MOH/P/PAK/621.26(GU)-e

TRAINING MANUAL FOR



LSS

OBSTETRIC LIFE SAVING SKILLS



Ministry of Health Malaysia

TRAINING MANUAL FOR

OBSTETRIC LIFE SAVING SKILLS (OLSS)

DISCLAIMER

This **Training Manual for Obstetric Life Saving Skills (OLSS)** is intended as an educational resource to equip healthcare professionals with foundational knowledge and practical skills for managing obstetric emergencies. The information contained herein is for training purposes only and is designed to supplement, not replace, formal medical education, clinical experience, and ongoing professional development.

All figures, tables, and diagrams contained in this manual are derived from various sources. Where applicable, original sources are duly acknowledged. Certain images are original photographs taken by the committee using mannequins, while others are generated using artificial intelligence (AI).

Front page illustration including most of the images used in this manual is by Dr Chong Sin Yue from Hospital Sri Aman, Sarawak.

TRAINING MANUAL FOR
OBSTETRIC LIFE SAVING SKILLS (OLSS)

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was developed by the
Jawatankuasa Pengurusan dan Perkembangan O&G KKM (JPPOBG)
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GLOSSARY

ABC	Airway, Breathing, Circulation
ABCD	Airway, Breathing, Circulation, Defibrillation
ABG	Arterial Blood Gas
AED	Automated External Defibrillator
AHA	American Heart Association
ALSO	Advanced Life Support in Obstetrics
ALT	Alanine Transaminase
APH	Antepartum Haemorrhage
aPTT	Activated Partial Thromboplastin Time
ARM	Artificial Rupture of Membrane
AST	Aspartate Transaminase
AV	Arteriovenous
BMI	Body Mass Index
BMJ	British Medical Journal
BP	Blood Pressure
BPI	Brachial Plexus Injury
BVM	Bag Valve Mask
CAB	Circulation, Airway, Breathing
CAD	Coronary Artery Disease
CBD	Continuous Bladder Drainage
CCT	Control Cord Traction
CKD	Chronic Kidney Disease
CNS	Central Nervous System
CP	Cerebral Palsy
CPR	Cardiopulmonary Resuscitation
CT	Computed Tomography
CTG	Cardiotocography
CVD	Cardiovascular Disease
CVPU	Confusion, Voice, Pain, Unresponsive

CVS	Cardiovascular System
DBP	Diastolic Blood Pressure
DDI	Decision to Delivery Interval
DIVC	Disseminated Intravascular Coagulation
DRS-ABC	Danger, Response, Shout for help, Airway, Breathing, Circulation
ECV	External Cephalic Version
ETD	Emergency and Trauma Department
ERC	European Resuscitation Council
FAHR	Febrile, Allergic and Hypotensive Transfusion Reaction
FBC	Full Blood Count
FFP	Fresh Frozen Plasma
FGR	Foetal Growth Restriction
FNHFTR	Febrile Non-haemolytic Febrile Transfusion Reaction
FSB	Fresh Stillbirth
GCS	Glasgow Coma Scale
GI	Gastrointestinal
GTG	Green-top Guideline
GTN	Glyceryl Trinitrate
GVHD	Graft-Versus-Host Disease
HDP	Hypertensive Disorders of Pregnancy
HDU	High Dependency Unit
HELLP	Haemolysis, Elevated Liver enzymes, Low Platelets
HFpEF	Heart Failure with preserved Ejection Fraction
HIE	Hypoxic Ischaemic Encephalopathy
HPT	Hypertension
HR	Heart rate
ICP	Intracranial Pressure
ICU	Intensive Care Unit

ILCOR	International Liaison Committee on Resuscitation
IM	Intramuscular
INR	International Normalized Ratio
ISBAR	Identify, Situation, Background, Assessment, Recommendation
ISSHP	International Society for the Study of Hypertension in Pregnancy
IV	Intravenous
IVC	Inferior Vena Cava
KKM	Kementerian Kesihatan Malaysia
LDH	Lactate Dehydrogenase
LMA	Laryngeal Mask Airway
LMWH	Low Molecular Weight Heparin
LUD	Lateral Uterine Displacement
MaHTAS	Malaysian Health Technology Assessment Section
MAP	Mean Arterial Pressure
MCQ	Multiple Choice Question
MECC	Medical Emergency Call Centre
MERS999	Malaysian Emergency Response Services 999
$MgSO_4$	Magnesium Sulphate
MMC	Malaysia Medical Council
MOH	Ministry of Health
MRI	Magnetic Resonance Imaging
MRP	Manual Removal of Placenta
MSV	Mauriceau-Smellie-Veit
MTP	Massive Transfusion Protocol
NICE	National Institute for Health and Care Excellence
O&G	Obstetrics & Gynaecology
OA	Occipital Anterior
OASIS	Obstetric Anal Sphincter Injuries

OLSS	Obstetric Life Saving Skills
omqSOFA	Obstetrically Modified Quick Sequential Organ Failure Assessment
OPA	Oropharyngeal Airway
OSI	Obstetric Shock Index
OT	Operation Theatre
PAS	Placenta Accreta Spectrum
PCI	Protein Creatinine Index
PMCS	Perimortem Caesarean Section
POC	Product of Conception
POG	Period of Gestation
PPH	Postpartum Haemorrhage
PPI	Proton Pump Inhibitors
PRBCs	Packed Red Blood Cells
PT	Prothrombin Time
RCOG	Royal College of Obstetricians and Gynaecologists
ROSC	Return of Spontaneous Circulation
S/C	Subcutaneous
SALSO	Sarawak Advanced Life Support in Obstetrics
SBP	Systolic Blood Pressure
SGA	Small for Gestational Age
SIRS	Systemic Inflammatory Response Syndrome
SLE	Systemic Lupus Erythematosus
SpO_2	Saturation of Peripheral Oxygen
TRALI	Transfusion Related Acute Lung Injury
UKOSS	UK Obstetric Surveillance System
UTI	Urinary Tract Infection
VF	Ventricular Fibrillation
VT	Ventricular Tachycardia
WHO	World Health Organization

FOREWORD BY

DIRECTOR-GENERAL OF HEALTH MALAYSIA



The publication of the first edition of the **Training Manual for Obstetric Life Saving Skills (OLSS)** marks a significant milestone in strengthening maternal healthcare within the Ministry of Health Malaysia. It reflects our national commitment to achieving Sustainable Development Goal 3, particularly in reducing maternal mortality and ensuring safe, high-quality care for every mother. While pregnancy and childbirth are natural and meaningful life events, obstetric emergencies can arise unexpectedly.

Effective management depends on a prepared, coordinated system guided by clear standards. The manual embodies this national approach, aligning policy, governance, and clinical standards into a structured framework to enhance emergency preparedness across all levels of care. More than a training resource, this manual demonstrates our collective commitment to excellence, accountability, and patient safety. Its implementation will strengthen the resilience of our healthcare system and ensure consistent access to quality obstetric care nationwide.

I extend my highest commendation to the MOH O&G Management and Development Committee (*Jawatankuasa Pengurusan dan Perkembangan O&G KKM*) and Medical Development Division for their exemplary leadership. May this manual serve as a cornerstone in safeguarding mothers' lives and advancing maternal healthcare across Malaysia, with consistent adoption nationwide driving lasting improvements in outcomes.

Datuk Dr. Mahathar bin Abd Wahab
Director-General of Health Malaysia

FOREWORD BY

DIRECTOR OF MEDICAL DEVELOPMENT DIVISION



The official release of the inaugural **Training Manual for Obstetric Life Saving Skills (OLSS)** represents a major milestone in advancing maternal healthcare within the Ministry of Health Malaysia. This comprehensive, evidence-based resource underscores a strong commitment to enhancing the quality, safety, and standardization of obstetric emergency care across the country. Effective management of obstetric emergencies requires more than knowledge. It demands structured training, sustained competency, and a culture of preparedness.

This manual consolidates essential protocols into a clear, standardised framework, equipping healthcare professionals across hospitals, clinics, and community settings to respond confidently to critical conditions.

Beyond immediate clinical application, the manual supports continuous professional development, skill reinforcement, and performance improvement. It fosters consistency, teamwork, and a culture of readiness, enhancing patient safety and reliability across the health system.

Sincere appreciation is extended to the editorial committee for their tireless commitment. Their dedication, alongside demanding clinical responsibilities, reflects a shared vision of excellence in maternal care. This manual empowers professionals, strengthens collaboration, and ensures that when emergencies arise, care is swift, structured, and lifesaving.

Dr. Nor Hayati binti Ibrahim
Director of Medical Development Division

NATIONAL COMMITTEE ON OBSTETRIC LIFE SAVING SKILLS

Dr. Mohd Suhaidin bin Che Ngah
Coordinator of the Subcommittee for Training, CME & Human Capital JPPOBG Kelantan's Head of Service O&G, Head of Department
O&G Department
Hospital Sultan Ismail Petra
Kuala Krai, Kelantan

Dr. Juliana binti Mohamad Basuni
O&G Consultant and Head of Department
O&G Department
Hospital Pasir Gudang
Pasir Gudang, Johor

Dr. Fatimah Zarina binti Jamaludin
O&G Consultant and Head of Department
O&G Department
Hospital Sultanah Nora Ismail
Batu Pahat, Johor

Dr. Norizan binti Kamarudin
O&G Consultant
O&G Department
Hospital Sultan Idris Shah
Serdang, Selangor

Dr. Rizal bin Firdaus
O&G Specialist
O&G Department
Hospital Putrajaya
W. P. Putrajaya

Dr. Ong Zhong Wei
O&G Specialist
O&G Department
Hospital Tengku Ampuan Rahimah
Klang, Selangor

Dr. Azureen binti Hasan
O&G Specialist
O&G Department
Hospital Sultan Ismail Petra
Kuala Krai, Kelantan

Dr. Masyitah binti Mahdi
O&G Specialist
O&G Department
Hospital Sultan Ismail Petra
Kuala Krai, Kelantan

Dr. Angeline Wong Tze Yin
O&G Specialist
O&G Department
Hospital Umum Sarawak
Kuching, Sarawak

Dr. Nor Fatimah Zakiah binti Hanafi
O&G Specialist
O&G Department
Hospital Wanita dan Kanak-Kanak Sabah
Kota Kinabalu, Sabah

Dr. Wang Ming
O&G Specialist
O&G Department
Hospital Pulau Pinang
Pulau Pinang

Puan Daranafiz binti Riffin
Head Nurse
O&G Department
Hospital Sultan Ismail Petra
Kuala Krai, Kelantan

Puan Siti Zuraida binti Ali
Head Nurse
O&G Department
Hospital Sultan Idris Shah
Serdang, Selangor

MEDICAL DEVELOPMENT DIVISION

Dr. Murnilina binti Abdul Malek
Head of Unit
Obstetrics & Gynaecology and Paediatric Services Unit
Medical Development Division

Dr. Mohamad Afiq Farhan bin Ahmad Safian
Senior Principal Assistant Director
Obstetrics & Gynaecology and Paediatric Services Unit
Medical Development Division

Dr. Siti Nur Aishah binti Rahmat
Senior Principal Assistant Director
Obstetrics & Gynaecology and Paediatric Services Unit
Medical Development Division

Puan Siti Rahmah binti Abdul Rashid
Head Nurse
Obstetrics & Gynaecology and Paediatric Services Unit
Medical Development Division

EXTERNAL REVIEWER

Associate Professor
Dr. Amilia Afzan binti Mohd Jamil
O&G Consultant (Maternal Foetal Medicine)
O&G Department
University of Putra Malaysia

Dr. Hii Ling Yien
O&G Consultant (Maternal Foetal Medicine)
O&G Department
Hospital Wanita dan Kanak-Kanak Sabah
Kota Kinabalu, Sabah

IMPORTANT CONSIDERATIONS AND LIMITATIONS:

1. **Not a Substitute for Professional Medical Judgment**: This manual provides guidelines and best practices based on current medical understanding. However, every patient presentation is unique. Users of this manual must exercise their independent professional medical judgment, critical thinking, and clinical expertise in assessing individual patient circumstances, considering all available clinical data, and making appropriate treatment decisions. This manual does not absolve healthcare providers of their professional responsibility or liability for patient care.

2. **Dynamic Nature of Medical Knowledge**: Medical science, including obstetric care, is constantly evolving. New research, clinical guidelines, and advancements in treatment protocols emerge regularly. While every effort has been made to ensure the accuracy and currency of the information at the time of publication, this manual may not reflect the absolute latest evidence or recommendations. Users are strongly encouraged to stay abreast of the most current medical literature, national and international guidelines, and local protocols.

3. **Scope of Training**: This manual focuses on life-saving skills in obstetric emergencies. It is not intended to be a comprehensive textbook on obstetrics or a guide to routine obstetric care. The skills and interventions described are for the immediate stabilization and management of critical situations, often as a bridge to definitive, higher-level care.

4. **Resource Limitations**: The practical application of the skills and interventions detailed in this manual may be influenced by the availability of resources, including:

    i. **Personnel**: The number, skill level, and specialization of available staff (e.g., obstetricians, anaesthesiologists, nurses, midwives, assistant medical officers) can vary significantly across settings. This manual cannot account for real-time staffing constraints.
    ii. **Equipment and Facilities**: Access to specialized equipment, blood products, operating theatres, intensive care units, and diagnostic capabilities (e.g., ultrasound, laboratory services) may be limited, particularly in rural or resource-constrained environments.
    iii. **Geographical Locality**: The distance to the nearest comprehensive medical facility and the challenges of patient transport can severely impact outcomes in time-sensitive obstetric emergencies.

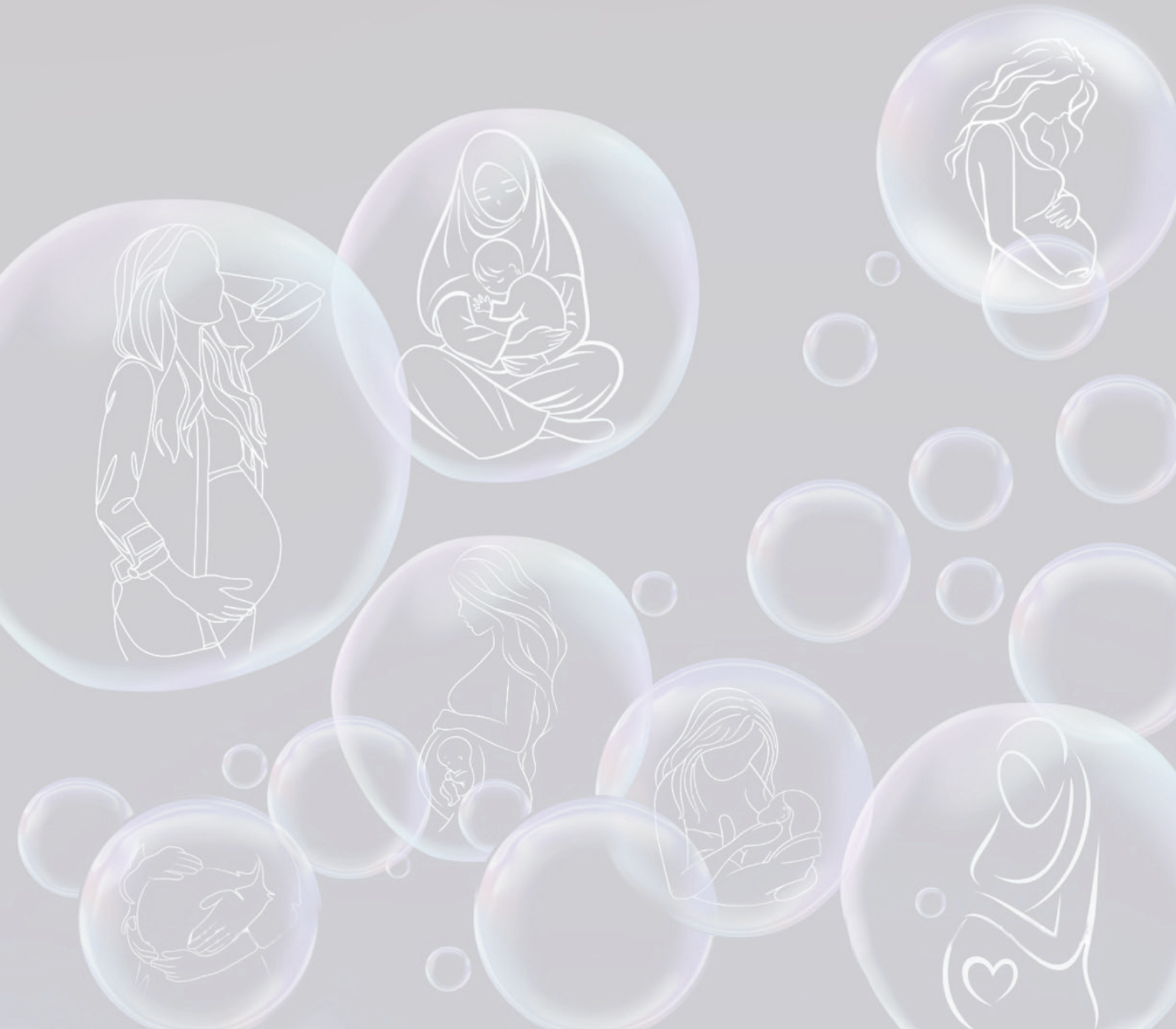
5. **Variations in Practice**: Medical practice may vary across different healthcare settings, geographical locations, available resources, and availability of medical personnel, experience level, training and capability.

6. **No Guarantee of Outcome**: The successful application of the techniques described in this manual is dependent on numerous factors, including the clinical presentation of the patient, the timeliness of intervention, the skill and experience of the provider, and the availability of resources. This manual cannot guarantee specific patient outcomes.

By utilising this OLSS Training Manual, the user acknowledges and accepts these limitations. It should be clearly understood that this training manual listed here are not the minimum standards that should be found in all healthcare settings and should not carry any adverse inference in any healthcare settings that cannot comply with this training manual due to the reasons stated above. Healthcare service providers will continue to be accountable for all the services that they provide in good faith for the benefit of the patients that they serve.

1.0

INTRODUCTION



1.0 INTRODUCTION

1.1 The Imperative for Obstetric Emergency Training

Pregnancy and childbirth are physiological processes that, for most, culminate in a joyous outcome. However, the journey can be fraught with unexpected and life-threatening complications that demand immediate and skilled intervention. The capacity of healthcare providers to respond effectively during these critical moments is paramount to prevent maternal and perinatal mortality and morbidity.

This training manual is designed to equip all members of the maternity care team with the essential knowledge, practical skills, and teamwork strategies required to manage a range of obstetric emergencies. The outcome of a critical event depends not just on what we know, but on how we perform as individuals and as a team under pressure.

1.2 Objectives of the Training Manual

General Objective

To develop a comprehensive training manual on Obstetric Life Saving Skills for all healthcare providers.

Specific Objectives

a. **To provide adequate knowledge and practical skills** in the recognition and immediate management of critical obstetric emergencies for all healthcare providers.
b. **To develop a simplified and standardised training manual** for the effective and coordinated response to obstetric emergencies across various healthcare settings, including hospitals, health clinics, and community/home environments.
c. **To ensure that all healthcare providers are able to identify the signs, symptoms, and associated complications of obstetric emergencies**, thereby enabling them to initiate timely and appropriate life-saving interventions.

1.3 The Scope of Obstetric Emergencies

An obstetric emergency can arise at any stage of pregnancy, labour, or the postpartum period. These events are often rapid in onset and require a coordinated, multidisciplinary response. Throughout this manual, we will address the prevention, recognition, and management of the most critical obstetric situations, including:

a. **Haemorrhage**: Postpartum Haemorrhage (PPH) remains a leading cause of maternal death. Guidance includes early recognition, assessment of blood loss, and a systematic approach to management, from uterotonics to surgical interventions.
b. **Hypertensive Disorders**: Eclampsia is an acute, life-threatening complication of hypertensive disorders in pregnancy. This manual will detail the principles of managing a hypertensive crisis, controlling convulsions, and preventing further complications.
c. **Labour and Delivery Complications**: Emergencies such as shoulder dystocia, cord prolapse, uterine inversion, and complicated vaginal breech delivery require specific manoeuvres and a calm, stepwise approach to prevent devastating injury to both mother and baby.
d. **Maternal Collapse and Sepsis**: The sudden collapse of a pregnant or postpartum woman is a terrifying event. The principle of care includes a systematic approach to resuscitation of pregnant women, identification of underlying causes and subsequent treatment. The one-hour sepsis bundle concept is an essential component in managing maternal sepsis.
e. **Operative Vaginal Delivery**: Safe and competent performance of operative vaginal delivery is a crucial skill to resolve foetal or maternal compromise in the second stage of labour.

1.4 Core Principles of Emergency Management

Across all obstetric emergencies, a set of core principles underpins successful management and improves outcomes. These principles are the foundation of the OLSS course:

a. **Teamwork and Communication**: No single person can manage an emergency alone. A coordinated multidisciplinary team—including obstetricians, midwives, anaesthetists, and paediatricians—is essential. Effective leadership, clear delegation of tasks, closed-loop communication, and situational awareness are critical skills that will be emphasised and practiced.
b. **Structured Approach**: A systematic approach ensures that vital steps are not missed during a crisis. The DRS-ABC (Danger, Response, Shout for help, Airway, Breathing, Circulation) protocol for resuscitation is fundamental. For specific emergencies, structured mnemonics and algorithms like the "4Ts" for PPH provide a framework for rapid diagnosis and treatment.

c. **Early Recognition and Prompt Resuscitation**: The "Golden Hour" concept is crucial. Early recognition of a developing problem allows for timely intervention before the patient's condition deteriorates irreversibly. Prompt and effective resuscitation to stabilise the mother is always the first priority.
d. **Skills and Drills**: Obstetric emergencies are infrequent for most practitioners. Therefore, regular training, simulation drills, and hands-on practice are vital to maintain the necessary skills and ensure the team can function efficiently and effectively when a real crisis occurs.

1.5 The Importance of Post-Event Care

Management of an emergency does not conclude when the immediate crisis is resolved. The period following the event is a critical opportunity for learning, recovery, and future prevention. Key components of post-event management include:

a. **Debriefing**: A structured team debriefing allows for reflection on the event. It helps identify what went well and what could be improved, enhances team dynamics, and provides psychological support for the staff involved.
b. **Documentation**: Accurate, comprehensive, and contemporaneous documentation of all events, interventions, and timings is essential for clinical governance, continuity of care, and fulfil medico-legal requirements.
c. **Counselling and Communication**: The patient and her family will have experienced a traumatic event. Clear explanation, compassionate counselling regarding the events and potential complications, and a detailed plan for future care are integral parts of holistic patient management.

This manual is designed to guide the mastery of these principles and skills. Active engagement with the material and full participation in training will foster confidence and competence of healthcare providers, ensuring readiness to deliver the highest standard of care when required.

