listed as below:

Items	Quantity
Resuscitative Hysterotomy Set • Scalpel Handle No. 3 • Hegar Mayo Needle Holder • Standard Dressing Forceps • Suture Scissor • Green Armytage Forceps • Stainless Steel Kidney Dish	 1 1 1 1 2 1
Skin Prep Towel	4
Sterile Abdominal Pack	1
Chlorhexidine gluconate 2% with Isopropyl Alcohol 70% solution	100mls x 2
Sterile Scalpel Blade No. 10	1
Sutures Vicryl/ Ecosorb 1	3
Sutures Dafilon/ Nylon	1
Cord Clamp	2

Note: Resuscitative *Hysterotomy Box* should be checked and replenished after each use immediately. Expiry dates of certain disposable items should be checked by in-charge personnel every month.

Adapted from:

1. Sarawak General Hospital's Labour Ward Manual 2020 Edition.
2. Obstetric Protocol (O&G Department Hospital Tuanku Fauziah Kangar, Perlis) 2020- 2025.
3. Obstetric and Gynaecology Protocol State of Kedah 2019.
4. Obstetric and Gynaecology Protocol HTJ Negeri Sembilan 2018.

Reference:

1. National Antimicrobial Guideline 2019 MOH.
2. Malaysia CPG On Management of Hypertension 5th Edition 2018.
3. NICE Clinical Guideline 107 On Hypertension in Pregnancy 2019.
4. Greentop Guideline No. 37a Reducing the Risk of Venous Thromboembolism during Pregnancy and the Puerperium 2015.
5. World Association of Perinatal Medicine and Perinatal Medicine Foundation. Clinical Practice Guideline. The use of antenatal corticosteroids for fetal maturation, 2022.
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7. RCOG.Antenatal corticosteroids to reduce neonatal morbidity and mortality, 2022.

DRAFTING COMMITTEE OF HANDBOOK OF OBSTETRICS GUIDELINE

ADVISORS

Dato' Dr Mohd. Azman bin Yacob
Director
Medical Development Division
Ministry of Health Malaysia

Dato' Dr. Mohd Rushdan Bin Md Noor
National Head of O&G Services
2021 – 2023

Datuk Dr. Wan Ahmad Hazim Wan Ghazali
National Head of O&G Services
2023 - Present

CHAIRMAN

Dr. Rafaie Bin Amin
Sarawak State Head of O&G Services
Consultant O&G (MFM)
Hospital Umum Sarawak

CONTRIBUTORS

Dr. Kanddy Loo Chin Yee
Consultant O&G (Gynae-Oncology)
Hospital Umum Sarawak

Dr. Voon Hian Yan
Consultant O&G (MFM)
Hospital Umum Sarawak

Dr. Tan Lee Na
Consultant O&G (MFM)
Hospital Umum Sarawak

Dr. Chai Ming Cheng
O&G Specialist
Hospital Sarikei

Dr. Woon Shu Yuan
O&G Specialist (Reproductive Medicine Trainee)
Hospital Wanita & Kanak-Kanak Sabah

Dr. Teo Wan Sim
O&G Specialist
Hospital Serian

Dr. Nor Hayati binti Ibrahim
Deputy Director
Medical Development Division of MOH

Dr Jafanita binti Jamaludin
Senior Principal Assistant Director
& Head of Unit
O&G and Paediatrics Services Unit
Medical Development Division of MOH

Dr Siti Nur Aishah binti Rahmat
Senior Principal Assistant Director
O&G and Paediatrics Services Unit
Medical Development Division of MOH

Dr Mohamad Afiq Farhan Ahmad Safian
Principal Assistant Director
O&G and Paediatrics Services Unit
Medical Development Division of MOH

Puan Siti Rahmah Abdul Rashid
Head Nurse
O&G and Paediatrics Services Unit
Medical Development Division of MOH

INTERNAL REVIEWERS

Datuk Dr. Tham Seng Woh
Melaka State Head of O&G Services
O&G Consultant
Hospital Melaka

Dato' Dr. Rozihan Ismail
Pahang State Head of O&G Services
Consultant O&G (Urogynaecology)
Hospital Tengku Ampuan Afzan Kuantan

Dr Rafaie bin Amin
Sarawak State Head of O&G Services
Consultant O&G (MFM)
Hospital Umum Sarawak

Dr. Ab Rahim bin Abd Ghani
Johor State Head of O&G Services
Consultant O&G
Hospital Pakar Sultanah Fatimah Muar

Dr Faridah binti Mohd Yusof
Terengganu State Head of O&G Services
Consultant O&G (Urogynaecology)
Hospital Sultanah Nur Zahirah Kuala Terengganu

Dr Sharmini Diana Parampaklan
Penang State Head of O&G Services
Consultant O&G
Hospital Pulau Pinang

Dr Haris Tham Seong Wai
Consultant O&G (Reproductive)
Hospital Raja Permaisuri Bainun Ipoh

Dr Nik Ahmad Nik Abdullah
Consultant O&G (Gynae-Oncology)
Hospital Raja Perempuan Zainab II
Kota Bharu

Dr Shahril Abu Bakar
Consultant O&G
Hospital Tuanku Azizah Kuala Lumpur

Dr Hoong Farn Weng Michael
Consultant O&G (MFM)
Hospital Wanita dan Kanak-Kanak Sabah

Dr Darminder Chopra
Consultant O&G
Hospital Sungai Buloh

Dr Sharifa Azlin binti Hamid
Consultant O&G (MFM)
Hospital Sultanah Bahiyah Alor Setar

Dr Noor Aini Harun
Consultant O&G
Hospital Tuanku Fauziah Kangar

Dr Choi Yee Xian
O&G Specialist
Hospital Tuanku Ja'afar Seremban

EXTERNAL REVIEWERS

Prof Dato' Dr. Hamizah binti Ismail
Professor in Obstetrics and Gynecology
Department of Obstetrics and Gynaecology
Sultan Ahmad Shah Medical Center @IIUM
Kulliyyah of Medicine
International Islamic University Malaysia

Prof Madya Rahana Abdul Rahman
Head of MFM Unit
Consultant Obstetrics and Gynaecology
Hospital Canselor Tuanku Muhriz
Universiti Kebangsaan Malaysia

Dr Rahmah Binti Saaid
Senior Lecturer and Consultant
Department of Obstetrics & Gynaecology
University Malaya Medical Centre
Faculty of Medicine
Universiti Malaya

Dr Engku Husna Engku Ismail
Medical Lecturer/ Obstetrician & Gynaecologist
Department of Obstetrics & Gynaecology
School of Medical Sciences
Universiti Sains Malaysia

MINISTRY OF HEALTH MALAYSIA

MEDICAL DEVELOPMENT DIVISION
Block E1, Parcel E,
Federal Government Administrative Centre,
62590 Putrajaya, Malaysia
Tel.: +603-8883 1047
http://www.moh.gov.my