Rapid Response Blueprint: Obstetric Life Saving Skills (OLSS)



UNIVERSAL EMERGENCY FRAMEWORK

The DRS-ABCD Stabilisation Protocol



Danger



Response



Shouting for help



Airway



Breathing



Circulation



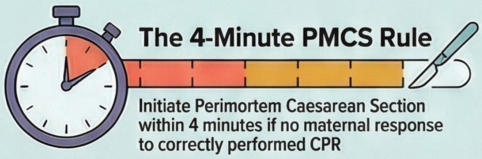
Defibrillation

Maternal CPR Modifications (≥ 20 Weeks)



Manual Lateral Uterine Displacement (LUD)

The 4-Minute PMCS Rule



Initiate Perimortem Caesarean Section within 4 minutes if no maternal response to correctly performed CPR

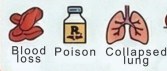
Systematic Causes of Maternal Collapse (4H 4T 1E)

4H: Metabolic/Fluid



Hypovolaemia
Hypoxaemia
Hypo/Hyperkalaemia
Hypothermia

4T: Circulatory/Trauma



Thromboembolism,
Toxicity (Local Anaesthetic/Mg)
Tension Pneumothorax,
Tamponade

1E: Common Causes



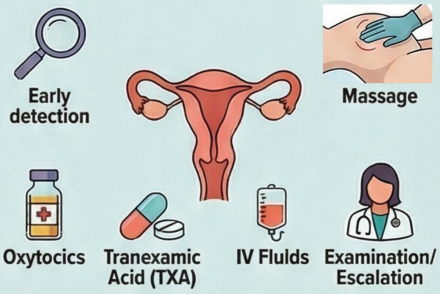
Eclampsia (Intracranial haemorrhage)

CRITICAL INTERVENTION BUNDLES

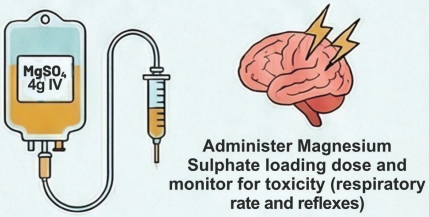
Sepsis Hour-1 Bundle



E-MOTIVE for Postpartum Haemorrhage (PPH)

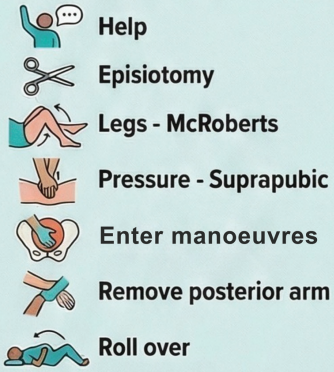


$MgSO_4$ for Eclampsia Control



Administer Magnesium Sulphate loading dose and monitor for toxicity (respiratory rate and reflexes)

HELPERR Mnemonic for Shoulder Dystocia



- Help
- Episiotomy
- Legs - McRoberts
- Pressure - Suprapubic
- Enter manoeuvres
- Remove posterior arm
- Roll over

2.0

MATERNAL COLLAPSE



2.0 MATERNAL COLLAPSE

2.1 Introduction

Maternal collapse is a rare but catastrophic event that demands immediate, coordinated action to optimise outcomes for both mother and foetus. It encompasses a broad spectrum of causes; cardiac, respiratory, obstetric, and metabolic in which each requires rapid recognition and targeted intervention. Understanding its risk factors, early warning signs, and structured emergency response is essential for all clinicians involved in maternity care.

2.2 Learning Objectives

a. To comprehend and perform basic life support effectively
b. To learn about modifications that need to be performed during performing CPR for pregnant patients
c. To understand the importance of performing resuscitative hysterotomy

2.3 Definition

Maternal collapse is defined as an acute event involving the cardiorespiratory system and/or central nervous system, 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 (GTG No.64, 2019).

2.4 Causes of Maternal Collapse

Causes of Maternal Collapse can be systematically recalled using the 4T, 4H, 1E algorithm, as follows in **Table 1**:

TABLE 1: Pregnancy-specific causes of collapse **(4H 4T 1E)**

4H	**H**ypovolaemia	• Bleeding (including intracranial bleed, splenic artery rupture and hepatic rupture) • Septic shock • Neurogenic shock
	Hypoxaemia	• Cardiomyopathy • Acute pulmonary oedema • Myocardial infarction • Aortic dissection
	Hypo/**H**yperkalaemia	• Insulin sliding scale/metformin • Diabetic ketoacidosis • Hyperemesis gravidarum • Potassium-sparing diuretics/ACE inhibitors • Massive blood transfusion
	Hypothermia	
4T	**T**hromboembolism	• Deep vein thrombosis/pulmonary embolism • Amniotic fluid embolism • Air embolism
	Toxicity	• Local anaesthetic • Magnesium toxicity
	Tension pneumothorax	• Central line insertion • Rib fracture
	Tamponade (cardiac)	• Pericarditis • Malignancy • Chest trauma • Aortic dissection
1E	**E**clampsia	• Intracranial haemorrhage

*Source: Handbook of Obstetrics Guideline, 2024

2.5 Immediate Assessment and Stabilisation: DRS-ABCD Approach

2.5.1 **D** – **D**anger.

a. Quickly assess the situation.
b. Check for danger.
c. Ensure safety (self, bystanders, and the casualty).
d. Recovery position.

2.5.2 **R** – **R**esponse

Check for response by using COWS mnemonic:

a. **C**an you hear me?
b. **O**pen your eyes.
c. **W**hat is your name?
d. **S**queeze my hand.

2.5.3 **S** – **S**hout for help

a. Outside hospital setting – Call MERS999.
b. Inside hospital setting – Activate Code Red.

2.5.4 **A** – **A**irway

a. Clear any blockages from the mouth.
b. Establish a patent airway by gentle head tilt & chin lift technique as shown in **Figure 1**. One hand over forehead to gently extend the neck. Another hand is placed under the mandible to gently lift the chin upward. It is important to avoid hyperextension of the neck.

Figure 1: Head tilt and chin lift



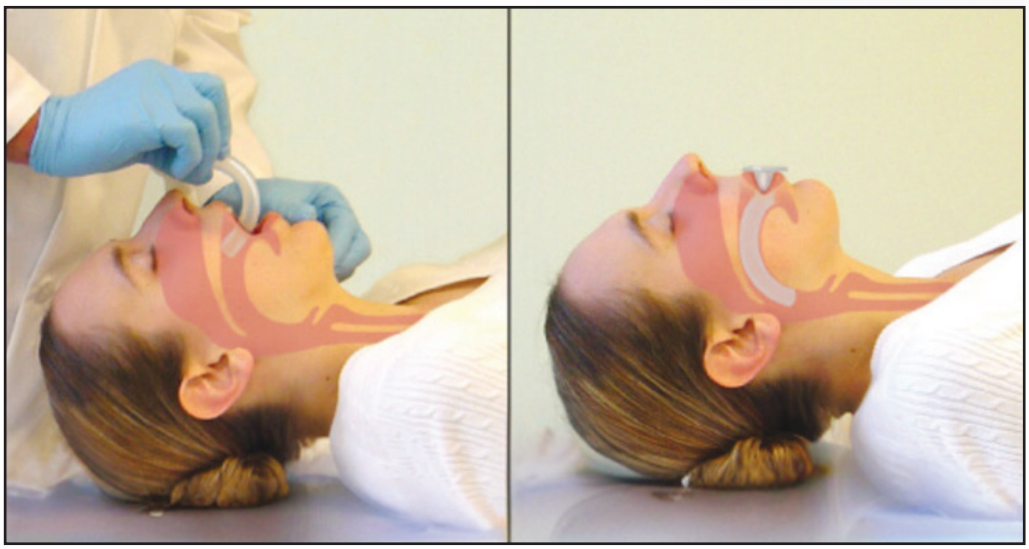
c. Jaw thrust (**Figure 2**)
   i. Grasp lower jaw with both hands and lift jaw forward while opening lower lip with thumb.
   ii. It may be more difficult to perform compared to head tilt and chin lift.
   iii. More effective in opening difficult airways.
   iv. Recommended for suspected cervical spine injuries.

Figure 2: Jaw thrust



d. Secure airway
   i. Gold standard – early intubation with endotracheal tube. However, it requires skilled personnel.
   ii. Alternatives include Oropharyngeal Airway (OPA) and Laryngeal Mask Airway (LMA).
   iii. OPA: Measure from corner of the mouth to angle of the jaw. Using OPA that is too large can press on the epiglottis, obstruct the airway and cause trauma to soft tissue. Using OPA that is too small will be ineffective at holding the tongue away from posterior pharynx and ineffective in securing airway.
   iv. Once appropriate size is identified, insert OPA into the mouth with the tip pointed to the roof of mouth (concave facing upwards). Rotate OPA 180 degrees while advancing into posterior oropharynx. This technique prevents OPA from pushing the tongue backwards and causing airway obstruction.
   v. If inserted completely, the flange of the OPA should rest over the patient's lips.
   vi. **Figure 3** illustrates the measurement of the oropharyngeal airway.

Figure 3: Measurement of OPA



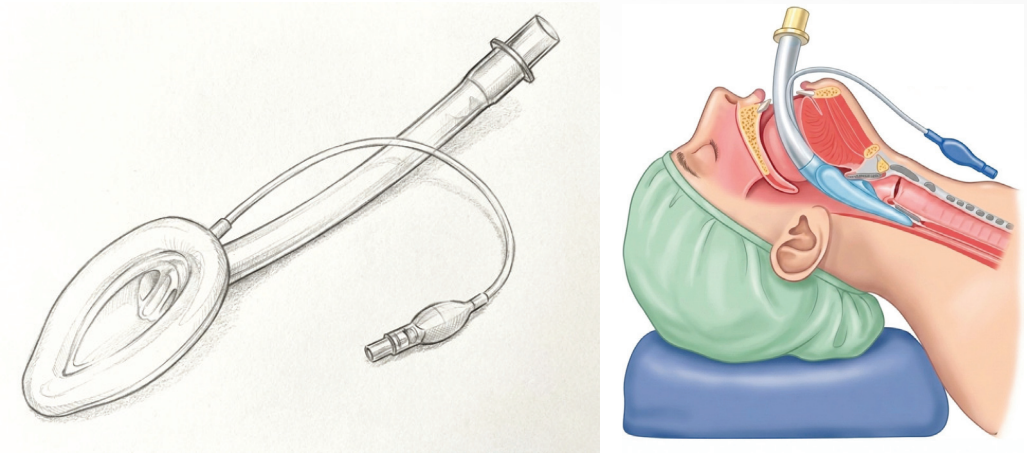
*Source: Photo from RCEM Learning website

vii. LMA can be inserted without direct visualisation of glottis, hence technically easier compared to endotracheal tube, making it more useful in prehospital setting, failed intubation and difficult airway algorithm.
viii. Compared to bag valve mask (BVM) ventilation, LMA reduces problems due to inadequate face-mask seal and difficult ventilation due to soft tissue from the upper airway. When used appropriately, it causes less gastric insufflation compared to BVM ventilation.
ix. Once appropriate size selected, deflate the cuff, lubricate and insert LMA into the mouth with the mask opening facing anteriorly. Manually guide the mask along the hard palate into the throat by pushing the tube with index and middle finger. Insertion should follow the curve of the hard and soft palates. Once the tube reaches the appropriate position, the mask will overlie the laryngeal opening.
x. The selection of the appropriate laryngeal mask airway (LMA) size is shown in **Table 2**, and its position is illustrated in **Figure 4**.

TABLE 2: Size of LMA based on patient's body weight

SIZE	RECOMMENDED BODY WEIGHT (KG)
2	10 – 20
2.5	20 – 30
3	30 – 50
4	50 – 70
5	70 - 100

Figure 4: Laryngeal Mask Airway (LMA)



2.5.5 **B** – **B**reathing

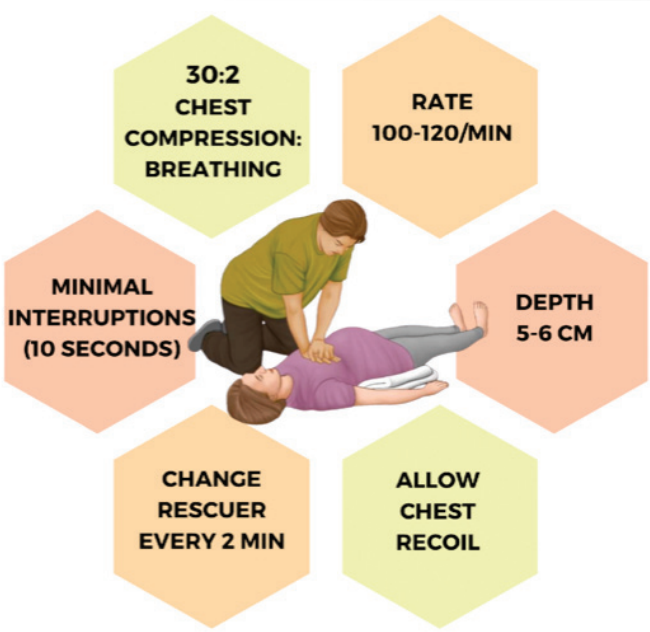
a. **Look** for chest rise and abdominal movements.
b. **Listen** for breathing and abnormal sounds.
c. **Feel** for expired air.
d. If the airway is clear and no breathing, commence chest compressions immediately.
e. If breathing is normal but the patient is unconscious, put the patient in recovery position.

CONSIDER EARLY INTUBATION IN MATERNAL COLLAPSE.

2.5.6 **C** – **C**irculation

a. Immediate initiation of cardiac compression is the most critical element for survival (AHA Guidelines for CPR and Emergency Cardiovascular Care, 2025).
b. Landmark: Centre of chest, lower ½ of sternum, compression direction perpendicular to chest wall.
c. Rate: 100 – 120 compressions per minute.
d. Depth: 5 – 6 cm.
e. 30 chest compressions followed by 2 ventilation breaths (before intubation).
f. Once intubated, compression to ventilation should be desynchronised. Continuous chest compressions at 100 – 120 per minute with 10 breaths per minute.
g. **Figure 5** below illustrates the components of effective cardiopulmonary resuscitation (CPR).

Figure 5: Summary of CPR



Maternal Modifications During CPR

From 20 weeks of gestation, changes in maternal physiology mean that adaptations are needed for the resuscitation process. Weight and pressure from the gravid uterus will compress on great vessels, particularly aorta and inferior vena cava. This will lead to markedly reduced cardiac output and ineffective CPR. Increase in maternal breast size can cause increased chest wall resistance, while pharyngeal and nasal oedema can make intubation difficult. These are critical considerations during maternal resuscitation.

1. Lateral uterine displacement (LUD)
2. Left lateral tilt

Lateral Uterine Displacement (LUD)

There are 2 ways to perform LUD:

- Pull technique (2 hands technique) - more preferred
- Push technique (1 hand technique)

Pull technique (shown in **Figure 6**) allows rescuers to cup and lift the uterus more effectively, provides a better mechanical advantage and allows for more sustained and consistent displacement compared to the push technique (shown in **Figure 7**). The European Resuscitation Council (ERC) 2025 suggests manual displacement as the preferred method, due to practicalities.

Figure 6: Pull technique LUD



Figure 7: Push technique LUD



*Source: Photo from American Heart Association Guideline, 2010

Left Lateral Tilt

- A left lateral tilt from head to toe at an angle of 15 – 30 degree on a firm surface will relieve aortocaval compression in the majority of pregnant women and still allow effective chest compressions to be performed in the event of cardiac arrest. Refer to **Figure 8** and **9**.
- By tilting the patient 15 degree to the left, the uterus is displaced off the IVC and aorta, allowing for improved venous return and thus an increase in cardiac output.

- **IT IS IMPORTANT TO USE A PROPER WEDGE TO ENSURE THE PROPER ANGLE AND SUPPORT FOR CPR.**
- **UTERINE DISPLACEMENT AND LEFT LATERAL TILT IS NOT NECESSARY FOR UTERUS BELOW 20 WEEKS.**

Figure 8: Using a wedge

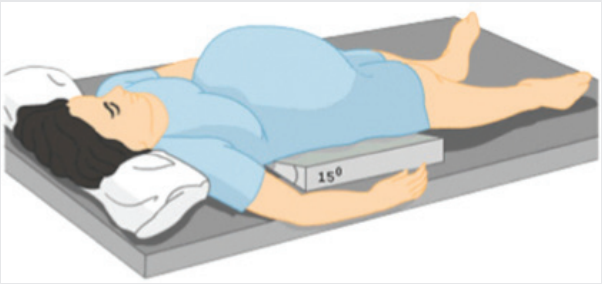


Figure 9: Using operating table



*Source: Photo from website, http://www.e-safe-anaesthesia.org

2.5.7 D – Defibrillator (AED)

a. Indication: VF / Pulseless VT
b. Same defibrillation energy levels should be used as in a non-pregnant woman since there is no change in thoracic impedance. Adhesive defibrillator pads are preferable to defibrillator paddles, and the left defibrillation pad should be applied lateral to the left breast.

TABLE 3: The energy level for defibrillator

Energy Level	Pregnant	Non-Pregnant
Biphasic (first shock)	120 - 200J	120 - 200J
Biphasic (subsequent shock)	120 - 360J	120 - 360J

c. The energy level is shown in **Table 3**.
d. Monophasic defibrillators are no longer manufactured, having been superseded by biphasic defibrillators. Biphasic waveforms are more effective at terminating ventricular arrhythmias at lower energy levels and have a greater first-shock efficacy than monophasic waveforms. Biphasic defibrillators are also smaller, lighter and portable due to smaller capacitors and less battery power required.
e. Energy from shock is directed across the heart. No evidence to show adverse effects on the foetus.

2.6 Resuscitative Hysterotomy / Perimortem Caesarean Section (PMCS)

In women over 20 weeks of gestation, if there is no response to correctly performed CPR **within 4 minutes of maternal collapse** or if resuscitation is continued beyond this, then PMCS should be undertaken to assist maternal resuscitation (GTG No. 56, 2020).

2.6.1 Rationale

a. Primary: Increase chance of maternal ROSC by two important mechanisms:
   i. Reduces blood flow to the uterus.
   ii. Relieves diaphragmatic pressure and aortocaval compression.
b. Secondary: May save a viable foetus.

2.6.2 Location

a. Perform at the location of resuscitation. Moving to the operating theatre is not recommended as it causes significant delay.

2.6.3 Incision

a. Use incision with most rapid access. It may be midline vertical incision or suprapubic transverse incision.
b. Midline abdominal incision and a classical uterine incision give the most rapid access. However, many obstetricians prefer suprapubic transverse incision.

2.6.4 Preparation

a. Scalpel and cord clamp.
b. The doctrine of "best interests of the patient" would apply to conduct of this procedure being carried out without consent. (GTG No. 56, 2019, MMC Guideline, 2019).

Malaysian Medical Council (MMC) Guideline: Good Medical Practice 2019

In a situation where a patient is unable to give consent due to being under influence of alcohol or drugs or confused or comatose, and emergency lifesaving intervention is necessary, and there are no relatives or next-of-kin present to give consent, then the attending doctor and a colleague, a registered medical practitioner, may take it as consent given and manage the patient in the patient's best interests.

c. Consent from next of kin if available should be taken and should not delay the PMCS due to its time sensitive nature.

2.6.5 Before 20 weeks of gestation, there is no proven benefit from delivery of the foetus and placenta (GTG No. 56, 2019).

2.6.6 All facilities should be equipped with a perimortem caesarean set.

4-MINUTE RULE: PERIMORTEM CAESAREAN SECTION MAY SAVE LIVES.

2.6.7 ERC guidelines 2021 recommends delivery within 5 minutes of collapse if no ROSC. However, ERC guidelines 2025 de-emphasises 5 minutes and emphasis immediate preparation for resuscitative hysterotomy.

2.6.8 Resuscitative hysterotomy steps:

a. Get into the abdomen
   i. Position: Left lateral
   ii. Pour antiseptic on the abdomen
   iii. No need to drape
   iv. Midline vertical incision from umbilicus to symphysis pubis / Lower transverse abdominal incision

b. Get into the uterus
   i. Perform classical caesarean section
   ii. Cut through placenta if necessary

c. Get the baby out
   i. Deliver head or breech
   ii. Fundal pressure to assist

d. Cord and placenta
   i. Clamp umbilical cord and cut
   ii. Hand baby to neonatal resuscitation team
   iii. Deliver placenta via MRP/CCT
   iv. Intramuscular oxytocin 10 IU
   v. Intramuscular carboprost 250 mcg

e. Close the abdomen: Closure during arrest is not recommended by RCOG GTG 56 and may be harmful.
   i. Do not attempt formal closure during arrest. Priority is maternal resuscitation. Another option is to pack the abdomen quickly and continue CPR. The obstetrician should exercise clinical judgment in handling this scenario.
   ii. Single layer uterine closure
   iii. Simple rectus closure
   iv. Continuous skin closure

f. Post resuscitative care
   i. Broad spectrum antibiotics
   ii. Check for bleeding once circulation restored
   iii. Intensive care monitoring

2.7 Risk Management

2.7.1 Documentation: Accurate documentation is essential in all cases of maternal collapse, irrespective of resuscitation outcome.

2.7.2 Incident reporting: All cases of maternal collapse should generate a clinical incident form and the care should be reviewed through the clinical governance process.

2.7.3 Training and drills: All life support training programs shall incorporate adaptations of CPR specific to pregnant women. Every maternity department should have regular drills on generic life support and the management of maternal collapse as life support training improves resuscitation skills. Small group multidisciplinary interactive practical training is recommended to improve the management of maternal collapse.

2.7.4 Team debriefing: Debriefing is recommended for the woman, the family and staff involved in the event.

2.8 Additional Notes

2.8.1 ABC or CAB?

a. In general, maternal collapse with no known cause, confusion arises when the patient's pulse is not detected. Hence both approaches ABC or CAB are both important for resuscitation.
   i. When the pulse is absent, start with C, and then AB.
   ii. When the pulse is present but breathing is absent, start with A.

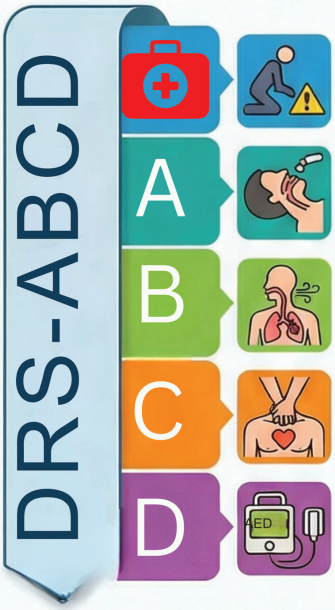
b. Why the confusion?
   i. In the majority of adult collapse, cardiac arrest is the main cause.
   ii. In pregnancy, due to 3P (Progesterone, Pressure, Potential of aspiration), airway or breathing arrest may be more common than cardiac arrest.
      - **P**rogesterone: As pregnancy comes along with significant elevation of progesterone and oestrogen level. Progesterone causes widespread capillary engorgement and fluid retention in the mucous membranes of the upper airway; this leads to narrowing of airway passage and increases likelihood of obstruction. Oedematous tissue is also more friable and prone to bleeding, making intubation a more difficult procedure.
      - **P**ressure: Intraabdominal pressure increases along pregnancy, and this pressure pushes the diaphragm upwards as much as 4 cm. Thoracic circumference increases about 6 cm but is still insufficient to prevent reduced residual lung volume created by the elevated diaphragm. Increases in oxygen demand in normal pregnancy also contribute to more incidence of breathlessness in pregnancy.
      - **P**otential of aspiration: Due to progesterone effect, lower oesophageal sphincter tone is reduced, making patients more prone to gastric acid reflux. Mechanical pressure from the gravid uterus on the stomach further increases chances of gastric contents being pushed up to the oesophagus. Delayed gastric emptying time in normal pregnancy also increases risk and volume of aspiration.

2.8.2

ABC approach was introduced in the 1950s and was formally adopted into training by the American Heart Association (AHA) in 1966. Data in 1990–2000 showed immediate initiation of cardiac compression is the most critical element for survival. In 2010, the International Liaison Committee on Resuscitation (ILCOR), European Resuscitation Council (ERC), and AHA started recommending the CAB approach.

Take home messages:
- Perform CPR immediately if the pulse is absent or if you are unsure.
- Lateral Uterine Displacement (LUD) is essential to improve maternal circulation.
- Perform a resuscitative hysterotomy within 4 minutes of collapse.

Maternal Collapse Management: Obstetric Life-Saving Skills



Danger, Response, Shout

Ensure safety, check response using COWS mnemonic (Can you hear me? Open your eyes! What's your name? Squeeze my hand), and activate "Code Red" or call 999 immediately.



Airway Management

Open the airway (head tilt & chin lift and jaw thrust); consider early intubation by skilled personnel or use alternatives like Oropharyngeal Airway (OPA) or Laryngeal Mask Airway (LMA).

Breathing and Oxygen

Look, listen, and feel for normal breathing; if absent, provide high-flow oxygen and commence chest compressions immediately.

High-Quality Circulation

Perform compressions at a rate of 100-120 bpm at a depth of 5-6 cm using a 30:2 ratio before intubation and continue continuous compressions after intubation.

Defibrillation

Use an Automated External Defibrillator (AED) immediately if Ventricular Fibrillation (VF) or Pulseless VT is detected; shock levels and safety are the same as in non-pregnant patients.

Critical Maternal Modifications (>20 Weeks)

Relieve Aortocaval Compression

From 20 weeks gestation, the gravid uterus compresses the aorta and inferior vena cava, which can render CPR ineffective by reducing cardiac output.



Lateral Uterine Displacement (LUD)

Manually displace the uterus to the left; the **'Pull Technique'** using two hands is preferred over the **'Push Technique'** for better mechanical advantage.



Left Lateral Tilt

If LUD is not possible, place the mother on a firm wedge at an angle of 15-30 degrees to shift the uterine weight off the major blood vessels.

Differential Diagnosis (4H, 4T, 1E)

4H Factors	4T Factors	1E Factor
• Hypovolaemia • Hypoxaemia • Hypo/Hyperkalaemia • Hypothermia	• Thromboembolism • Toxicity • Tension Pneumothorax • Tamponade (cardiac)	• Always consider Eclampsia (may present as intracranial haemorrhage or reduced conscious level)

Resuscitative Hysterotomy (Perimortem C-Section)



The Critical Timing

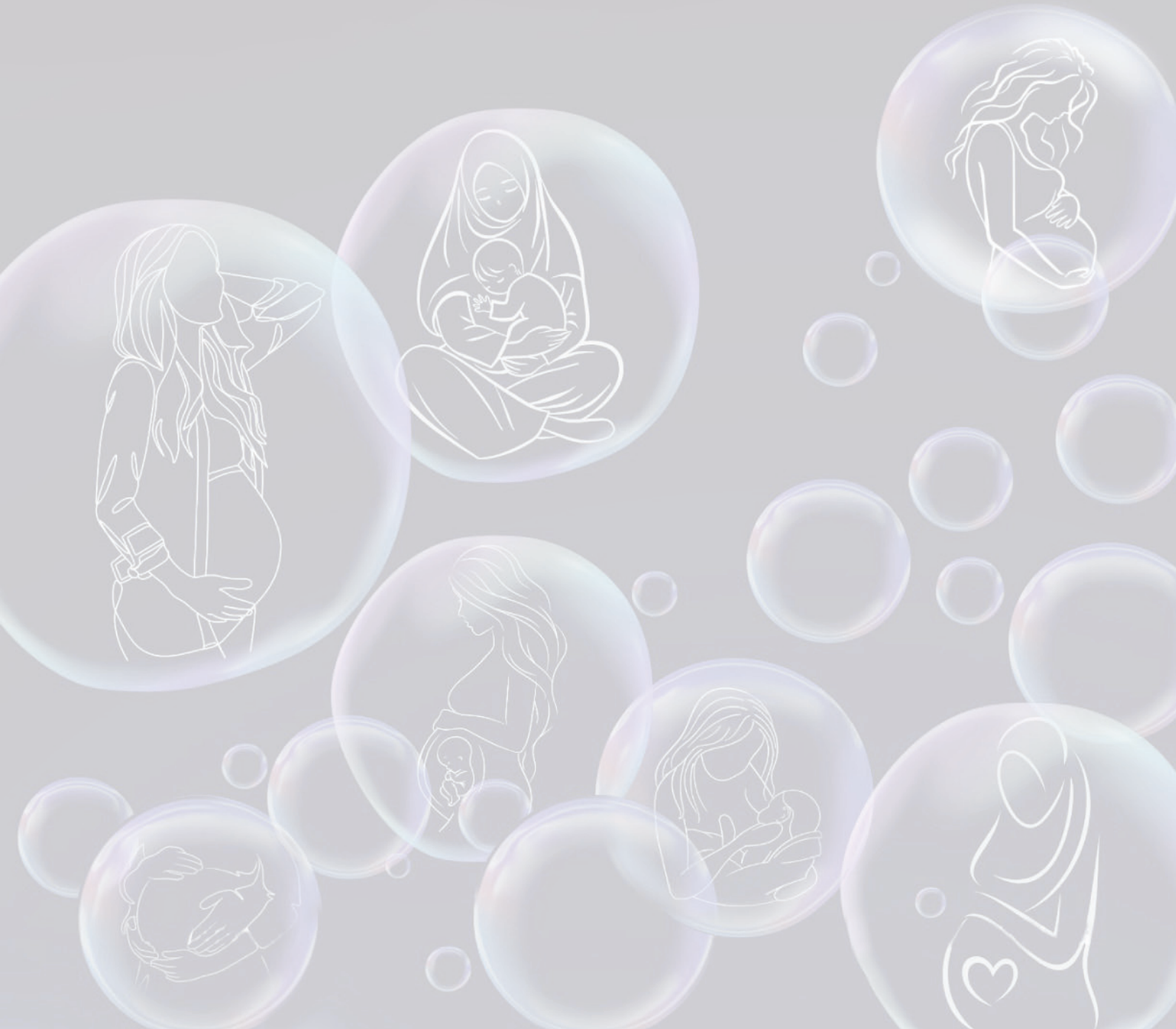
- **The 4-Minute Rule:** If Return of Spontaneous Circulation (ROSC) is not achieved within 4 minutes of collapse, PMCS should be initiated.
- **The primary goal** is maternal survival, with foetal salvage being a secondary benefit.
- **Physiological benefit**: Emptying the uterus relieves aortocaval compression and diaphragmatic pressure, significantly improving the effectiveness of CPR.
- **Location:** Perform the procedure at the site of the collapse (do not move to the OT).
- **No Delays:** Consent from next-of-kin should be sought if they are present, but the procedure must never be delayed to obtain it.
- **Surgical Technique:** A midline vertical abdominal incision and classical uterine incision are recommended for the fastest access.

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3.0

SEPSIS IN PREGNANCY AND PUERPERIUM



3.0 SEPSIS IN PREGNANCY AND PUERPERIUM

3.1 Introduction

Sepsis during pregnancy and the puerperium accounts for approximately 6.6% of maternal deaths globally (WHO Systematic Analysis, 2025). Pregnancy and the puerperium are associated with altered immune function, increasing susceptibility to severe infection compared with non-pregnant women. Early recognition and prompt treatment are therefore critical, as delays in antibiotic administration are associated with reduced survival.

It is important to recognise that sepsis is not synonymous with Systemic Inflammatory Response Syndrome (SIRS). SIRS is a non-specific physiological response and may occur in a range of non-infectious conditions such as trauma, burns, and pancreatitis. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3) introduced the quick Sequential Organ Failure Assessment (qSOFA) score as a tool to predict mortality and prolonged ICU stay in patients with suspected or confirmed infection. Since its introduction, multiple studies have evaluated its role as a screening tool for sepsis.

The National Early Warning Score 2 (NEWS2) had the highest sensitivity for sepsis detection (73.1 %; specificity 81.6 %), compared with qSOFA (23.1 %; specificity 96.6 %), SIRS (28.2 %; specificity 94.3 %), and MEWS (Modified Early Warning System) (48.7 %; specificity 88.1 %). qSOFA may be better used to identify patients at higher risk of clinical deterioration however, it performed poorly as a screening tool for sepsis (Prescott et al., 2026).

The obstetrically modified qSOFA (omqSOFA) score was developed by Carle et al. (2023) through collaboration between the UK Obstetric Surveillance System (UKOSS), the Intensive Care Society Maternal Critical Care Working Group and several UK academic maternity units to better account for the physiological changes in pregnancy.

3.2 Learning Objectives

a. To define sepsis
b. To identify the different causes and clinical presentations of sepsis
c. To use NEWS2 as a screening tool for sepsis
d. To understand the role of omqSOFA as an indicator for severe sepsis
e. To manage sepsis in pregnancy and puerperium

3.3 Definition of Sepsis

3.3.1 According to WHO, (Statement on Maternal Sepsis, 2017):

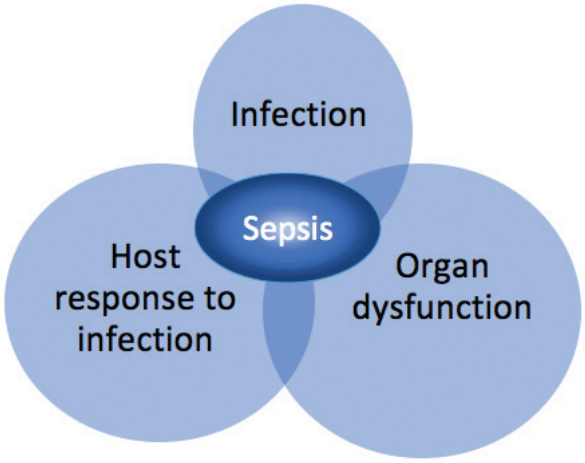
a. Maternal sepsis is a life-threatening condition defined as organ dysfunction resulting from infection during pregnancy, childbirth, post-abortion, or postpartum period.
b. All ***unwell*** pregnant women or postpartum women ***with/without fever*** must be reviewed by a medical officer and ***screened for sepsis*** upon presentation.

3.3.2 According to the Third International Consensus Definitions for Sepsis and Septic Shock (2016),

a. Sepsis is a life-threatening organ dysfunction caused by dysregulated host response to infection.
b. Septic shock is sepsis with persistent hypotension requiring vasopressors to maintain mean arterial pressure (MAP) ≥ 65 mmHg and an elevated serum lactate level > 2 mmol/L despite adequate fluid replacement therapy.

3.3.3 In essence, sepsis requires 3 components, as shown below in **Figure 10**.

Figure 10: Components of sepsis



3.4 Early assessment

The aim of early assessment is:

3.4.1 To assess patient's overall condition based on the NEWS2 scoring system.

a. NEWS2 was created as a deterioration detection tool, but has been shown to have the highest sensitivity for identifying potential sepsis amongst all the early warning scoring systems.

b. **Table 4** shows the parameters used to calculate the NEWS2 score.

TABLE 4: Parameters used to calculate NEWS2 score

Physiological parameters	Score						
	3	2	1	0	1	2	3
Respiration rate (per minute)	≤ 8			12–20			≥ 25
SpO_2 Scale 1 (%)	≤ 91	92–93	94–95	≥ 96			
SpO_2 Scale 2 (%)	≤ 83	84–85	86–87	88–92 ≥ 93 on air	93–94 on oxygen	95–96 on oxygen	≥ 97 on oxygen
Air or oxygen?		Oxygen		Air			
Systolic blood pressure (mmHg)	≤ 90	91–100		111–219			≥ 220
Pulse (per minute)	≤ 40		41–50	51–90	91–110	111–130	≥ 131
Consciousness				Alert			CVPU
Temperature (°C)	≤ 35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥ 39.1	

c. SpO_2 Scale 1 is used for most patients with normal lung function.

d. SpO_2 Scale 2 is used for patients with hypercapnic respiratory failure (e.g., COPD) who have a lower target oxygen saturation range.

TABLE 5: Interpretation of NEWS2 scores		
NEW score	**Clinical risk**	**Response**
Aggregate score 0–4	Low	Ward-based response
Red score Score of 3 in any individual parameter	Low–medium	Urgent ward-based response*
Aggregate score 5–6	Medium	Key threshold for urgent response*
Aggregate score 7 or more	High	Urgent or emergency response**

* Response by a clinician or team with competence in the assessment and treatment of acutely ill patients and in recognising when the escalation of care to a critical care team is appropriate.

** The response team must also include staff with critical care skills, including airway management.

3.4.2 **Table 5** shows how to interpret the NEWS2 scores.

a. A score of ≥ 5 warrants urgent review and clinical correlation for sepsis. A score of 3 in any single parameter is considered significant even if the total score is low and should prompt escalation of care.

3.4.3 To screen for the most likely source of sepsis.

a. Take a focused history based on the presenting complaint.
b. Do a quick systemic screen through all systems to ensure no other sources of sepsis.
c. Perform a general examination to confirm the source of sepsis.

3.4.4 **Table 6** shows the common signs of infection based on system.

TABLE 6: Common signs of infection based on system	
SYSTEM	**PRESENTATION**
Central nervous system	Confusion/fitting/headache/altered mentation
Respiratory system	Cough/shortness of breath
Gastrointestinal system	Diarrhoea/vomiting/abdominal pain
Urinary system	Dysuria/pyuria/haematuria/loin pain
Dermatological system	Rashes/open wounds/abscess
Reproductive system	Foul-smelling per vaginal discharge or liquor

3.5 Stabilisation and Resuscitation

3.5.1 Management of sepsis should always start with stabilisation of the patient concurrent with the sepsis Hour-1 Bundle. The fundamental concepts are as follows:

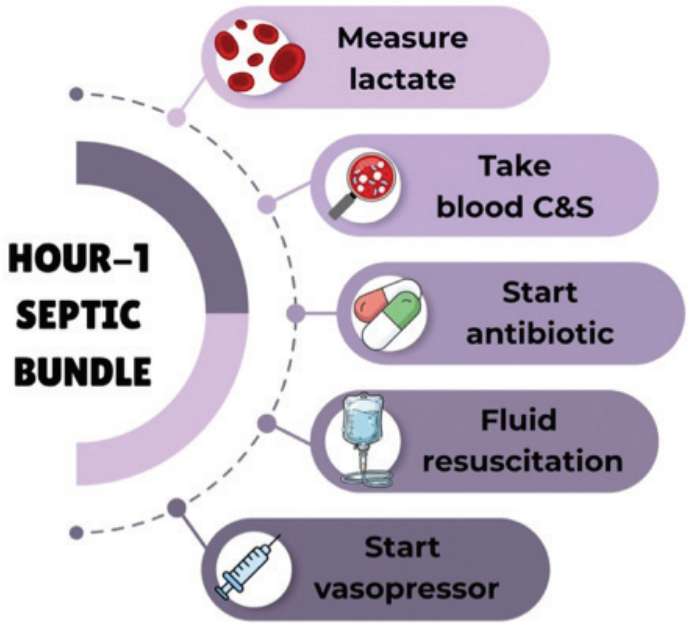
a. Call for help.
b. Check for ABC and start CPR if the patient is unconscious.
c. Start continuous SpO_2, BP, HR and cardiac monitoring.
d. Insert 2 large bore cannulas (14 – 16 gauge) and send blood for serum lactate, venous blood gas, full blood count, renal profile, liver function test, coagulation profile and blood glucose level.
e. Arterial blood gas (ABG) should be done for patients with respiratory distress. Normal findings in pregnancy include hypocapnia ($PaCO_2$ ~ 30 mmHg) and compensated respiratory alkalosis.
f. Insert CBD for strict urine output monitoring. Oliguria is a sign of organ dysfunction.
g. Consider CTG for women ≥ 28 weeks POG.

REMEMBER THAT 'STABILISATION AND RESUSCITATION' SHOULD BE DONE CONCURRENTLY WITH 'URGENT MANAGEMENT'.

3.5.2 Sepsis Hour-1 Bundle:

a. The five critical elements of the Hour-1 Bundle are displayed in **Figure 11**; these interventions must be initiated within 60 minutes of a sepsis diagnosis, though completion within that timeframe is not mandatory.

Figure 11: Hour-1 Septic Bundle



b. If the initial serum lactate is >2 mmol/L, a repeat measurement should be performed within 2–4 hours to assess response to resuscitation and ongoing tissue hypoperfusion.
c. Blood cultures should be obtained as early as possible and ideally prior to antibiotic administration, provided this does not delay treatment. If a specific source of infection is suspected, appropriate site-specific cultures should also be taken (e.g. urine culture in suspected pyelonephritis).
d. Empiric broad-spectrum antibiotics should be initiated within 1 hour of recognising sepsis. Where beta-lactam antibiotics are used, prolonged infusion is preferred over bolus dosing to optimise pharmacokinetic and pharmacodynamic efficacy. Escherichia coli and Group B *Streptococcus* account for the majority of maternal sepsis cases; however, Group A *Streptococcus* is associated with the most severe disease and poorest outcomes.
e. Fluid resuscitation should be initiated in patients with hypotension or a lactate level of ≥4 mmol/L. In patients with lactate levels between 2–4 mmol/L, fluid resuscitation should be considered based on the overall clinical picture and evidence of hypoperfusion.
f. In the general population, an initial bolus of **30 mL/kg** is recommended. However, the RCOG suggests starting with 20 mL/kg in pregnant patients to account for pregnancy-related physiological changes and to reduce the risk of fluid overload (RCOG Green-top Guideline No. 64, 2024). The latest Surviving Sepsis Campaign recommends balanced crystalloids (e.g. Hartmann's solution) in preference to normal saline, as large volumes of saline may lead to hyperchloremic metabolic acidosis and adverse outcomes (Surviving Sepsis Campaign, 2026). The use of starches and gelatin-based colloids (e.g. Gelafundin) is not recommended.
g. Fluid resuscitation should be started in the first hour and should be completed within 3 hours. Actual amount and rate of fluid resuscitation should be titrated based on on-going assessment of the clinical condition.
h. Noradrenaline should be used as the first choice to maintain MAP ≥ 65 mmHg during or after fluid resuscitation.

3.5.3 Subsequent management:

a. Any woman with sepsis in a district hospital should be transferred to a specialist hospital as soon as possible.
b. During transfer, patients must be escorted by the senior most medical personnel available.
c. Vital signs should be monitored every 15 minutes during the transfer.
d. Urine output should be monitored hourly. Adequate output should be more than 0.5 ml/kg/hr.
e. Once in a tertiary centre, patients should be managed by a multidisciplinary team (O&G, Medical, Anaesthetist, Infectious Disease team) and monitored in the Intensive Care Unit (ICU)/High Dependency Unit (HDU).
f. All previous blood investigations and imaging must be traced and treated accordingly.
g. The source of infection should be removed, if possible, e.g., evacuation of POC for endometritis or surgical drainage of abscess. Early source control (within 6 hours) seems to have better outcomes.
h. Best supportive care should be initiated to prevent complications from sepsis.
    i. Consider IV hydrocortisone 200 mg/day if unable to maintain MAP with fluid resuscitation and vasopressors.
    ii. Maintain Hb 7 - 9 g/dL or higher if bleeding is anticipated.
    iii. Patients requiring oxygen support should be started on high flow nasal cannula (HFNC).
    iv. Start insulin sliding scale if blood sugar is persistently >10 mmol/L.
    v. Sodium bicarbonate infusion should not be routinely given if pH ≥ 7.2.
    vi. Start LMWH (based on weight) if there is no immediate risk of bleeding for VTE prevention.
    vii. Consider starting proton pump inhibitors (PPI) if ICU admission or high gastro-intestinal bleed risk.
    viii. Oral intake should be encouraged unless contraindicated.
    ix. IV immunoglobulins have not been shown to improve outcomes.
i. Monitor for organ dysfunction.
    i. GI system : Paralytic ileus
    ii. Urinary system : Oliguria/anuria
    iii. Hematologic system : Thrombocytopenia/DIVC
    iv. CNS : Altered mental status
    v. CVS : Hypotension
    vi. Respiratory system : Tachypnoea
j. Consider repeating blood investigations after 6-8 hours to monitor progression of organ dysfunction if the patient is not improving clinically.

3.5.4 Risk stratification during admission for sepsis

a. Following the diagnosis of sepsis, patients should be **closely monitored** for early signs of clinical deterioration and the need for escalation of care.
b. While **NEWS2** has demonstrated higher sensitivity as a screening tool for sepsis, **qSOFA** is more useful for identifying patients at increased risk of poor outcomes and may assist in guiding escalation and critical care referral.
c. It is important to note that the omqSOFA score is NOT meant to be used as a screening tool to diagnose sepsis. Rather, it is a tool to predict the likelihood of severe sepsis in a patient who is ALREADY diagnosed with sepsis.

d. The components of omqSOFA score are as mentioned in **Table 7**.

TABLE 7: omqSOFA score

PARAMETER	omqSOFA Cut-off (for pregnancy/ puerperium)	SCORING
Respiratory rate	≥ 25 breaths/min	1 point
Systolic BP	≤ 90 mmHg	1 point
Mental status (GCS)	GCS <15	1 point

e. All patients with an omqSOFA score of ≥ 2 are considered at **high risk of severe sepsis** and care should be escalated accordingly.

3.5.5 Timing of Delivery

a. Delivery should be considered if delivery would be beneficial to mother or baby or both.
b. Decisions for delivery and mode of delivery should be made by a senior specialist/consultant.
c. Decisions for antenatal corticosteroids for preterm delivery should be individualised.
d. In cases of severe sepsis where delivery is not imminent, continuous CTG monitoring is preferred. Maternal resuscitation and stabilisation must take precedence over foetal intervention. Any evidence of foetal distress should be interpreted as a potential indicator of deteriorating maternal status and should prompt immediate reassessment of the mother.

3.6 Risk management

3.6.1 Training: Healthcare workers should be trained in recognising sepsis and implementation of Hour-1 bundle.

3.6.2 Early intervention and escalation: Timely intervention and escalation of care is essential once sepsis is suspected.

3.6.3 Documentation: Ensure proper and contemporaneous documentation.

3.6.4 Debriefing: Patients and their partners should be appropriately debriefed at the time of diagnosis and whenever there are significant changes in the patient's condition.

3.6.5 Infection control: The most effective way to reduce the risk of sepsis is through infection prevention. Strict infection control measures including rigorous hand hygiene must be enforced, alongside appropriate antimicrobial stewardship.

Take home messages:

- Maintain a high index of suspicion for sepsis in all unwell pregnant women.
- The Hour-1 Sepsis Bundle must be initiated as soon as sepsis is suspected.
- Delays in sepsis management can lead to significant morbidity or maternal death.

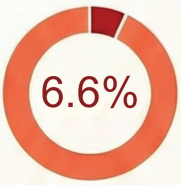
Maternal Sepsis: Rapid Recognition and the Hour-1 Bundle

Sepsis accounts for 6.6% of maternal deaths globally, and pregnancy-related physiological changes often mask its early signs.



IDENTIFICATION AND RISK ASSESSMENT

SEPSIS IS AN INFECTION WITH ORGAN DYSFUNCTION
Life-threatening dysregulated host response to infection during or after pregnancy.



6.6% of Global Maternal Deaths
Leading cause of mortality; requires high index of suspicion.



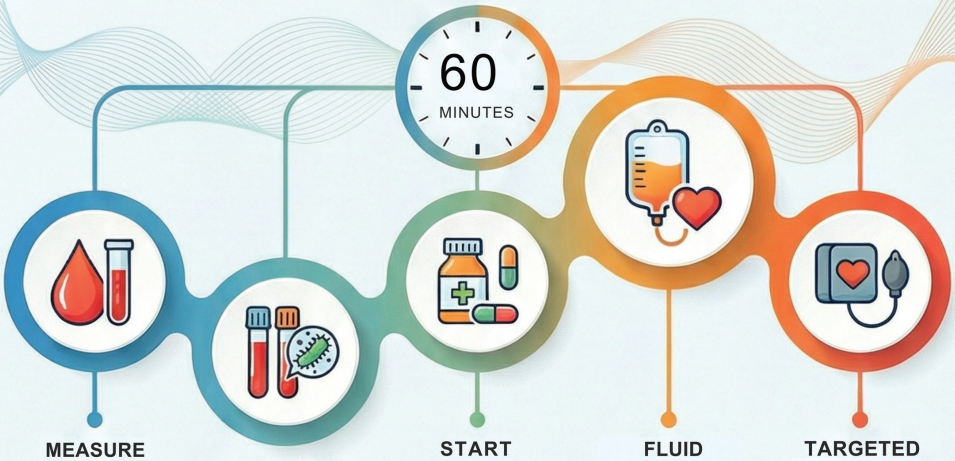
CLINICAL CONCERN OVERRIDES omqSOFA SCORING
Pregnancy masks early signs; always screen unwell women regardless of fever status.

omqSOFA Score

RESPIRATORY RATE	SYSTOLIC BP	MENTAL STATUS
≥ 25 breaths/min	≤90 mmHg	GCS<15
1 point	1 point	1 point

(Note: A total score of ≥ 2 indicates high risk of severe sepsis.)

THE HOUR-1 SEPSIS BUNDLE
INITIATE FIVE ELEMENTS WITHIN 60 MINUTES



MEASURE LACTATE
Measure initial lactate level immediately.

OBTAIN BLOOD CULTURES
Before antibiotics, if possible, without delay.

START EMPIRICAL ANTIBIOTICS
Broad-spectrum antibiotics.

FLUID RESUSCITATION
Administer 20ml/kg balanced crystalloids.

TARGETED HAEMODYNAMIC GOALS
Use vasopressors (Noradrenaline) to maintain MAP ≥ 65mmHg.

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4.0

PRE-ECLAMPSIA AND ECLAMPSIA



4.0 PRE-ECLAMPSIA AND ECLAMPSIA

4.1 Introduction

Hypertensive disorders of pregnancy (HDP) remain one of the leading causes of preventable maternal and perinatal morbidity and mortality. Early classification and risk stratification are essential to guide appropriate management, including the use of low-dose aspirin for prevention where indicated. Prompt treatment of acute severe hypertension and eclamptic seizures is critical, as these are obstetrics emergencies.

Magnesium sulphate remains the first-line medication for both the prevention and treatment of eclampsia, while acute severe hypertension requires the use of rapid-acting antihypertensive agents. The timing and place of birth should be planned with senior clinical input, ensuring a coordinated multidisciplinary approach. Postnatal follow-up and long-term cardiovascular risk counselling are vital components of comprehensive care for women affected by HDP.

4.2 Learning Objectives

a. To identify women at risk of developing eclampsia
b. To manage hypertensive crisis and eclampsia effectively

4.3 Definition

4.3.1 According to the International Society for the Study of Hypertension in Pregnancy (ISSHP) 2021, hypertension is diagnosed when blood pressure (BP) thresholds:

a. Hypertension in pregnancy: BP ≥ 140/90 mmHg, based on the average of at least two measurements more than 4 hours apart.
b. Severe hypertension: ≥ 160 systolic or ≥ 110 diastolic on any single reading and it is recommended to treat immediately.
c. Hypertensive emergency when SBP ≥ 180 mmHg.

4.3.2 Blood pressure should be measured using an appropriate cuff in a sitting position. If mid arm circumference is ≥ 33 cm, use a large cuff.

4.4 Classification of Hypertensive Disease in Pregnancy

4.4.1 Chronic hypertension: hypertension before pregnancy or < 20 weeks gestation.

4.4.2 Gestational hypertension: New onset hypertension ≥ 20 weeks without significant proteinuria/organ dysfunction.

4.4.3 Pre-eclampsia: New onset hypertension ≥ 20 weeks with one or more of the following:

a. Proteinuria
   i. 24-hour urine protein ≥ 300 mg/day or PCI ≥ 30 mg/mmol.
   ii. If the dipstick is the only test available, 2+ is equivalent to ≥ 300 mg/day proteinuria.
   iii. Significant proteinuria reflects advanced disease and is associated with poorer prognosis.
   iv. 24-hour urine collection for proteinuria is still indicated to confirm nephrotic syndrome which has implications for thromboprophylaxis.

b. Maternal end organ dysfunction
   i. Acute kidney injury (Creatinine > 90 umol/L)
   ii. Liver involvement (AST/ALT > 40 IU/L)
   iii. Neurological complications (eclampsia, altered mental status, blindness, stroke, clonus, severe headache and persistent visual scotomata)
   iv. Haematological complications (thrombocytopenia, DIVC, haemolysis)

c. Uteroplacental dysfunction
   i. Foetal growth restriction
   ii. Abnormal Doppler
   iii. Stillbirth

PRE-ECLAMPSIA CAN BE DIAGNOSED IN THE PRESENCE OF NEW ONSET END ORGAN DYSFUNCTION, EVEN WITHOUT PROTEINURIA.

4.4.4 **Eclampsia**: A convulsive condition associated with pre-eclampsia (UK's National Institute for Health and Care Excellence (NICE) 2019, revised 2023).

OCCURRENCE OF TONIC-CLONIC SEIZURES IN PREGNANCY SHOULD BE TREATED AS ECLAMPSIA UNTIL PROVEN OTHERWISE.

4.4.5 White-coat HPT: does not require treatment unless BP in the clinic exceeds 160/110 mmHg. These women are at higher risk of developing gestational HPT and pre-eclampsia than normotensive women.

4.4.6 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.

4.4.7 Unclassified hypertension: Hypertension ≥ 20 weeks with no BP recorded before 20 weeks.

4.5 Risk factors for Hypertensive Disease in Pregnancy

4.5.1 At booking, all patients should be assessed to identify high and moderate risk factors for pre-eclampsia. All patients diagnosed with pre-eclampsia are at risk of developing eclampsia.

4.5.2 The identified risk factors are outlined in **Table 8**.

TABLE 8: Risk of pre-eclampsia

HIGH RISK FACTORS	MODERATE RISK FACTORS
• HPT, pre-eclampsia or eclampsia in previous pregnancy	• Primigravida
• Chronic hypertension	• Maternal age ≥ 40 years
• Pre-existing chronic kidney disease	• Maternal *BMI ≥ 30 kg/m^2 at booking **BMI ≥ 35 kg/m^2 according to NICE 2019*
• Diabetes Mellitus (Type 1 & Type 2)	• Family history of pre-eclampsia
• Autoimmune diseases (e.g. SLE, antiphospholipid syndrome)	• Pregnancy interval > 10 years
	• Multiple pregnancy

*Source: Handbook of Obstetrics Guideline, 2024

4.6 Prevention of Hypertensive Disease in Pregnancy

Start medication for pre-eclampsia prevention if presence of:

ONE (1) High Risk Factor OR TWO (2) Moderate Risk Factors

4.6.1 Aspirin prophylaxis:

a. Offer low dose Aspirin starting from 11-14 weeks until 36 weeks of gestation (ISSHP 2021). Prophylactic aspirin can reduce the risk of preterm pre-eclampsia by over 62 % when started prior to 16 weeks of gestation.
b. Prophylactic aspirin dose:
   i. < 40 kg: Tab Cardiprin 100 mg on night
   ii. ≥ 40 kg: Tab Aspirin 150 mg on night

4.6.2 Calcium prophylaxis:

a. As our population has presumptively low calcium intake, consider calcium supplement starting 20 weeks of gestation to reduce both preterm and term pre-eclampsia.
b. Prophylactic calcium dose: Tab Calcium carbonate 1g BD.
c. However, the latest evidence published by Cochrane Library suggests that calcium supplementation, compared with placebo, may result in little to no difference in the incidence of pre-eclampsia (Cochrane, 2025).

4.6.3 Exercise:

a. Recommended 3 times per week, average 15 minutes per session, combination of aerobic, strength and flexibility.
b. This has been associated with less weight gain and less hypertensive disorders in pregnancy without any adverse effect.

4.7 Investigations and Surveillance

4.7.1 Baseline tests (taken when hypertension first detected or at booking if chronic HPT):

a. FBC
b. BUSE/creatinine
c. LFT
d. Urine PCI/24h urine protein
e. Midstream urine for analysis (to exclude UTI if proteinuria)
f. Ultrasound for foetal growth, liquor, Dopplers (if indicated)

4.7.2 Monitoring (gestational HPT or pre-eclampsia without severe features):

a. BP monitoring 1 to 2 times per week depending on BP control.
b. Monitor biochemical profile as per clinical concern.
c. Serial foetal assessment: growth scan every 2 to 4 weeks; CTG only when clinically indicated.

4.8 Management of Hypertensive Disease in Pregnancy

4.8.1 Criteria for Admission

a. Blood pressure of ≥ 150/100 mmHg
b. Any following symptoms:
   i. Severe headache
   ii. Visual disturbance
   iii. Epigastric pain
   iv. Chest heaviness or shortness of breath
   v. Abnormal blood investigation
   vi. Evidence of foetal compromise
   vii. Any clinician concern or poor social support

4.8.2 Emergencies: Acute Severe Hypertension

a. Acute Severe hypertension

i. Act immediately. Close/continuous maternal-foetal monitoring and involve obstetricians.

ii. Targets: Reduce SBP to < 150, DBP 90–100, avoiding rapid drops to prevent placenta hypoperfusion.

iii. Antihypertensive agents: First line medication- oral nifedipine, IV labetalol, or IV hydralazine (ISSHP, 2021), please refer **Figure 12**.

- Oral nifedipine and IV labetalol are equally effective when BP ≥ 160/110 mmHg.
- If SBP ≥ 180 mmHg, blood pressure should be controlled preferably by parenteral antihypertensive agents.
- Parenteral hydralazine is used when labetalol is contraindicated or fails to control BP.
- IV GTN can be considered in cases of refractory hypertension.

iv. Magnesium Sulphate ($MgSO_4$):

- Indicated in severe hypertension with concomitant preeclampsia, biochemical derangement, related complications e.g., acute pulmonary oedema, HELLP syndrome, abruptio placenta.
- $MgSO_4$ is also indicated for foetal neuroprotection if delivery is planned prior to 34 weeks gestation (NICE, 2023).

MaHTAS Information Brief (015/2025)

Evidence demonstrates IV nicardipine is effective as a fast-acting anti-hypertensive agent for hypertensive emergencies in pregnancy. Safety profile is generally tolerable.

*MaHTAS: Cawangan Penilaian Teknologi Kesihatan, Bahagian Perkembangan Perubatan, KKM.

Figure 12 illustrates rapid-acting antihypertensive medication options, which should be chosen based on local protocols and contraindications.

Figure 12: Antihypertensive medications protocol



v. Delivery

- If the pregnancy is at term, consider delivery once blood pressure has stabilized.
- Indications for delivery in any hypertensive disorder of pregnancy HDP at any gestational age include (ISSHP, 2021):
  - Abnormal neurological features (such as eclampsia, severe intractable headache or repeated visual scotomata)
  - Repeated episodes of severe hypertension despite maintenance treatment with three classes of antihypertensive agents
  - Pulmonary oedema
  - Progressive thrombocytopenia or platelet count <50 x10^9/L
  - Abnormal and rising serum creatinine
  - Abnormal and rising liver enzymes

- Hepatic dysfunction (INR > 2.0 in absence of DIVC or warfarin), haematoma or rupture
- Abruptio placentae
- Non-reassuring foetal status (including death)

A DECISION TO DELIVER SHOULD NOT BE SOLELY BASED ON THE DEGREE OF EITHER PROTEINURIA OR HYPERURICAEMIA.

b. Eclampsia

i. Prior to developing eclampsia, some patients might develop features of impending eclampsia. The signs or symptoms before a seizure are shown in **Figure 13**.
ii. Other differential diagnoses that should be considered are shown in **Figure 14**.

Figure 13: Features of impending eclampsia

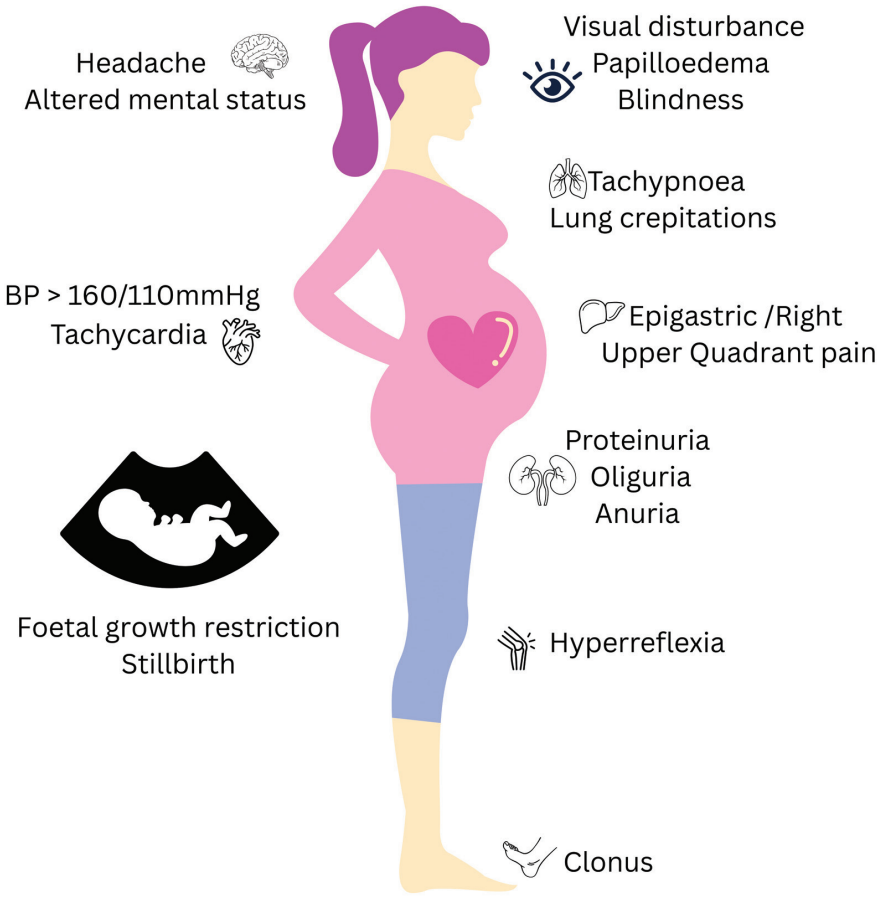
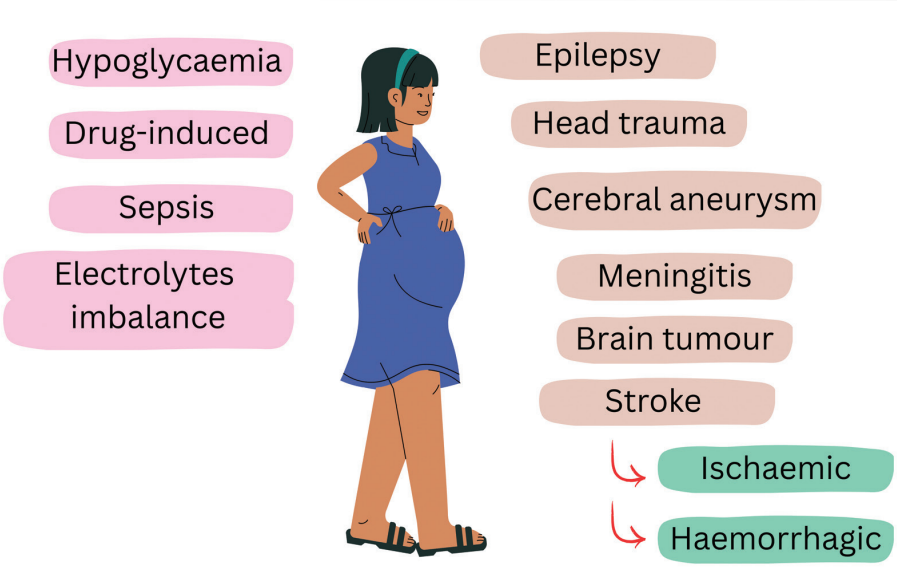


Figure 14: Differential diagnosis of pre-eclampsia



iii. The steps in the management of eclampsia should follow the following sequence in **Figure 15**:

Figure 15: Steps in the management of eclampsia



STEP 1: RESUSCITATION

- ABC = Airway, Breathing, Circulation
- Initiate CODE RED
- Oxygen 15 L/min via HFM
- Left lateral and recovery position
- Suction to clear airway to avoid aspiration
- Blood: PE profile/Electrolytes/RBS/GSH or GXM

STEP 2: IV MAGNESIUM SULPHATE ($MgSO_4$)

Protocol for usage of $MgSO_4$ are shown in **Table 9** and **10**.

TABLE 9: Magnesium Sulphate Protocol

OPTIONS	ROUTE	LOADING	MAINTENANCE
1	IV	4 g (8 ml) of $MgSO_4$ in 20 ml NS over 15 mins * Dilute 8 ml of $MgSO_4$ from vial + 12 ml of NS	1 g/1hr = 5 ml/hr * Dilute 4 vials (20 ml) pure $MgSO_4$ + 30 ml NS
2	IM	5g (10 ml) of $MgSO_4$ + 1 ml lignocaine 2 % at each buttock (total 10 g)	5g (10 ml) of $MgSO_4$ + 1 ml lignocaine 2% at alternate buttock every 4 hours
3	IV & IM	IV $MgSO_4$ 4g in 20 ml NS over 15 mins **AND** IM 5 g of $MgSO_4$ at each buttock (Total of 14 g - ISSHP 2021)	Either IV or IM maintenance route

TABLE 10: Magnesium Sulphate Protocol for Recurrent Seizure

OPTIONS	ROUTE	LOADING	MAINTENANCE
1	IV	2 g (4 ml) of $MgSO_4$ over 15 mins * Dilute 4 ml of $MgSO_4$ from vial + 8 ml of NS	Continue with either IV or IM maintenance route
2	IM	5 g (10 ml) of $MgSO_4$ + 1 ml lignocaine 2 % at buttock	
To take serum magnesium level before repeated bolus of $MgSO_4$ whenever possible			

STEP 3: CONTROL BLOOD PRESSURE

Table 11 shows antihypertensive protocols for selected drug options.

TABLE 11: Antihypertensives protocol

OPTIONS	ROUTE	LOADING	MAINTENANCE
		SYRINGE PUMP	
Selective alpha-1 antagonist & non-selective beta- 2	IV Labetalol	1st dose: 25 mg (5 ml) over 2 minutes. 2nd dose: 25-50 mg (5-10 ml) after 30 minutes if BP still ≥ 160/110 mmHg 3rd dose: 50 mg (10 ml) to be considered if SBP ≥ 180 mmHg after 30 minutes **MAXIMUM 3 DOSES**	Undiluted 8 ampoules (40 ml) in 50cc syringe Start at 4 ml/hr (20 mg/hr) Double the dose every 30 minutes (4 → 8 → 16 → 32 ml/hr) **MAXIMUM 32 ML/HR (160MG/HR)**
Vasodilator *Direct relaxant effect on vascular smooth muscle (arterioles > veins)	IV Hydralazine	1st dose: 5 mg (2.5 ml) slow bolus *Dilute 1 ml (20 mg) + 9 ml NS 2nd dose: 5 mg after 30 minutes if BP still uncontrolled 3rd dose: 5 mg after 30 minutes if BP still uncontrolled **MAXIMUM 3 DOSES**	2 ampoules (2 ml) + 38 ml NS Start at 5 ml/hr (5 mg/hr) Increase by 1 ml/hr every 30 minutes **MAXIMUM 10 ML/HR (10MG/HR)**
Relaxation of vascular smooth muscle, dilatation of peripheral arteries & veins (veins > arteries)	IV GTN	No loading dose	2 ml (10 mg) + 48 ml NSD5% or NS *1 ampoules = 10 ml = 50 mg Start at 1.5 ml/hr (5 mcg/min) Increase 1.5 ml/hr (5 mcg/hr) every 5 minutes **MAXIMUM 60 ML/HR (200 MCG/MIN)**

STEP 4: FLUID MANAGEMENT

- Strict input and output charting
- Avoid fluid overload, maintenance total fluid should not exceed 80 ml per hour or 1 ml/kg/hour
- Careful with fluid challenge
- Diuretics should not be given in the event of oliguria unless APO

STEP 5A: MATERNAL MONITORING

Tables 12-14 provide a comprehensive summary of magnesium toxicity symptoms and their management protocols.

TABLE 12: Maternal monitoring for $MgSO_4$ toxicity

SIGNS	FREQUENCY OF MONITORING	AIM
Blood pressure	15 minutes	≤ 135/85 mmHg
Pulse rate	15 minutes	60 - 100 bpm
Respiratory rate	30 minutes	16-20 breath/min
SpO_2	30 minutes	≥ 95%
Urine output	Hourly	≥ 0.5 ml/ kg/hr
Deep tendon reflex of knee	Hourly	Presence of reflex

*Source: Handbook of Obstetrics Guideline, 2024

TABLE 13: $MgSO_4$ toxicity level

MAGNESIUM LEVEL (mmol/L)	CLINICAL FEATURES
2.0 - 4.0	Therapeutic range
3.5 - 5.0	ECG changes Prolonged PR interval Widened QRS complex
5.5 - 6.5	Loss of deep tendon reflex
> 12.5	Maternal collapse

*Source: Handbook of Obstetrics Guideline, 2024

TABLE 14: Suspected $MgSO_4$ toxicity		
CLINICAL SIGNS	**ASSESSMENT**	**MANAGEMENT**
Reduce urine output (<0.5 ml/kg/hr for 4 hours)	• Hydration status • Lungs examination • Review fluid balance • Check deep tendon reflexes, RR, PR • Send RP and serum Mg if available	• If tendon reflex is ABSENT, stop $MgSO_4$ • If tendon reflex is present, adjust $MgSO_4$ infusion rate according to serum creatinine and Mg level
Absence of deep tendon reflex	• Check RR & PR • Send RP and serum Mg if available	• Stop $MgSO_4$ infusion • Perform ECG to look for prolonged PR interval or wide QRS complex • Consider restarting infusion at lower dose when reflexes return
Respiratory depression	• Check RR & PR • Send RP and serum Mg if available	• Stop $MgSO_4$ infusion • Maintain airway, put patient in recovery position • Consider giving IV calcium gluconate
Respiratory arrest	• Assessment as per maternal collapse • Send RP and serum Mg if available	• Stop $MgSO_4$ infusion • Maintain airway with intubation and ventilation • Give IV calcium gluconate
ANTIDOTE FOR MAGNESIUM TOXICITY	**10 ML OF IV CALCIUM GLUCONATE 10% OVER 10 MINUTES**	

*Source: Handbook of Obstetrics Guideline, 2024

STEP 5B: FOETAL MONITORING

This can be done by performing CTG or Daptone to monitor the foetal heart rate.

STEP 6: DELIVERY

- Delivery is the definitive treatment for eclampsia.
- Timely delivery after maternal stabilisation.
- Multidisciplinary care: Obstetrician, anaesthesiologist, physician and sneonatologist.
- Antenatal corticosteroid can be given if indicated, but delivery should not be delayed to complete the course.

STEP 7: POSTPARTUM CARE

- Monitoring in HDU/ICU.
- Postpartum monitoring (eclampsia may occur up to 7 days post-delivery).
- Adjustment of antihypertensive drugs. Aim to stop or reduce parenteral anti hypertensives and to initiate oral antihypertensive. Aim BP ≤ 135/85 mmHg.
- Choices of postpartum antihypertensive medication are shown in **Table 15**.

TABLE 15: Postpartum antihypertensives

SAFE FOR BREAST FEEDING	INSUFFICIENT DATA ON SAFETY
Labetalol	ARBs
Nifedipine	Other ACEIs except Enalapril and Captopril
Metoprolol	
Amlodipine	
Enalapril	
Captopril	
Atenolol	

- High risk discharge: Communicate with a health clinic for monitoring of BP and adjustment of antihypertensive medication.
- Documentation in discharge summary.
- Follow up in the postnatal clinic.
- Counselling should be done about the risks of recurrent gestational hypertension (at least 4 %) or pre-eclampsia (at least 15 %) in future pregnancy (ISSHP, 2021).
- Long-term: Cardiovascular and renal follow-up, counselling on recurrence in future pregnancies. Need a pre-pregnancy consultation.

4.9 Management of Complications

4.9.1 Management of Acute Pulmonary Oedema in Eclampsia

a. Early Recognition

i. Sudden dyspnoea, tachypnoea.
ii. Crepitations on auscultation.
iii. Hypoxaemia (SpO_2 < 90 %).
iv. Pink frothy sputum, orthopnoea.
v. Chest X-ray: pulmonary congestion.

b. Immediate Supportive Measures

i. Position: Sit patient upright (semi-Fowler's) to reduce venous return.
ii. Oxygen therapy: High-flow O_2 via face mask to maintain SpO_2 more than 94 %.
iii. Airway: Secure airway if severe distress or altered mental status; may require intubation/ventilation.

c. Pharmacologic Management

i. Diuretics: IV frusemide 20 – 40 mg slowly, may repeat as needed, ensure strict monitoring of urine output.
ii. Antihypertensives: Control severe hypertension (IV labetalol, IV hydralazine, or oral nifedipine).
iii. $MgSO_4$: Continue for seizure prophylaxis (unless contraindicated).
iv. Fluid restriction: Strict fluid balance, avoid overload (maintenance around 80 ml/hr; no routine IV fluids).

d. Circulatory Support

i. Avoid aggressive fluid resuscitation (risk of worsening pulmonary oedema).
ii. Insert Foley catheter and monitor urine output hourly.

e. Definitive Management

i. Delivery: Once mother stabilises, plan timely delivery.
ii. Multidisciplinary team: Obstetrician, anaesthetist or intensivist, physician and neonatologist

f. Critical Care

i. Transfer to ICU/HDU if persistent hypoxaemia, hemodynamic instability, or need for ventilatory support.
ii. Monitor: SpO_2, BP, HR, urine output, electrolytes.

g. Post-Crisis Care

i. Continue antihypertensives, diuretics as indicated.
ii. Watch out for recurrent pulmonary oedema (especially in the postpartum period).
iii. Educate patients on recurrence risk in future pregnancies.
iv. Suggest for Echocardiogram to exclude cardiac causes.

4.9.2 Management of HELLP Syndrome in Eclampsia

a. Early Recognition

Early detection of HELLP syndrome in women with pre-eclampsia/ eclampsia is vital for reducing maternal and perinatal morbidity. Approximately 20-30 % of pre-eclampsia progress to HELLP syndrome.

i. Laboratory diagnosis:
ii. Haemolysis: LDH≥ 600 IU/L, peripheral smear with schistocytes.
iii. Elevated liver enzymes: AST/ALT ≥ 70 IU/L.
iv. Low platelets: < 150,000/mm³.

b. Severity of HELLP Syndrome can be assessed by using the Mississippi Classification as shown in **Table 16**.

TABLE 16: Mississippi Classification of HELLP Syndrome

Class	Platelet Count ($x10^9$/L)	AST or ALT (IU/L)	LDH (IU/L)	Severity
Class I	< 50	≥ 70	≥ 600	Severe
Class II	≥ 50 – 100	≥ 70	≥ 600	Moderate
Class III	≥ 100 – < 150	≥ 40	≥ 600	Mild

*Source: American Journal of Obstetrics and Gynaecology, 1999

EARLY RECOGNITION REQUIRES VIGILANCE, AS SYMPTOMS MAY BE NON-SPECIFIC AND OVERLAP WITH SEVERE PRE-ECLAMPSIA.

c. Immediate Measures

i. Stabilisation of maternal condition takes priority.

- Airway, Breathing, Circulation (ABC): Oxygen, IV access, continuous monitoring.
- Seizure control: Magnesium sulphate (loading and maintenance doses as per eclampsia protocol).
- Blood pressure control: IV labetalol, IV hydralazine, or oral nifedipine.
- Monitoring: Hourly urine output, BP, reflexes, fluid balance, and foetal heart rate if viable pregnancy.

ii. Anticipated Complications

- Disseminated intravascular coagulation (DIVC)
- Acute renal failure
- Pulmonary oedema
- Hepatic rupture/haematoma
- Intracranial haemorrhage
- Maternal and perinatal death

iii. Definitive Management

- Delivery is the only definitive treatment of HELLP syndrome. Timing and method depend on maternal and foetal conditions.
- Multidisciplinary approach involving obstetrician, anaesthesiologist, haematologist, neonatologist, intensive care physician & transfusionist is essential.
- Timing of delivery: Expedite delivery irrespective of gestation.
- Mode of delivery:
  - Caesarean section if urgent delivery is indicated.
  - Vaginal delivery if advance labour. May require assisted delivery.
- Corticosteroids for foetal lung maturity if less than 36 weeks.
- Blood products:
  - Platelets transfusion recommended if < 20 $x10^9$/L (any mode of delivery) or < 50 $x10^9$/L (if caesarean).
  - Packed red blood cells transfusion for anaemia or haemolysis.
  - Fresh frozen plasma and cryoprecipitate if DIVC

d. Post-Crisis Care

Care continues after delivery and maternal stabilisation:

i. Continue magnesium sulphate infusion for 24 hours after delivery or last seizure (in eclampsia) whichever later.
ii. Monitor BP, platelets, liver enzymes, renal function for at least 72 hours postpartum.
iii. Control BP with oral/IV antihypertensives as needed.
iv. Avoid excessive fluid infusion; risk of pulmonary oedema is high.
v. Neonatal evaluation by paediatrics/neonatology team.
vi. Counselling regarding recurrence risk and preconception care for future pregnancies.

4.9.3 Management of Intracranial Bleeding in Eclampsia

a. Early Recognition

i. Sudden, severe headache.
ii. Loss of consciousness or persistent coma after seizure control.
iii. Focal neurological deficit (haemiparesis, aphasia).
iv. Persistent uncontrolled hypertension.
v. CT/MRI brain: confirm diagnosis.

b. Immediate Stabilisation

i. Airway, Breathing, Circulation (ABC)
   - Secure airway, provide oxygen, intubate if GCS < 8.

ii. Position
   - Head elevation 30 degree to reduce intracranial pressure (ICP).

iii. Seizure control
   - Continue magnesium sulphate (unless toxicity/ contraindication).

iv. BP management
   - Cautious reduction to target systolic 140–150 mmHg and diastolic 90–100 mmHg using IV labetalol, IV hydralazine, or oral nifedipine.
   - Blood pressure control and cerebral perfusion are key to preventing secondary brain injury and achieving safe outcomes.

v. Fluid management
   - Strict input and output, avoid overload (may worsen cerebral oedema).

c. Definitive Management

i. Neuroimaging (CT/MRI) to confirm type/extent of haemorrhage.
ii. Neurosurgical consultation.
iii. Intracranial pressure (ICP) control:
   - Head elevation, mannitol (if signs of raised ICP and neurosurgical advice).
   - Avoid hyperventilation unless for impending herniation.

d. Obstetric Management

i. Delivery is definitive treatment for eclampsia but should only proceed after maternal stabilisation.
ii. If pregnancy is viable and mother stable, expedite delivery (usually caesarean section).
iii. If unstable, for planned delivery after maternal stabilisation.
iv. Multidisciplinary input (obstetrician, anaesthetist, neurosurgeon, ICU).

e. Critical Care

i. Admit to ICU/HDU for close monitoring.
ii. Continuous vital signs monitoring.
iii. Monitor urine output to avoid fluid overload.
iv. Avoid hypotension to maintain cerebral perfusion.
v. Correct coagulopathy if present.

f. Post-Crisis Care

i. Long-term neurologic rehabilitation if neurological deficit presents.
ii. Counselling on recurrence risk and need for preconception care in future pregnancies.
iii. Psychological support for patients and family.

4.9.4 Long term cardiovascular risks after pre-eclampsia/eclampsia

a. Hypertension
Women are 3–4 times more likely to develop chronic hypertension within 5–15 years postpartum. Risk is higher in those with early-onset (less than 34 weeks) or severe disease.

b. Ischaemic Heart Disease
Lifetime risk of coronary artery disease (CAD) is 2-fold higher. Shared risk factors include endothelial dysfunction, vascular remodelling and persistent metabolic changes.

c. Stroke
Risk of both ischaemic and haemorrhagic stroke is increased by 1.5–2 times. Higher risk if eclampsia occurred or if there was HELLP syndrome.

d. Heart Failure and Cardiomyopathy
Up to 4-fold increased risk of heart failure, particularly HFpEF (heart failure with preserved ejection fraction). Peripartum cardiomyopathy risk is also higher.

e. Chronic Kidney Disease
Endothelial injury during pre-eclampsia predisposes to CKD and proteinuria, which further increases CVD risk.

f. Metabolic Syndrome and Diabetes
Women with a history of pre-eclampsia are more likely to develop insulin resistance, type 2 diabetes, dyslipidaemia, and obesity, which contribute to later CVD.

g. Premature Mortality
Overall cardiovascular mortality is increased, particularly in women with recurrent preeclampsia or early-onset disease. Advice for annual medical check-up for high risk women (recurrent pre-term pre-eclampsia and family history of cardiovascular disease) particularly first 5-10 years after hypertensive pregnancy when the disease appeared most frequently.

*Source: American College of Cardiology 2019, ISSHP 2021, European Heart Journal 2023

Take home messages:
- All pregnant women should be screened for the risk of pre-eclampsia.
- Start Aspirin and Calcium Carbonate in women with identified risk factors.
- Maintain a low threshold for administering $MgSO_4$ and parenteral antihypertensive in cases of severe pre-eclampsia.
- All seizures in pregnancy should be treated as eclampsia until proven otherwise.
- Delivery is the definitive management for eclampsia.

Emergency Management of Pre-eclampsia and Eclampsia: The 7-Step Life-Saving Protocol



1. **Resuscitation (ABC)**
Secure airway, initiate Code Red, and place patient in left lateral recovery position.



2. Seizure Control ($MgSO_4$)
Administer Magnesium Sulphate as the first-line medication for all eclamptic seizures.



3. Control Blood Pressure
Use rapid-acting IV Labetalol or Hydralazine to reduce BP below 150/100 mmHg.



5. Maternal and Foetal Monitoring
Monitor vital signs and monitor for $MgSO_4$ toxicity. Monitor foetal heart rate.



4. Strict Fluid Management
Restrict total fluid intake to maximum 80 ml/hr to prevent pulmonary oedema.



6. Delivery
Delivery is the only definitive treatment; expedite once the mother is stable.



7. Postpartum Care
Continue monitoring in ward; change to oral antihypertensives when stable.

The Magnesium Sulphate ($MgSO_4$) Regime



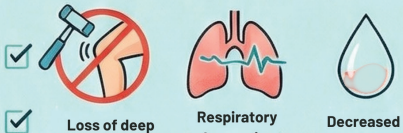
Loading Dose
(The 4g IV Standard)
Administer 4g (8ml) $MgSO_4$ in 20ml Normal Saline over 15 minutes to stabilise.



Maintenance Dose
(The 1g/hr Continuous)
Infuse 1g/hr IV; if seizures recur, give a 2g IV bolus over 15 minutes.

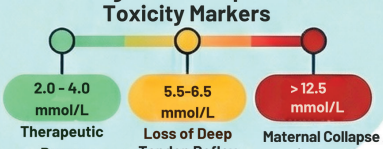
MONITORING & TOXICITY PROTOCOL

Signs of $MgSO_4$ Toxicity



- Loss of deep tendon reflexes
- Respiratory depression
- Decreased urinary output

Magnesium Sulphate Toxicity Markers



2.0 - 4.0 mmol/L	5.5-6.5 mmol/L	> 12.5 mmol/L
Therapeutic Range	Loss of Deep Tendon Reflex	Maternal Collapse / Respiratory Arrest

The Life-Saving Antidote



10ml of 10% IV Calcium Gluconate over 10 minutes if toxicity occurs.





Prophylactic Screening & Medication
Start Aspirin (150mg) and Calcium Carbonate (1g BD) in women with identified risk factors.



The Clinical Threshold
Maintain a low threshold for $MgSO_4$ in severe pre-eclampsia; all seizures are eclampsia until proven otherwise.



Rapid Stabilisation Priority
Rapidly stabilise the patient with $MgSO_4$ and airway management before delivery.



Delivery as Definitive Cure
Delivery is the only definitive cure for eclampsia.



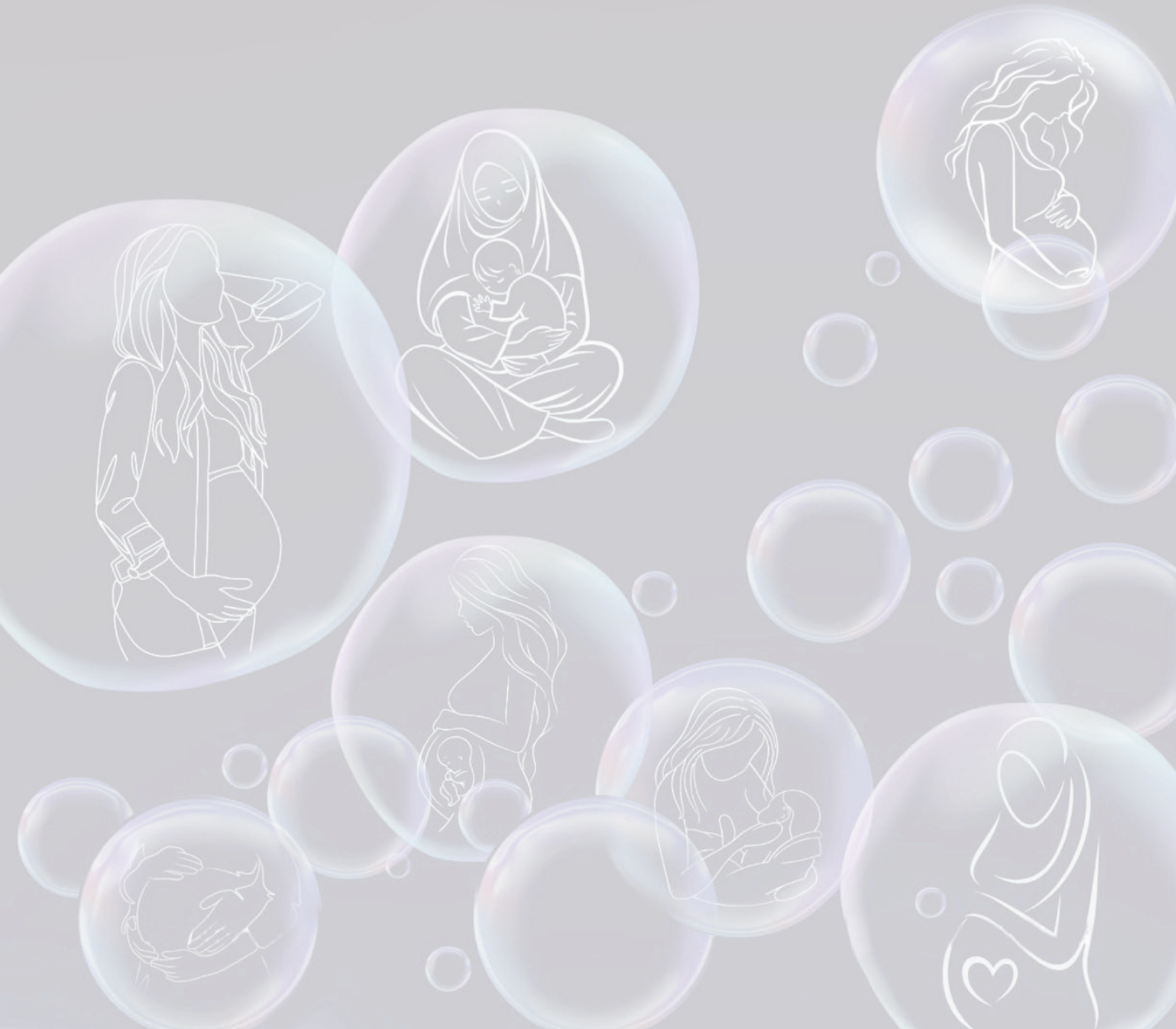
Postpartum Vigilance
Continue monitoring and care in the postpartum period.

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5.0

POSTPARTUM HAEMORRHAGE



5.0 POSTPARTUM HAEMORRHAGE

5.1 Introduction

Postpartum haemorrhage (PPH) is one of the leading causes of maternal morbidity and mortality worldwide and the most common form of major obstetric haemorrhage. Prompt recognition, prevention, and effective management are essential components of obstetric care. In Malaysia, post-partum haemorrhage still contributes as the leading cause of maternal mortality.

Early decisive action is critical during bleeding emergencies, every minute counts in saving a life. To ensure optimal outcomes, all staff members must remain up-to-date on the relevant clinical management and procedural standards. Prompt and effective response is essential.

5.2 Learning Objectives

a. To assess the severity of PPH
b. To determine the causes of PPH
c. To manage PPH efficiently

5.3 Definition

Postpartum haemorrhage (PPH) is defined as blood loss of more than 500 mls in a vaginal delivery or more than 1000 ml in a caesarean section birth. A more clinical definition is any blood loss from the genital tract sufficient to cause haemodynamic instability after birth (GTG No. 52, 2022). Patients with pre-existing anaemia or volume depletion exhibit a diminished physiological reserve, significantly impairing their ability to compensate for acute blood loss.

a. Primary PPH is when bleeding occurs within 24 hours after delivery.
b. Secondary PPH is when bleeding occurs after 24 hours until 6 weeks post-delivery.
c. Massive PPH is when bleeding occurs after delivery and exceeds blood loss of 1500 ml.

5.3.1 Stages of Labour

To understand postpartum haemorrhage, we need to know about the 3 stages of labour as shown in **Table 17**.

TABLE 17: Stages of labour	
First stage	• Begins with the onset of regular uterine contractions that cause cervical changes and ends with full cervical dilatation of 10 cm
Second stage	• Begins when cervical dilatation of 10 cm is reached and ends with the delivery of the foetus
Third stage	• Commences when the foetus is delivered and ends with the expulsion of the placenta

5.3.2 Physiology of the third stage of labour

a. Placental separation occurs at the time or soon after delivery. Contraction and retraction of the uterus reduce uterine volume and the area of placental attachment, which aids in placental separation. Inevitably, the bleeding uterine sinuses form a retroplacental clot which aids in detachment and subsequent expulsion of the placenta.
b. Traditionally, the third stage of labour is considered delayed if it is not completed within 30 minutes with active management or within 60 minutes with physiological management. However, the healthcare giver should be cautious as the risk of haemorrhage increases after 30 minutes (Hutchinson et al, 2025).
c. Options in management of the third stage of labour is summarised in **Table 18**.

TABLE 18: Management of third stage of labour	
ACTIVE MANAGEMENT	**PHYSIOLOGICAL MANAGEMENT**
Routine prophylactic uterotonics	No routine uterotonic agents
Cord clamping and cutting*	No cord clamping until cessation of cord pulsation or delivery of placenta
Controlled cord traction after signs of placental separation	Spontaneous delivery of placenta

*Source: NICE Guidelines No. 235, 2025.

d. Delayed cord clamping between 1-5 minutes is advocated unless there is concern about integrity of the cord or baby require resuscitation or further intervention.
e. Combination of ergometrine and oxytocin may be used instead of oxytocin alone in the absence of hypertension in any woman at increased risk of haemorrhage.
f. These are the steps in active management of the third stage of labour:

1. 10 IU intramuscular or 5 to 10 IU intravascular oxytocin should be given immediately after birth of the baby, before the cord is clamped and cut (after excluding multiple pregnancy).
2. Delayed cord clamping is done not earlier than 1 minute but before 5 minutes from foetal delivery.
3. Monitor patient's general condition, blood pressure, pulse rate and vaginal blood loss.
4. Palpate the uterus and ensure it is well contracted.
5. Deliver the placenta via controlled cord traction (CCT).
6. Document the timing of placental delivery.
7. Examine the placenta and membranes for completeness.
8. Estimate and document the blood loss.

5.4 Risk Factors

Risk-stratifying pregnant patients will give them the best care possible. Remember that risk factors may present antenatally or intrapartum and may change as the pregnancy progresses. To optimise safe delivery, women with high PPH risk should deliver in centres with on-site blood banks, with adequate intravenous access established early in the intrapartum period. Risk factors for PPH are shown in **Table 19**.

TABLE 19: Risk factors for PPH

ANTENATAL	INTRAPARTUM	POSTPARTUM
Grand multiparity	Prolonged labour	Undiagnosed genital tract trauma (perineal haematoma- if the degree of hypovolaemic shock does not correlate with the revealed blood loss)
Anaemia in pregnancy	Precipitated labour	Underestimated blood loss
History of PPH	Prolonged third stage	
Previous uterine scar (caesarean section/ myomectomy)	Infection (chorioamnionitis)	
Overdistended uterus (multiple pregnancy / macrosomia/ polyhydramnios)	Instrumental delivery	
Placenta praevia/Placenta Accreta Spectrum (PAS)	Shoulder dystocia	
Bleeding disorders (inherent/ iatrogenic)	General anaesthesia/ tocolytic agents	
Uterine fibroids		

*Source: Handbook of Obstetrics Guidelines, 2024

EARLY RECOGNITION OF PPH IS ESSENTIAL!

5.5 Management

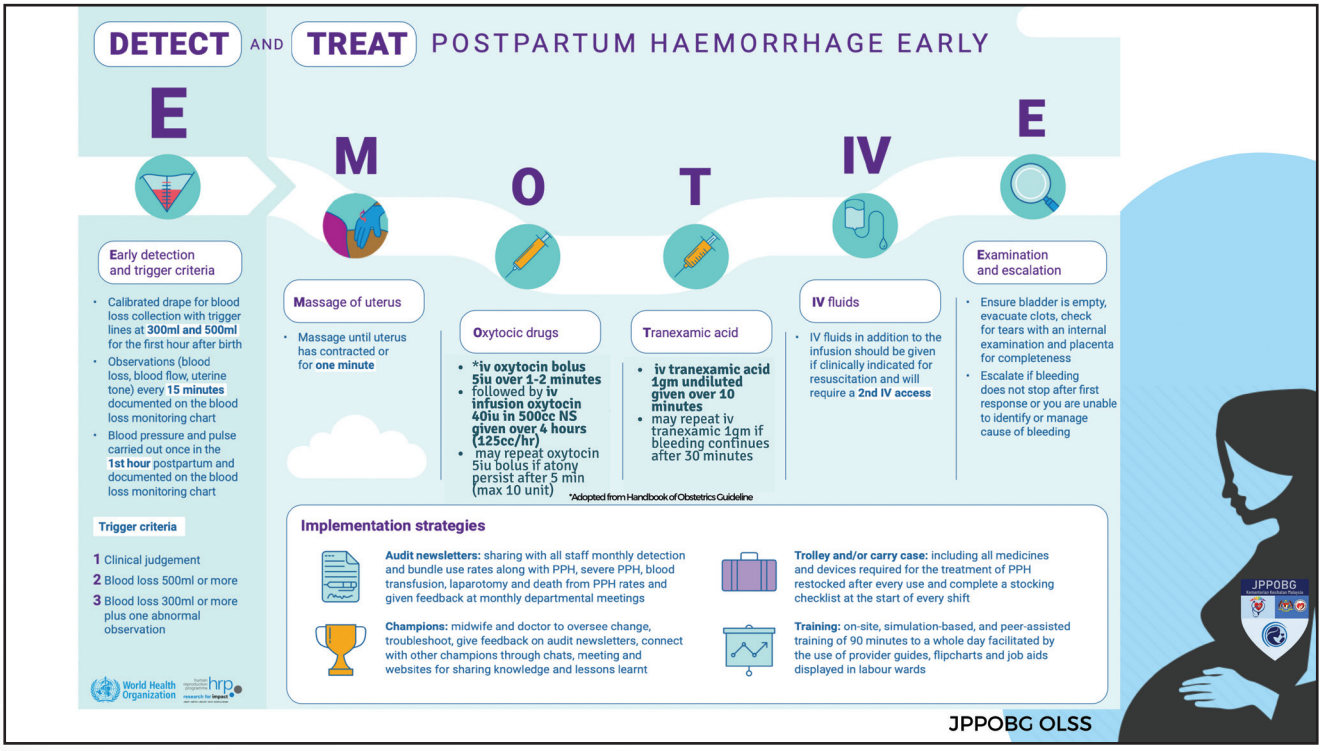
5.5.1 World Health Organisation (WHO), 2023 has recommended the use of E-MOTIVE to manage PPH. This method is thought to eliminate delays in diagnosis or treatment to improve patient outcome.

5.5.2 Key benefits of E-MOTIVE

a. **Reduces severe PPH**: A study in Nigeria, Kenya, Tanzania, and South Africa found that E-MOTIVE reduced severe PPH by 60 %.
b. **Improves detection OF PPH**: The E-MOTIVE detection protocol has shown a much higher detection rate (93.1 %) compared to usual care (51.1 %).
c. **Standardises management**: It provides a structured protocol for a coordinated response to a life-threatening emergency.
d. **Empowers healthcare providers**: The intervention is designed to be performed by midwives and other frontline health workers.

5.5.3 **Figure 16** shows E-MOTIVE diagram adopted from WHO, 2023.

Figure 16: E-MOTIVE diagram



5.5.4 (E) EARLY DETECTION

Early detection of PPH by precise estimation of actual blood loss during delivery is crucial in initiating the immediate management to reduce maternal morbidity and mortality. There are few methods to assess blood loss.

a. Subjective and objective methods

i. Visual estimation of blood loss
   - Use a customised pictogram (refer to a suggested pictogram in **Appendix 4A**). The values may differ in different centres and are often subjective and unreliable.

ii. Calibrated under-buttock drape during vaginal delivery (**Appendix 4B**)
   - Quantify the blood loss immediately after the delivery of the foetus and exclude the amniotic fluid and urine. Record the total volume of blood in the drape, especially the fluid after delivery of the placenta which is mainly blood.

iii. Blood suction collector during caesarean delivery
   - Mark or measure the amount of the amniotic fluid or irrigation fluid in the suction canister to estimate blood loss accurately.
   - Connect the collection bags under the patient's pelvis to the negative pressure blood collector.

iv. Weigh the blood-soaked items and clots
   - The equation used to calculate a blood-soaked is wet item in gram minus the dry item in gram. Weight in gram is equal to ml of blood (1 g equal to 1 ml). Create a list of dry weights of delivery items (e.g., sanitary pad, roller gauze etc).

BLOOD LOSS SHOULD BE ESTIMATED CONTINUOUSLY, RECOGNISING THAT VOLUME AND RATE MAY CHANGE OVER TIME AND REQUIRE REGULAR REASSESSMENT.

ACCURATE ESTIMATION ENABLES TIMELY DETECTION AND TREATMENT OF PPH.

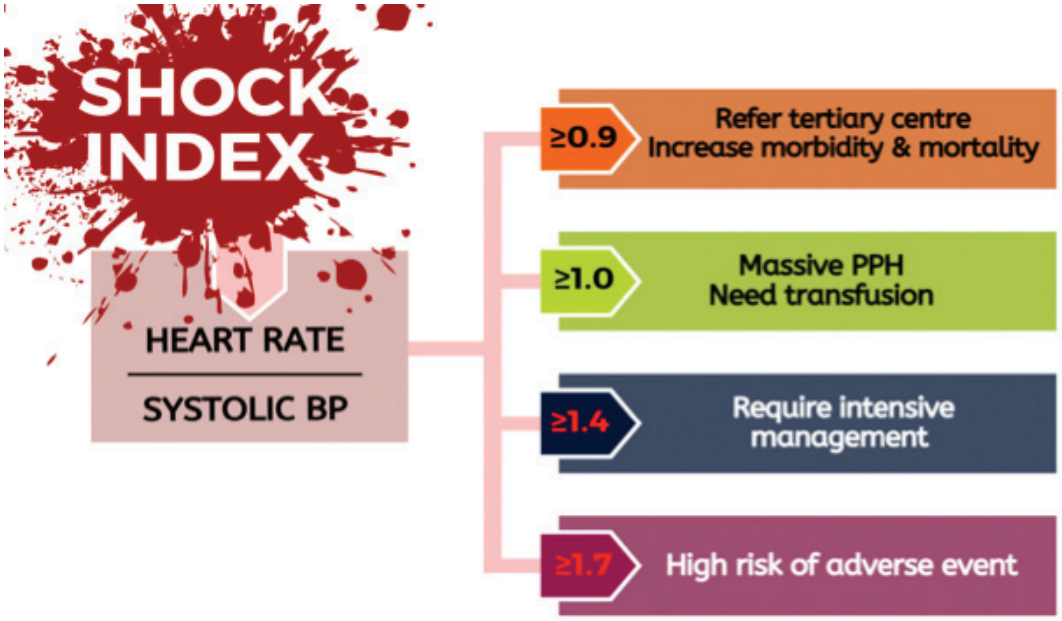
b. Clinical signs

i. Quick, comprehensive and precise bedside assessment should be done for all patients including the patient's conscious level and vital signs.
ii. Tachycardia may be an early sign of hypovolaemia.
iii. Remember to recognise and treat hypovolaemic shock early.
iv. Vital signs should be taken at least every 5 minutes after the third stage of labour in PPH cases.

c. Obstetric Shock Index (OSI)

i. Obstetric shock index is a simple bedside tool used in pregnancy and the postpartum period to detect early haemodynamic instability, especially from postpartum haemorrhage.
ii. In a pregnant woman, a **normal shock index is 0.7-0.9**.

Figure 17: Obstetric Shock Index and its significance



5.5.5 (M) MASSAGE OF UTERUS

This procedure, typically performed by a nurse or midwife after delivery, involves the application of firm pressure to the uterine fundus to stimulate uterine contraction and facilitate the expulsion of blood clots, thereby playing a critical role in the prevention of PPH.

5.5.6 (O) OXYTOCIC DRUGS

a. Oxytocic drugs are medications used to stimulate uterine contractions. They act by binding to oxytocin receptors in the myometrium, leading to an increase in intracellular calcium levels within uterine smooth muscle cells, which in turn triggers myometrial contraction.
b. Details are shown in **Table 20**.

TABLE 20: Medical management of PPH

NAME	DOSAGE & ROUTE	CONTRA -INDICATIONS	SIDE EFFECTS
Oxytocin 1 ampoule = 10 IU/ml	**Bolus** IM 10 IU or IV 5 IU May repeat every 5 min, max 10 - 20 IU **IV Infusion** Standard dilution 40 IU in 500 ml NS, start at 125 ml/hour for 4 hours	• Hypersensitivity to oxytocin	• Water intoxication • Hyponatraemia • Nausea • Vomiting • Arrhythmias • Anaphylaxis
Oxytocin/ Ergometrine 1 ampoule (1 ml) = 5 IU Oxytocin + 0.5 mg Ergometrine	IM 1 ampoule (1 ml) **(May repeat after 2 hours, max of 2 ml (2 amp)/24 hours)** **IV not recommended**	• Cardiac disease • Hypertensive crisis • Pre-eclampsia	• Nausea • Vomiting • Abdominal pain • Headache • Dizziness • Tinnitus
Carboprost (1 ampoule = 250 µg/1ml)	Deep IM 1 ampoule Repeat every 15 min, max 8 doses (2 mg) Mechanical or surgical management should be considered if atony persists after the **third dose**	• Cardiac disease • Renal disease • Hepatic disease • Asthma • Hypertension • Epilepsy • Caution in glaucoma	• Nausea • Vomiting • Diarrhoea • Hyperthermia • Flushing • Bronchospasm
***Carbetocin** (1 ampoule = 100 µg/ 1 ml) Long-acting synthetic oxytocin	**Bolus / IM** IV 1 ampoule administered over 1 minute Single dose, DO NOT REPEAT	• Hepatic disease • Renal disease Hypersensitivity to oxytocin or carbetocin	• Nausea • Vomiting • Flushing • Abdominal pain • Pruritus • Headache

***Carbetocin is for PPH prophylaxis, not treatment**

5.5.7 (T) TRANEXAMIC ACID (TXA)

a. TXA prevents PPH by inhibiting fibrinolysis. It acts as a synthetic antifibrinolytic agent that competitively blocks lysine-binding sites on plasminogen and plasmin, thereby preventing the formation of plasmin and subsequent breakdown of fibrin clots. This stabilises the formed clots and reduces ongoing bleeding from the placental site, without inducing uterine contraction.
b. Early use of IV TXA (**within 3 hours from birth**) in addition to standard care is recommended for women with PPH following vaginal birth or caesarean section (WHO, 2025).
c. Details are shown in **Table 21**.

TABLE 21: Tranexamic acid in prophylaxis of PPH

NAME	DOSAGE & ROUTE	CONTRA -INDICATIONS	SIDE EFFECTS
Tranexamic Acid	1 gm (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	• Active thromboembolism • Precaution in renal impairment and DIVC	• Nausea • Vomiting • Diarrhoea

5.5.8 (I) IV FLUIDS

a. Fluid resuscitation is a crucial component of PPH treatment.
b. Traditionally, a total volume of 3.5 litres of clear fluids (up to 2 litres of isotonic crystalloid as rapidly as possible, followed by up to 1.5 litres of colloid if blood is still not available) (GTG No. 52, 2016).
c. Rapid replacement is pertinent to prevent multi-organ failure or impairment.

**CONSIDER EARLY BLOOD TRANSFUSION IN PPH.
CRYSTALLOIDS SHOULD BE INFUSED
WHILE WAITING FOR BLOOD TRANSFUSION.**

**ACTIVATE MASSIVE TRANSFUSION PROTOCOL EARLY
IN MASSIVE PPH.**

5.5.9 (E) EXAMINATION AND ESCALATION

a. Ensure empty bladder.
b. Examination: A thorough examination is required to identify the cause of bleeding.
c. Escalation: If the initial bundle does not control the bleeding, care is escalated by calling for advanced help, performing surgery or referring the patient to a higher-level facility. Other causes of PPH should be excluded.

5.6 Cause-Specific Management of Postpartum Haemorrhage

Causes of PPH are shown in **Figure 18**.

Figure 18: Causes of PPH



5.6.1 Tone

Uterine atony is responsible for approximately 70–80 % of PPH cases. Initial management involves performing uterine massage and giving uterotonic medication. If still not successful to attain uterine contraction, then continue with the following:

a. Non-Surgical Management

i. Bimanual uterine compression

Place one hand at the fundus and insert the other hand (made into a closed fist) into the anterior fornix and push against the body of the uterus as shown in **Figure 19**. Maintain until bleeding is controlled and the uterus is contracted.

ii. Aortic compression

Press a closed fist downwards just above the umbilicus and slightly to the left as shown in **Figure 20**. Palpate to feel femoral pulses for effectiveness. If the femoral pulse is still palpable, it indicates the compression is not effective. This can be performed until help arrives.

Figure 19: Bimanual uterine compression



Figure 20: Aortic compression



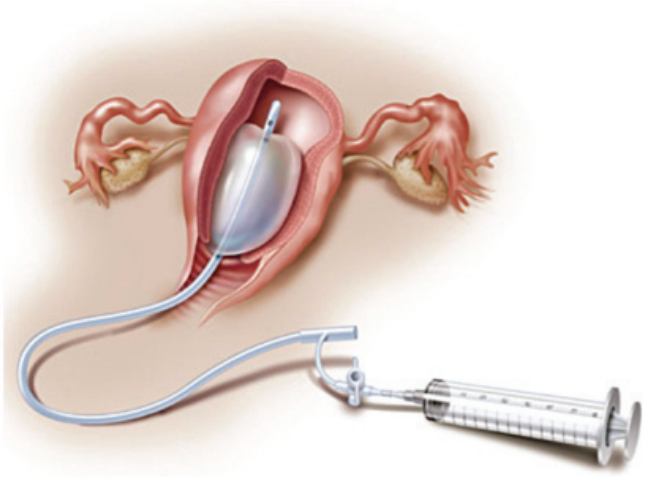
*Source: Sarawak Advanced Life Support in Obstetrics (SALSO), 2022

b. Mechanical management

i. Balloon tamponade

Balloon tamponade stops postpartum haemorrhage by inflating a balloon inside the uterus to compress bleeding vessels and achieve haemostasis. This can be done by using a Bakri balloon (**Figure 21**) and/or multiple Foley's Catheters attached together.

Figure 21: Balloon tamponade

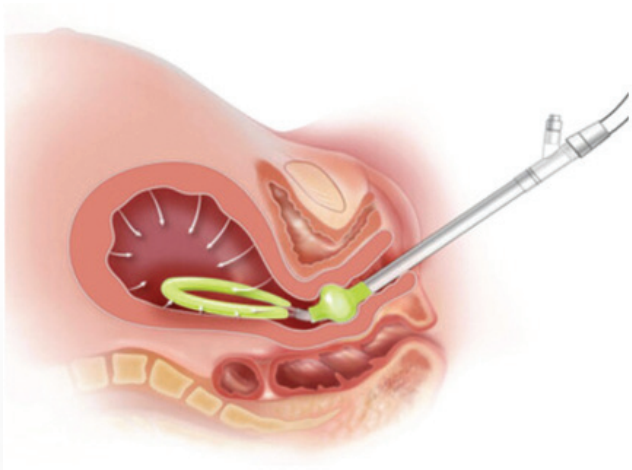


*Source: Photo taken from The Global Library of Women's Medicine (GLOWM) website

ii. Intrauterine vacuum device

The device (e.g., Jada System) is placed inside the uterus and connected to suction to create negative pressure within the uterine cavity, promoting uterine contraction and closure of bleeding vessels (**Figure 22**). This device should only be used by trained personnel. Contraindicated in uterine rupture or retained products of conception.

Figure 22: Intrauterine vacuum device



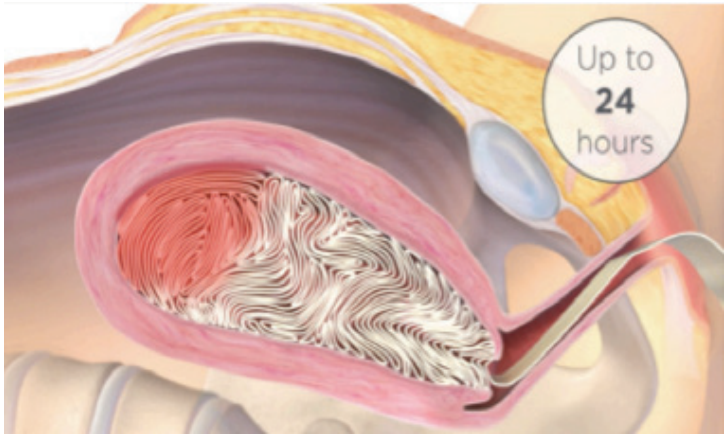
*Source: Photo from www.organonpro.com/en-us/product/the-jada-system

iii. Haemostatic tamponade gauze

This works by packing the uterus to apply pressure and promote clot formation, helping control postpartum haemorrhage as shown in **Figure 23**.

However, according to the latest recommendations by the World Health Organisation (2025), this method is no longer recommended for the management of postpartum haemorrhage.

Figure 23: Haemostatic tamponade gauze



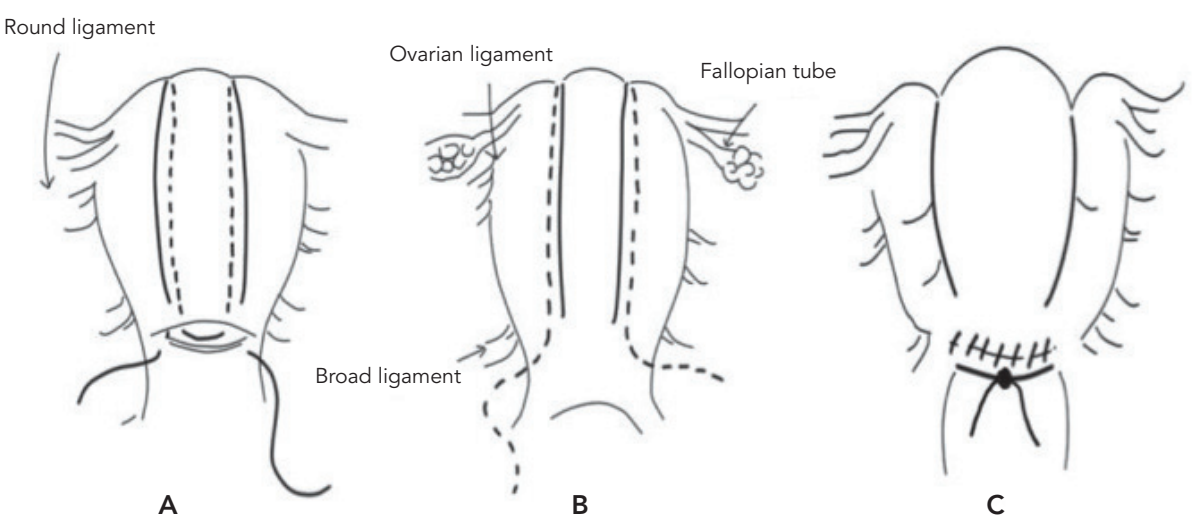
*Source: Photo from Celox PPH website

c. Surgical Management

The purpose of surgical management is to compress the atonic uterus to stop bleeding, avoiding hysterectomy. Options of surgical management:

i. Compressive uterine sutures: B-lynch, modified B-Lynch sutures or Hayman brace sutures as shown in **Figure 24**.
ii. Other methods will include internal iliac artery ligation, uterine artery embolisation and hysterectomy.

Figure 24: Steps on performing B-Lynch compression suture



*Source: Sarawak Advanced Life Support in Obstetrics (SALSO), 2022

A: Uterus is exteriorised. Suture is inserted 3 cm below the uterine incision and 3 cm from the lateral border. The suture is then threaded through the uterine cavity to emerge at the upper incision margin 3 cm above and approximately 4 cm from left lateral border.

B: This is then fed anteriorly and vertically to enter the posterior wall into the uterine cavity at the same level as the upper anterior entry point. The suture is then pulled under moderate tension assisted by bimanual compression exerted by the assistant. The suture is passed back posteriorly through the same surface marking as the left side, the suture is now lying horizontally in the uterine cavity. The suture is fed through posteriorly and vertically over the fundus to lie anteriorly and vertically compressing the fundus on the right side as occurred on the left side. The needle is passed in the same fashion on the right side through the uterine cavity and out approximately 3 cm anteriorly and below the lower incision margin on the right.

C: The two lengths of the suture are pulled taut, assisted by bimanual compression to minimise trauma and knots are thrown to secure tension.

CONSIDER ESCALATION OF TREATMENT SOONER RATHER THAN LATER.

5.6.2 Trauma

Postpartum haemorrhage arising from trauma contributes to approximately 20 % of all cases. The approach for arresting the bleeding may differ slightly depending on if the patient had just achieved a vaginal delivery or if she had undergone a Caesarean Section. In a patient who had delivered vaginally, inspect the cervix, fornices, vaginal walls and perineum systematically to look for any bleeding areas or undiagnosed tears. The attending clinician will require at least 2 assistants and good lighting.

a. Examination for genital tract trauma:

i. Ideally should be done in OT.
ii. One would need good lighting and at least 2 assistants.
iii. The cervix is examined first. 2 Sim's speculums and 2 sponge forceps are used to visualise all the 4 quadrants of the cervix for any laceration.
iv. Next the vaginal fornices are examined, followed by the lateral vaginal wall and finally the perineum is examined.
v. A careful examination of the vaginal fornices must be made. If the laceration extends upwards into the uterus, extensive bleeding can occur into the broad ligament. This is suspected when a pelvic mass is felt beside the uterus or deviated to one side.

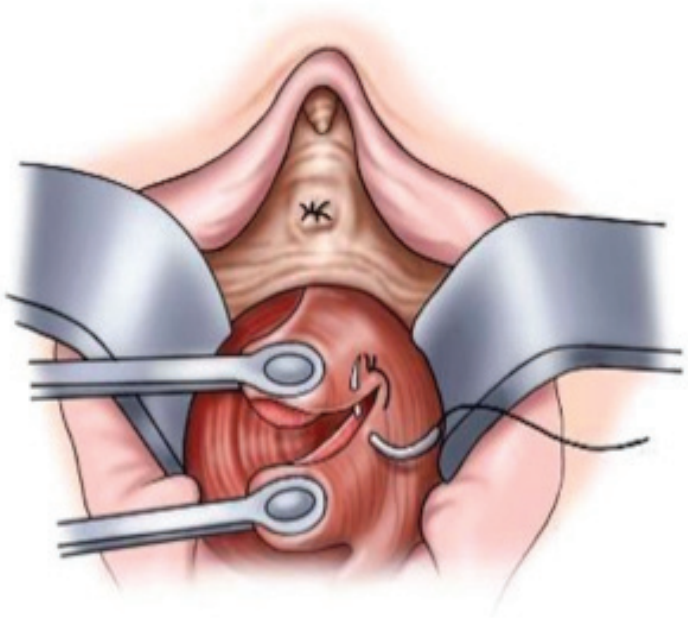
CONSIDER PERFORMING AN EXAMINATION UNDER ANAESTHESIA (EUA) IN OPERATION THEATRE (OT) SOONER RATHER THAN LATER IF UNABLE TO IDENTIFY AND SECURE HAEMOSTASIS QUICKLY OR SUSPECTING DEEP/CERVICAL TEARS. THIS WILL ENSURE:

- **ADEQUATE EXPOSURE**
- **PROPER LIGHTING**
- **ADEQUATE PAIN MANAGEMENT**
- **RAPID HAEMOSTASIS**
- **OPTIMAL RESUSCITATION BY ANAESTHETIST**

b. Managing cervical tear/ trauma:

i. Clean the perineum, vulva and vagina with antiseptic solution.
ii. Catheterise the bladder.
iii. Use the Sim's speculum to visualise the cervix and identify the tear.
iv. Place a sponge forceps on one side of the tear and a second sponge forceps on the other side of the tear.
v. The provider holds both forceps handles in one hand and applies gentle traction. This stabilises the cervix for the duration of the repair
vi. Suturing begins at the apex of the tear. If the apex is difficult to reach, a suture is applied below it and used for traction (**Figure 25**) until the apex is accessible for repair.
vii. Apply interrupted sutures along the length of the wound about 1 cm apart, taking the whole thickness of each lip of the cervix.
viii. Observe for a few minutes after suturing to ensure adequate haemostasis.

Figure 25: Suturing cervical tear



*Source: Photo from website http://academy.incision.care

c. Managing vagina or vulva trauma:

i. Arterial bleeding will require proper haemostasis.
ii. If the apex of the tear is very high, a stay suture is first placed as high as possible. By applying downward traction on the stay suture, the apex above the stay suture would be more accessible to secure.
iii. If the apex is extending upwards and cannot be identified, may need to resort to combined laparotomy and vaginal approach.
iv. Suture the vaginal mucosa continuously. If multiple tears/bleeders, apply a figure of '8' sutures.
v. During repair of high vaginal tear involving the fornices, beware of inadvertent ureteric injuries.

vi. If the vagina is too friable, sutures might cut through. This can cause difficulty during repair. In such cases, vaginal packing can be done to control the bleeding and is removed after 12-24 hours. Always confirm that all inserted packing has been fully removed and accurately documented.
vii. The roller gauze which is used to pack the vagina should be soaked with flavin or povidone iodine in order to lubricate it. This would prevent friction and trauma during removal.
viii. Administer prophylactic antibiotics.
ix. Insert CBD to prevent acute urinary retention due to pain and possible pressure on the urethra by the vaginal pack.

ENSURE THE APEX IS SECURED PROPERLY DURING REPAIR. PERFORM VAGINAL AND PER RECTAL EXAMINATION POST REPAIR TO LOOK FOR VAGINAL HAEMATOMA AND FOREIGN BODIES.

d. Managing trauma during Caesarean Section:

i. Trauma-related postpartum haemorrhage (PPH) during caesarean section poses a significant clinical challenge and demands prompt recognition and effective management to prevent maternal morbidity or even mortality.
ii. Among the most difficult causes to address are traumatic injuries to the genital tract, particularly uterine tears and lacerations. These injuries can present in various forms, including lateral tears with or without extension into the broad ligament, or vertical downward extensions, each carrying its own risks and complexities. Such trauma may occur spontaneously during delivery or be inadvertently caused during surgical manipulation, especially in cases of obstructed labour, abnormal foetal lie, or previous uterine surgery.
iii. A high index of suspicion, combined with a thorough understanding of pelvic anatomy and appropriate repair techniques, is essential to managing these injuries effectively.
iv. The key to minimising complications lies in:
    - Early anticipation
    - Careful surgical technique
    - Immediate intervention
v. Risk factors for trauma during caesarean section:
    - Difficult delivery of foetal head
    - Failed instrumentation at second stage of labour
    - Deeply engaged head
    - Obstructed labour
    - Foetal malposition
vi. Possible complications:
    - PPH
    - Bladder or ureteric injury
    - Broad ligament haematoma
    - Infection

e. Prevention:

i. Pre-delivery
- Conduct a thorough patient assessment to confirm that caesarean section is indicated and to anticipate potential complications.
- Ensure the procedure is performed by a trained, experienced and credentialed practitioner.
- Arrange for an assistant if required to facilitate disengagement of the foetal head from below.
- Perform a vaginal examination immediately prior to surgery to exclude imminent vaginal delivery and to reassess the station of the presenting part, bearing in mind that this may change by the time the uterine incision is made.
- Consider performing the caesarean section in a modified lithotomy position to facilitate manoeuvres for delivery of the foetal head.

ii. Intra-operatively
- Ensure adequate exposure and an appropriately sized incision.
- Enter the peritoneal cavity as high as possible, as the bladder may be distended.
- Identify the lower uterine segment, which may be markedly thin.
- Palpate the uterus to identify the presenting part. Make the incision slightly higher while ensuring it remains within the lower segment.
- Extend the uterine incision using either a sharp or blunt technique, selecting the method considered safest in the circumstances. Curve the incisions laterally and upwards to avoid injury to the uterine artery complex.
- Deliver the foetal head between uterine contractions.
- Using the non-dominant hand, disimpact the foetal head while the assistant applies upward pressure from below to dislodge it. Ensure the surgeon's hand remains straight and avoid flexion of the wrist.
- The foetal head should be disimpacted up to the level of uterine incision prior to delivery. Flexion of the foetal head by the assistant from below may further facilitate delivery.
- If these measures are unsuccessful, consider administering tocolysis (e.g., S/C terbutaline 250 mcg or nitrous oxide).
- If delivery remains unsuccessful, attempt upward traction on the foetal shoulders (Patwardhan method) using the dominant hand until the foetal head can be assessed with the non-dominant hand.
- As an alternative, grasp the foetal legs and deliver the foetus as a breech. This may necessitate extension of the uterine incision in the form of an inverted 'T', 'J' or 'U' incision.
- Communicate with the anaesthetist to briefly place the patient in a head-down (Trendelenburg) position, which may assist in dislodging a deeply impacted foetal head.

iii. Post delivery
- Administer prophylactic uterotonic agents (IV oxytocin 10 IU followed by infusion as per local protocol).
- After delivery of the placenta, examine for extended tears meticulously.

f. Management of extended uterine tear during caesarean section:

i. Call for help.
ii. Consider exteriorisation of the uterus to improve visualisation and access.
iii. Avoid blind suturing; clearly identify the full extent of the tear before attempting repair.
iv. Ensure adequate exposure using appropriate retractors, and use suction to maintain a clear operative field.
v. Confirm that the urinary bladder has been adequately reflected inferiorly by dissecting the uterovesical fold downward.
vi. Carefully inspect for posterior uterine tears and possible cervical extension.
vii. Identify and clamp any actively bleeding vessels.
viii. Locate the apex of the tear.
ix. Apply an Allis forceps to the apex of the tear to aid in repairing.
x. Repair the tear using a continuous suture technique with synthetic, absorbable polyglycolic sutures, proceeding from the apex toward the uterine incision.
xi. If the apex cannot be clearly identified and the tear extends beyond the cervix, a combined abdominal and vaginal approach may be required for adequate repair.
xii. In cases where the tear extends laterally into the broad ligament, open the round ligament and the anterior leaf of the broad ligament to identify the apex and bleeding points before securing haemostasis.
xiii. Ensure that the ureters are identified and preserved throughout the procedure.
xiv. Close the tear in two layers prior to uterine closure.
xv. Consider insertion of surgical drain if indicated.
xvi. Administer uterotonic agents as appropriate.
xvii. Initiate broad-spectrum antibiotic therapy and consider continuation in the postoperative period.
xviii. Ensure thorough documentation, including all identified trauma, measures taken to control bleeding and details of the repair performed.
xix. In the event of uncontrolled or intractable bleeding, assess the need for escalation of management, such as uterine artery ligation, internal iliac artery ligation or even hysterectomy, depending on the extent and severity of the tear.

g. Management of bleeding from the placental bed:

Bleeding from the placental bed is common following caesarean section for placenta praevia, particularly in cases of posterior placenta praevia.

i. Exteriorise the uterus to improve visualisation and access.
ii. Administer uterotonic agents as appropriate.
iii. If required, place the non-dominant hand posterior to the uterus and apply figure-of-eight suture(s) to the placental bed using absorbable sutures to achieve haemostasis.
iv. Consider insertion of a balloon tamponade via the abdominal approach.
v. Vertical compression sutures to the lower segment or bilateral uterine artery ligation may also be effective in controlling haemorrhage.

5.6.3 Tissue

The placenta is considered to be retained if it is not expelled within 30 minutes of third stage labour. Further management will be discussed in **Chapter 13**.

5.6.4 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.

5.7 Secondary PPH

5.7.1 Definition

Abnormal or excessive bleeding from the genital tract occurring after 24 hours up to 42 days post-delivery.

5.7.2 Causes

a. Infection (most common)
b. Retained product of conception
c. Unrecognised genital tract trauma
d. Bleeding disorder
e. Persistent trophoblastic disease
f. Others – chronic subinvolution of uterus, uterine AV malformation (rare)

5.7.3 Management

a. General resuscitation.
b. Start broad spectrum antibiotics after taking blood cultures and high vaginal swabs.
c. Investigations of secondary PPH should include blood count, coagulation profile and electrolytes.
d. A pelvic ultrasound may help to identify the presence of retained product of conception.
e. Surgical measures should be undertaken if there is excessive or continuing bleeding.
f. Perform surgical evacuation after adequate resuscitation and commencement of antibiotic therapy. There is a significant risk of uterine perforation in such cases and the evacuation of the uterus should be carried out by a trained person after consultation with an obstetrician.

5.8 Risk Management

5.8.1 Thorough documentation should be done as soon as possible.

5.8.2 To counsel couples regarding the events.

5.8.3 Team debriefing.

5.8.4 Regular training and obstetric drill.

Take home messages:

- Prompt and effective resuscitation saves lives.
- Efficient teamwork and clear communication improve patient outcomes.
- Initiate early blood transfusion and therapy escalation when required.
- Morbidity and mortality from PPH are largely preventable.

Managing Postpartum Haemorrhage: The WHO E-MOTIVE Response Bundle

CLINICAL DEFINITIONS & RECOGNITION

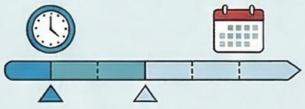


Defining PPH by Blood Loss
>500ml (Vaginal delivery) OR
>1000ml (Caesarean section)
OR any loss resulting in haemodynamic instability



Massive PPH: bleeding >1500ml

Primary vs. Secondary PPH



Primary PPH: within first 24 hours
Secondary PPH: from 24 hours up to 6 weeks postpartum

THE 4TS: IDENTIFYING THE CAUSE



TONE
(Uterine Atony)
70-80% of cases. Uterus fails to contract effectively.



TRAUMA
20% of cases. Genital tract tears, lacerations, or uterine rupture.

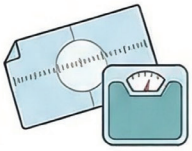


TISSUE
Retained products of conception (placenta or membranes).



THROMBIN
Coagulopathy or clotting disorders preventing stable clot formation.

THE E-MOTIVE RESPONSE BUNDLE



Early Detection
Objective methods: Use calibrated drapes and weigh blood-soaked items (1g = 1ml) to replace subjective estimation.

Massage

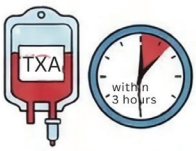


Oxytocic Drugs



Rapidly administer Oxytocin, Syntometrine, or Carboprost to stimulate contraction.

E-MOTIVE



Tranexamic Acid (TXA)
Administer IV TXA within 3 hours of birth to stabilise clots and reduce bleeding.



IV Fluids
Begin rapid resuscitation with up to 2 liters of isotonic crystalloids to prevent multi-organ failure.

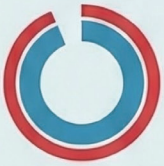


Examination and Escalation
Thorough examination
to rule out causes, and call for advanced help/facility referral if bleeding continues.

CLINICAL BENEFITS & IMPACT



60%
Reduction in Severe PPH
International research demonstrates significant reduction in severe bleeding events.



93.1%
Detection Rate
Shifting to objective measurement improves PPH detection accuracy.



Empowering First-Line Providers:
Midwives and labour room staff provide coordinated, rapid response and standardised management without treatment delays.

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6.0

VAGINAL BREECH DELIVERY



6.0 VAGINAL BREECH DELIVERY

6.1 Introduction

Breech presentation occurs in 3 - 4 % of all term pregnancies and is more common in nulliparous women and in preterm deliveries (GTG No. 20b, 2017). Term babies with breech presentation have worse outcomes than cephalic ones, irrespective of mode of delivery. Women diagnosed with a breech presentation at term are typically offered an external cephalic version if they prefer vaginal delivery.

6.2 Learning Objectives

a. To identify women at risk of breech presentation at term
b. To discuss options on management for breech presentation at term
c. To discuss prerequisite and contraindications of external cephalic version (ECV)
d. To discuss the prerequisite and contraindications of vaginal breech delivery
e. To describe the sequential steps and specific manoeuvres employed during vaginal breech delivery

6.3 Definition

Breech presentation refers to the baby presenting for delivery with the buttocks or feet first rather than head (BMJ Best Practice, 2025). There are 3 types of breech presentations as depicted in **Figures 26** through **28**.

Figure 26: Extended breech



Figure 27: Flexed breech



Figure 28: Footling breech



- **Extended Breech (most common, 50-70 %):** The buttocks present first, with the hips flexed and knee extended.
- **Flexed Breech (10-30 %):** The buttocks and feet present first, with the hips and knee both in flexed position.
- **Footling Breech (10 %):** One or both feet present first.

6.4 Risk Factors for Breech Presentation

Table 22 details the predisposing factors associated with breech presentation.

TABLE 22: Predisposing factors for breech presentation

MATERNAL	FOETAL
Uterine abnormalities: bicornuate uterus, fibroid	Prematurity
Placental abnormalities: placenta previa	SGA/ FGR
Previous breech delivery	Foetal anomaly
Advanced maternal age	Multiple gestation
Nulliparity	
Polyhydramnios	

6.5 Management of Breech Presentation at Term

Options of management available include:
1. External cephalic version (ECV)
2. Vaginal breech delivery
3. Caesarean section

6.5.1 External Cephalic Version (ECV)

ECV is usually performed after 36 weeks of gestation. The details of ECV is as described in **Table 23**.

TABLE 23: Prerequisites, Contraindications and Risk of ECV

Prerequisites	• Should be done in facilities able to perform caesarean section • Informed consent needed prior to procedure • Normal CTG prior to ECV • Normal foetal biometry on ultrasound: singleton, estimated foetal weight, AFI, placenta upper segment, flexed foetal head
Contraindications	**Absolute contraindications:** • Placenta previa • Major uterine abnormality • Ruptured membrane • Recent APH (within 7 days) • Multiple pregnancy (except for second twin) • Abnormal CTG **Relative contraindications:** • Uterine scar • Oligohydramnios • Foetal growth restriction • Major foetal anomalies • Unstable lie • Severe hypertensive or other medical disorders
Risks	• Placenta abruption • Uterine rupture • Foeto-maternal haemorrhage • Foetal bradycardia/abnormal foetal heart rate tracing • Ruptured membrane and cord prolapse • Preterm labour

6.5.2 Vaginal Breech Delivery

Vaginal breech delivery may be offered to selected women if the expertise is available. Proper assessment and counselling should be done as per **Table 24**.

TABLE 24: Pre-requisites, Contraindications and Risk of Vaginal Breech Delivery

Prerequisites	• A paediatric team is available to standby during delivery. • Delivery in a specialist hospital with facilities for immediate caesarean section. • Decisions for vaginal breech delivery should be made by a specialist. • Informed consent is needed. • Ensure availability of skilled attendants throughout labour. • Onset of labour is spontaneous. • The patient has a clinically adequate pelvis. • Normal foetal biometry on ultrasound: EFW 2.5-3.5 kg with flexed head.
Contraindications	• High risk pregnancy • Foetal hyperextended neck on ultrasound • Footling breech • Estimated foetal weight less than 2.5 kg and more than 3.5 kg • Previous uterine scar • Foetal abnormalities e.g., hydrocephalus • Evidence or suspected foetal compromise e.g., FGR • Cord around neck on ultrasound
Risks	• Head entrapment after delivery of body causing birth asphyxia • Cervical spine & basal skull injuries • Dislocation and bone fracture- humerus, clavicle, femur • Intracranial haemorrhage • Nerve injury- brachial and cervical plexus injury • Intraabdominal injury- liver, spleen

a. Early assessment

i. Assess if delivery is imminent - Cervical dilatation/station membrane intact or ruptured.
ii. Ensure no cord presentation / prolapse.
iii. Ensure it is not a footling breech.
iv. Pre-requisites for assisted vaginal delivery are fulfilled.

b. First stage of labour

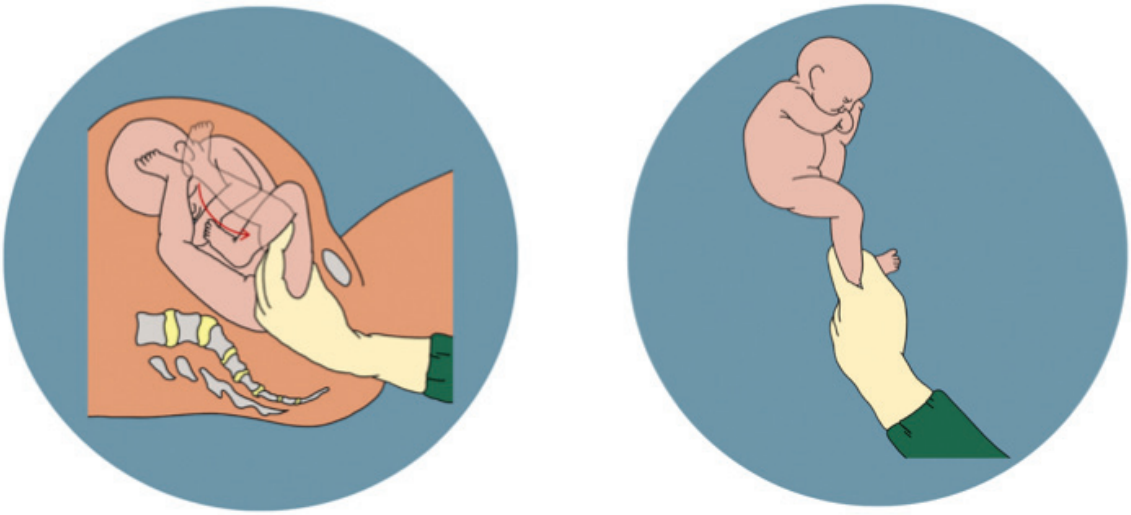
i. Plot partogram, progress should be the same with cephalic presentation.
ii. Ensure adequate analgesia.
iii. Perform continuous CTG.
iv. Oxytocin use for augmentation is discouraged.
v. Inform paediatric team to standby.

c. Attending second stage of labour of vaginal breech delivery

i. Preparation:
- Delivery should be conducted by the most experienced personnel.
- A paediatric medical officer should be on standby.
- Prepare neonatal resuscitation trolley/bay.
- Put the patient in a lithotomy position with maternal buttocks at the end of the bed.
- Catheterise urinary bladder.
- Ensure Neville Barnes or Piper forceps is available in case needed for the after-coming head.
- Perform episiotomy if indicated.

ii. Delivery process:
- Hands-off technique.
- Allow spontaneous process of labour, respecting the normal physiology of labour through the birth canal.
- Encourage mother to bear down to deliver the foetal buttock.
- Ensure sacroanterior to reduce resistance from pelvic floor muscle.
- Consider episiotomy when buttocks distend the perineum.
- Encourage mother to push further to deliver the legs and do Pinard manoeuvre if needed (**Figure 29**).

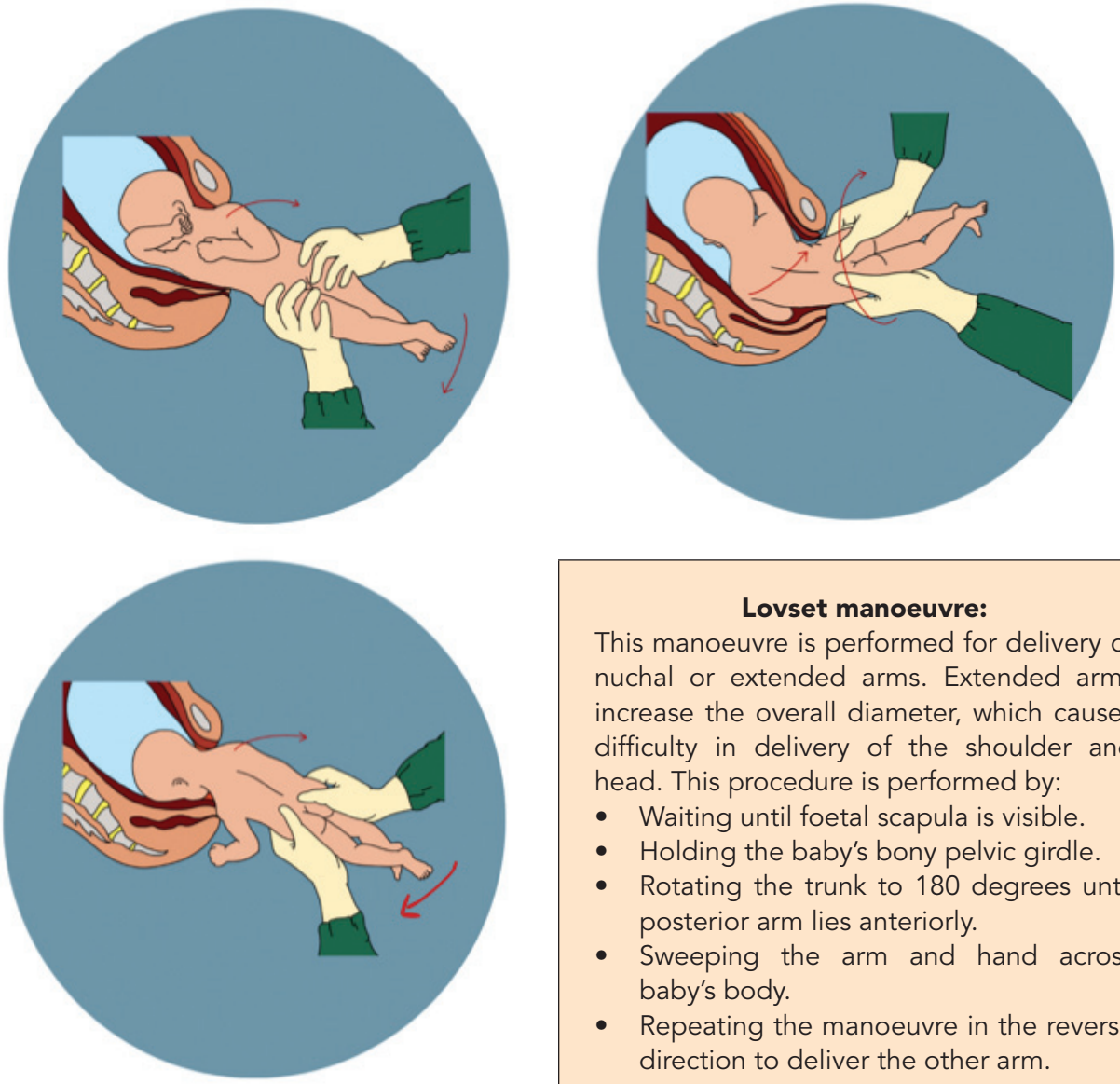
Figure 29: Pinard manoeuvre



Pinard manoeuvre:
This manoeuvre is performed if foetal leg is in an extended position and not delivered spontaneously with maternal pushing. This is done by flexing the knee joint to encourage the foetal leg to flex, then grasping the ankle to complete the delivery of the leg.

- Once the leg is delivered, wrap a towel around the foetus and support the baby by grasping the body over the pelvis with thumb and sacrum.
- Encourage mother to push further to deliver the trunk and hands using Lovset manoeuvre (**Figure 30**).

Figure 30: Lovset manoeuvre

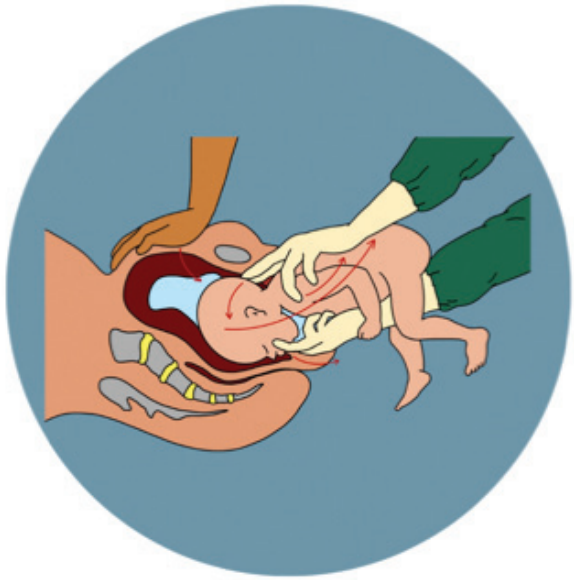


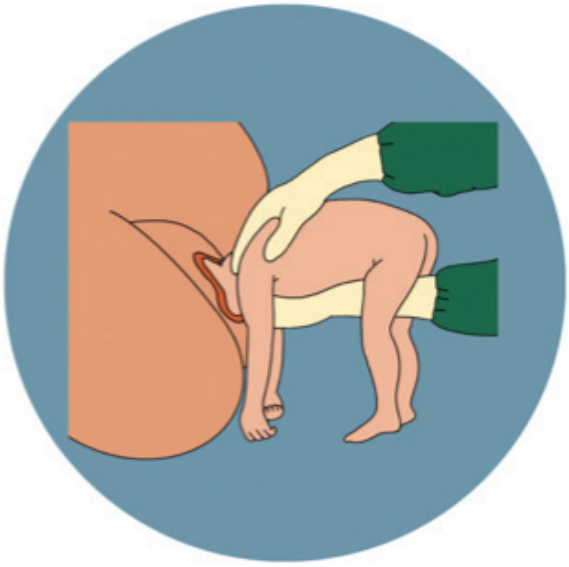
Lovset manoeuvre:
This manoeuvre is performed for delivery of nuchal or extended arms. Extended arms increase the overall diameter, which causes difficulty in delivery of the shoulder and head. This procedure is performed by:

- Waiting until foetal scapula is visible.
- Holding the baby's bony pelvic girdle.
- Rotating the trunk to 180 degrees until posterior arm lies anteriorly.
- Sweeping the arm and hand across baby's body.
- Repeating the manoeuvre in the reverse direction to deliver the other arm.

- Once the trunk and hand are delivered, allow foetus to hang from the vulva until the nape of the neck is seen.
- Proceed with delivery of after coming head either by using Mauriceau-Smellie-Veit (MSV) manoeuvre (**Figure 31**) or forceps delivery.

Figure 31: Mauriceau-Smellie-Veit manoeuvre







Mauriceau-Smellie-Veit manoeuvre:

- Support baby on the forearm.
- Place flexed middle finger on baby's chin, ring finger and forefinger over malar bones.
- Operator's other hand – place the middle finger on the baby's occiput and forefinger and ring finger across the shoulders.
- Flex the baby's occiput & deliver the head.

- Forceps delivery for after-coming head:
  - Ask the assistant to hold the baby.
  - Apply Pipers or Neville-Barnes forceps blades from below.
  - Baby's head is flexed and delivered following the pelvic curvature.
- If head entrapment occurs, may consider performing Duhrssen's incision.
  - Incision made over the cervix by avoiding cervical vessels at 3 and 9 o'clock.

BURNS-MARSHALL TECHNIQUE IS NOT ADVISABLE AS THIS MAY CAUSE HYPEREXTENSION OF BABY'S NECK.

6.5.3 Caesarean section

a. At term, most breech presentations are delivered by caesarean section, either by maternal choice or following unsuccessful external cephalic version (ECV). Caesarean breech delivery is usually uncomplicated; however, additional manoeuvres may be required in selected cases. These include techniques commonly used in vaginal breech birth, such as the Lovset and Mauriceau–Smellie–Veit manoeuvres.
b. Extension of the uterine incision and/or the use of forceps may be necessary for delivery of an entrapped foetal head. During caesarean breech delivery, excessive traction, hyperextension of the foetal neck, and undue pressure on the foetal thorax or abdomen should be avoided to minimise foetal injury.
c. Caesarean section reduces but does not fully eliminate the risks inherent in breech presentation.

6.6 Complications of Vaginal Breech Delivery

Table 25 outlines the potential maternal and foetal complications associated with vaginal breech delivery.

TABLE 25: Complications of Vaginal Breech Delivery

MATERNAL	FOETAL
Cervical tear	Hypoxia due to delay in delivery of head
Genital tract trauma due to manipulation	Fracture of femur, clavicle & humerus
	Visceral injuries
	Brachial plexus injury
	Spinal cord injury

6.7 Risk Management

6.7.1 Debrief couple regarding the delivery process and any associated complications.

6.7.2 Proper and detailed documentation regarding intrapartum events.

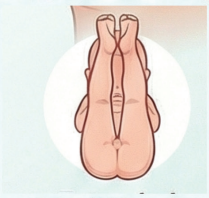
Take home messages:
- Safe breech delivery requires specific clinical skills and experience.
- Ensure all prerequisites for vaginal breech delivery are fulfilled before offering this option to a patient.

Managing Vaginal Breech Delivery: Key Life-Saving Manoeuvres

Breech presentation occurs in 3-4% of term pregnancies. Successful vaginal delivery requires a "hands-off" initial approach followed by rapid, sequential manoeuvres to resolve limb extensions and safely deliver the after-coming head.

CLINICAL PREPARATION AND PRESENTATION

Identify the Breech Type



Extended breech (most common: 50-70%)

Hips flexed/knees extended is the most common presentation

Confirm Flexed or Footling Positions



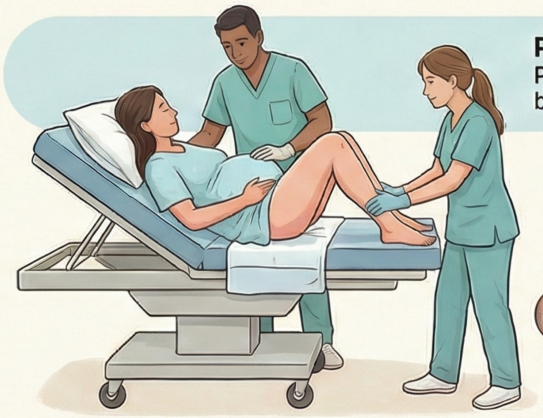
Flexed breech **Footling breech**

Flexed breech involves flexed knees; footling breech involves one or both feet presenting

Essential Prerequisites for Delivery

- Ensure spontaneous labour
- Empty bladder
- Paediatric team on standby

Preparation & The "Hands-Off" Phase



Proper Patient Positioning:
Place the mother in a lithotomy position with buttocks at the very edge of the bed.

The "Hands-Off" Technique



Allow the buttocks and trunk to deliver spontaneously to respect the normal physiology of labour.

Essential Delivery Manoeuvres

Pinard Manoeuvre for Legs



Flex the knee and grasp the ankle only if legs are stuck in an extended position.

Lovset Manoeuvre for Arms



Rotate the trunk 180 degrees to deliver extended arms once the foetal scapulae are visible.

Mauriceau-Smellie-Veit (MSV) for Head



Support the body on the forearm while flexing the chin and malar banes to deliver the head.

External Cephalic Version (ECV) Readiness

Perform after 36 weeks only if CS facilities and normal CTG are available.

CLINICAL ELIGIBILITY

PREREQUISITES FOR DELIVERY

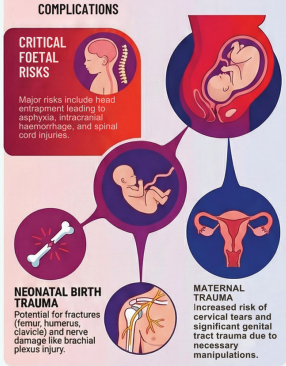
- Requires spontaneous labour
- Adequate maternal pelvis
- Foetal weight between 2.5kg and 3.5kg



FOETAL AND MATERNAL COMPLICATIONS

CRITICAL FOETAL RISKS

Major risks include head entrapment leading to asphyxia, intracranial haemorrhage, and spinal cord injuries.



NEONATAL BIRTH TRAUMA

Potential for fractures (femur, humerus, clavicle) and nerve damage like brachial plexus injury.

MATERNAL TRAUMA

Increased risk of cervical tears and significant genital tract trauma due to necessary manipulations.

TAKE-HOME MESSAGE

CLINICAL SKILLS AND EXPERIENCE:
Safe breech delivery requires specific clinical skills and high-level provider experience.

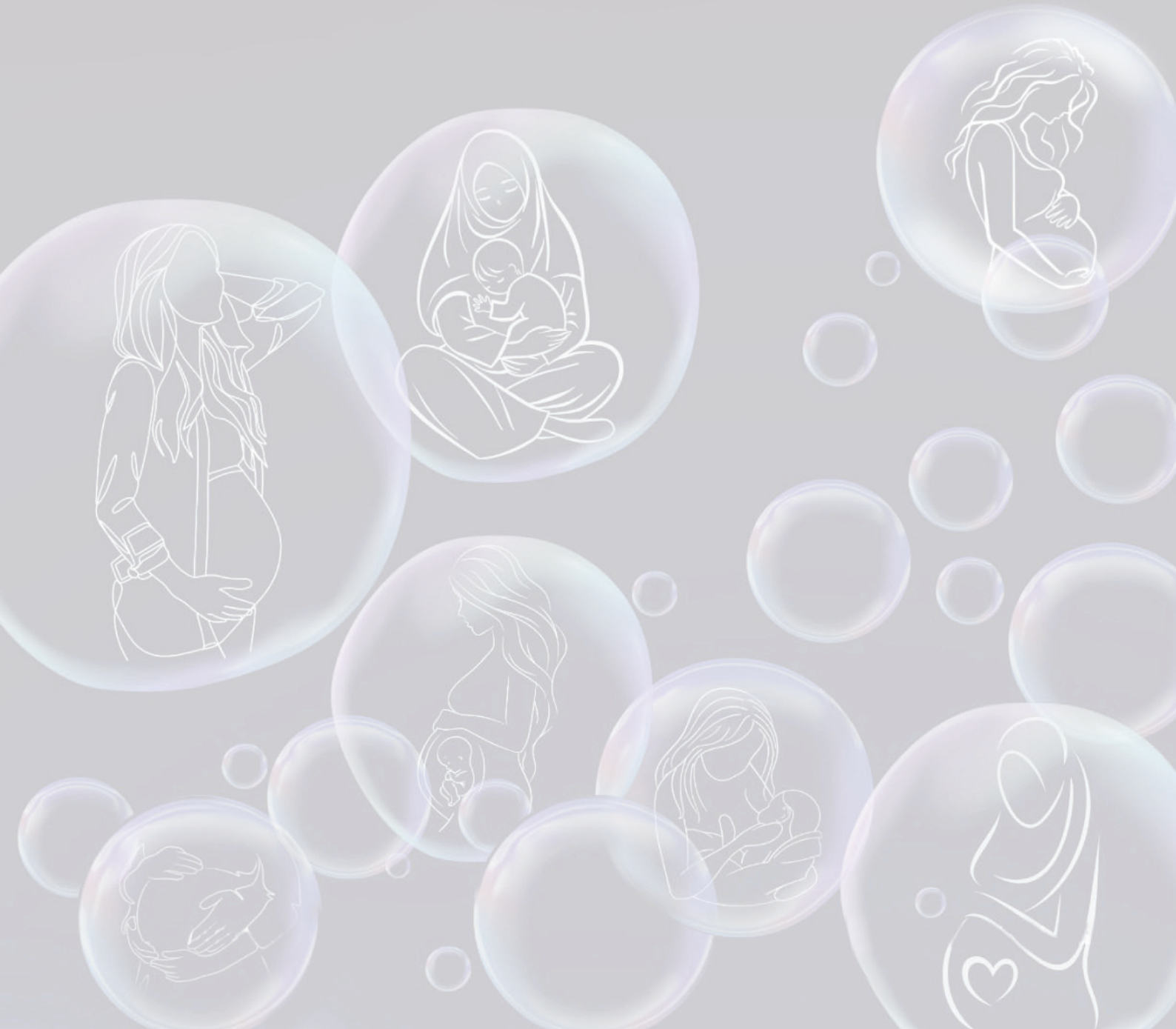
VERIFY BEFORE OFFERING:
Ensure every prerequisite is fulfilled before offering a vaginal breech option to a patient.

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1. Fruscalzo A, Londero AP, Salvador S, Bertozzi S, Biasioli A, Della Martina M, et al. New and old predictive factors for breech presentation: our experience in 14,433 singleton pregnancies and a literature review. J Matern Foetal Neonatal Med. 2014;27(2):167–72.
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7.0

CORD PROLAPSE



7.0 CORD PROLAPSE

7.1 Introduction

Umbilical cord prolapse is an unpredictable obstetric emergency with an incidence ranging from 1-6 per 1000 pregnancies (GTG No. 50, 2014). This causes loss of blood flow to the foetus with consequent hypoxia due to compression of the blood vessels in the cord or due to spasm of blood vessels if the cord prolapses outside the vagina.

7.2 Learning Objectives

a. To define cord prolapse
b. To identify risk factors of cord prolapse
c. To recognise early signs of cord prolapse
d. To manage cord prolapse

7.3 Definition

7.3.1 Cord prolapse happens when the umbilical cord lies beyond the presenting part in ruptured membranes.

7.3.2 Cord presentation happens when the umbilical cord lies between the foetal presenting part and the cervix, with intact membranes.

7.3.3 Type of cord prolapse

a. Occult cord prolapse (**Figure 32**): Descent of the umbilical cord through the cervix **alongside** the presenting part.
b. Overt cord prolapse (**Figure 33**): Descent of the umbilical cord through the cervix **beyond** the presenting part.

Figure 32: Occult cord prolapse

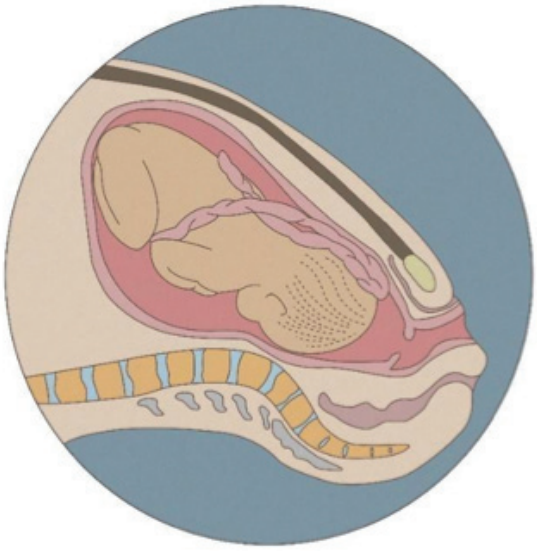
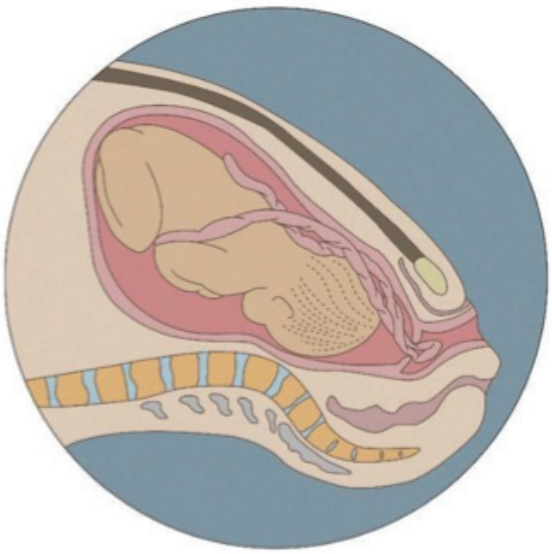


Figure 33: Overt cord prolapse



7.4 Risk Factors for Cord Prolapse

7.4.1 The common factor in most cases is a poor or unengaged foetal presenting part, allowing space for the cord to slip past.

7.4.2 Detailed risk factors are as listed in **Table 26** below:

TABLE 26: Predisposing factors for cord prolapse

GENERAL	PROCEDURES RELATED
Multiparity	Artificial rupture of membrane with high presenting part
Low birthweight	Vaginal manipulation of the foetus with ruptured membrane
Preterm labour	External cephalic version
Foetal congenital anomalies	Internal podalic version
Breech presentation	Stabilising induction of labour
Abnormal lie	Large balloon catheter induction of labour
Unstable lie	
Second twin	
Polyhydramnios	
Unengaged presenting part	
Low lying placenta	

7.5 Preventive Strategies

7.5.1 During antenatal (before labour)

a. Risk awareness and patient education
   i. Inform patients with identified risk factors (e.g., unstable lie, breech) about the symptoms of membrane rupture and the need for immediate hospital visit if this occurs.

b. Elective hospital admission
   i. Consider admission to hospital after 37 weeks of gestation in women with abnormal lie; transverse, oblique or unstable lie.
   ii. Inpatient management is recommended for patients with preterm prelabour rupture of membrane and a non-cephalic presentation.

7.5.2 During labour

a. Avoid elective Artificial Rupture of Membrane (ARM) if the foetal presenting part is mobile, high or not well-applied to the cervix.
b. If ARM is necessary with a high presenting part, it should be done in a setting where an immediate emergency caesarean section is possible (e.g., operation theatre room available).

7.6 Diagnosis of Cord Prolapse

7.6.1 The umbilical cord is palpable during a vaginal examination or visible during a per speculum examination.

7.6.2 Any abnormal foetal heart rate pattern (e.g., severe decelerations or bradycardia) following rupture of the amniotic membranes (either spontaneously or artificially) should trigger suspicion of cord prolapse.

IN THE PRESENCE OF ABNORMAL FOETAL HEART RATE, CORD PROLAPSE SHOULD BE SUSPECTED.

7.7 Management in Hospital Setting

7.7.1 Call for help – To alert obstetrician, anaesthetist and paediatric team.

7.7.2 The key principles in managing cord prolapse:

KEY PRINCIPLES IN CORD PROLAPSE
- **PREVENT VASOSPASM**
- **PREVENT CORD COMPRESSION**
- **PREPARE FOR DELIVERY**

a. Prevent vasospasm
Avoid handling of cord outside vagina by covering the cord with warm Gamgee or abdominal pack.

b. Prevent cord compression
There are 3 ways in preventing cord compression:

i. Digital elevation
- Elevate the presenting part away from the cord by applying upward pressure on the presenting part as shown in **Figure 34**.

Figure 34: Digital elevation of the presenting part



ii. Maternal positioning

This can be done by:

- Putting the patient in knee chest position.
- Positioning patient in Trendelenburg position.
- Lifting the patient's buttock with pillow as shown in **Figure 35**.

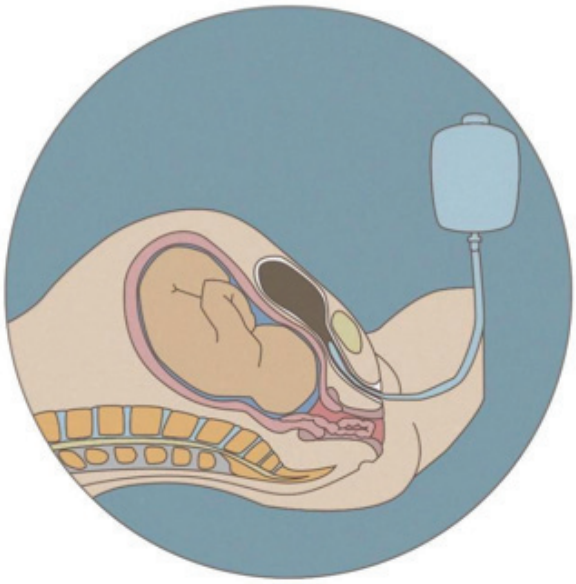
Figure 35: Lifting the patient's buttock with pillow



iii. Bladder filling

- Catheterise bladder with indwelling catheter and fill with 500 cc fluid and clamp the catheter once fluid instilled as in **Figure 36**.

Figure 36: Filling up bladder with fluid



b. Prevent cord compression

i. Emergency caesarean section if vaginal delivery is not imminent.
ii. Vaginal delivery can be attempted at full dilatation.
iii. Instrumental delivery if prerequisites for operative deliveries are met.
iv. An internal podalic version with breech extraction can be considered for the second twin.

IF EXPECTING DELAY IN DELIVERY, ELEVATION OF FOETAL PRESENTATION THROUGH BLADDER FILLING MAY BE MORE PRACTICAL THAN DIGITAL ELEVATION.

7.8 Management in Community Setting

7.8.1 An additional step that can be considered during transferring patients to the hospital with OT facilities is giving tocolysis (if strong contractions). Options include:
a. S/C Terbutaline 250 mcg stat
b. Tab. Nifedipine 20 mg stat
c. S/C or IV Salbutamol 200 mcg stat

7.9 Management of Cord Prolapse for Foetus in Pre-viable Gestation

7.9.1 Discuss with patients regarding expectant management.
a. Risk of foetal death and infection.
b. Consider early delivery or termination of pregnancy.

7.10 Post Event Management

7.10.1 Anticipate foetal complications:
a. Hypoxic Ischaemic Encephalopathy (HIE)
b. Cerebral palsy (CP)
c. Fresh stillbirth (FSB)
d. Infection

7.10.2 Counsel the patient regarding intrapartum events and foetal complications.

7.11 Risk Management

7.11.1 Documentation of the timing of events and the personnel involved in the event.

a. Procedure performed
b. Decision to delivery interval (DDI)
c. Apgar score of the baby at birth
d. Cord pH

7.11.2 Team debriefing.

7.11.3 Training: Regular obstetric drills should be done regularly.

Take home messages:

- Prompt recognition is essential to minimise perinatal morbidity and mortality.
- Labour ward staff must be skilled and trained in the immediate management of cord prolapse.
- Effective teamwork is crucial for preventing management delays.

EMERGENCY PROTOCOL:

MANAGING UMBILICAL CORD PROLAPSE IN THE LABOUR ROOM



AVOID CORD VASOSPASM
Minimise handling; cover externalised cord with warm, moist packs.

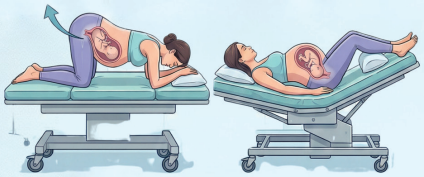
PREVENT CORD COMPRESSION
Use digital elevation, maternal positioning or bladder filling to relieve pressure.

PREPARE FOR DELIVERY
Immediate delivery is crucial to minimise foetal hypoxia.

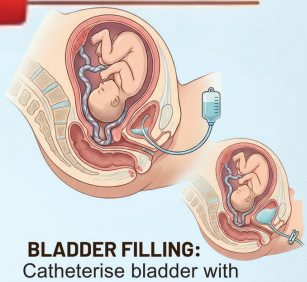
PREVENT CORD COMPRESSION



DIGITAL ELEVATION:
Manual upward pressure on presenting part for immediate relief.



MATERNAL POSITIONING:
Knee-chest or Trendelenburg uses gravity to shift foetus off the cord.



BLADDER FILLING:
Catheterise bladder with indwelling catheter and fill with 500cc fluid and clamp the catheter once fluid instilled.

PRESSURE-RELIEF TECHNIQUES COMPARISON

TECHNIQUE	APPLICATION	ADVANTAGE
Digital Elevation	Manual upward pressure on presenting part	Immediate relief during initial assessment
Maternal Positioning	Knee-chest or Trendelenburg	Uses gravity to shift the foetus off the cord
Bladder Filling	500cc fluid via indwelling catheter	**Most practical method if delivery delay is expected**

EXPERT TIP



Prompt Recognition:
Essential to minimise perinatal morbidity and mortality.

Staff Readiness:
Labour ward staff must be skilled and trained in immediate management.

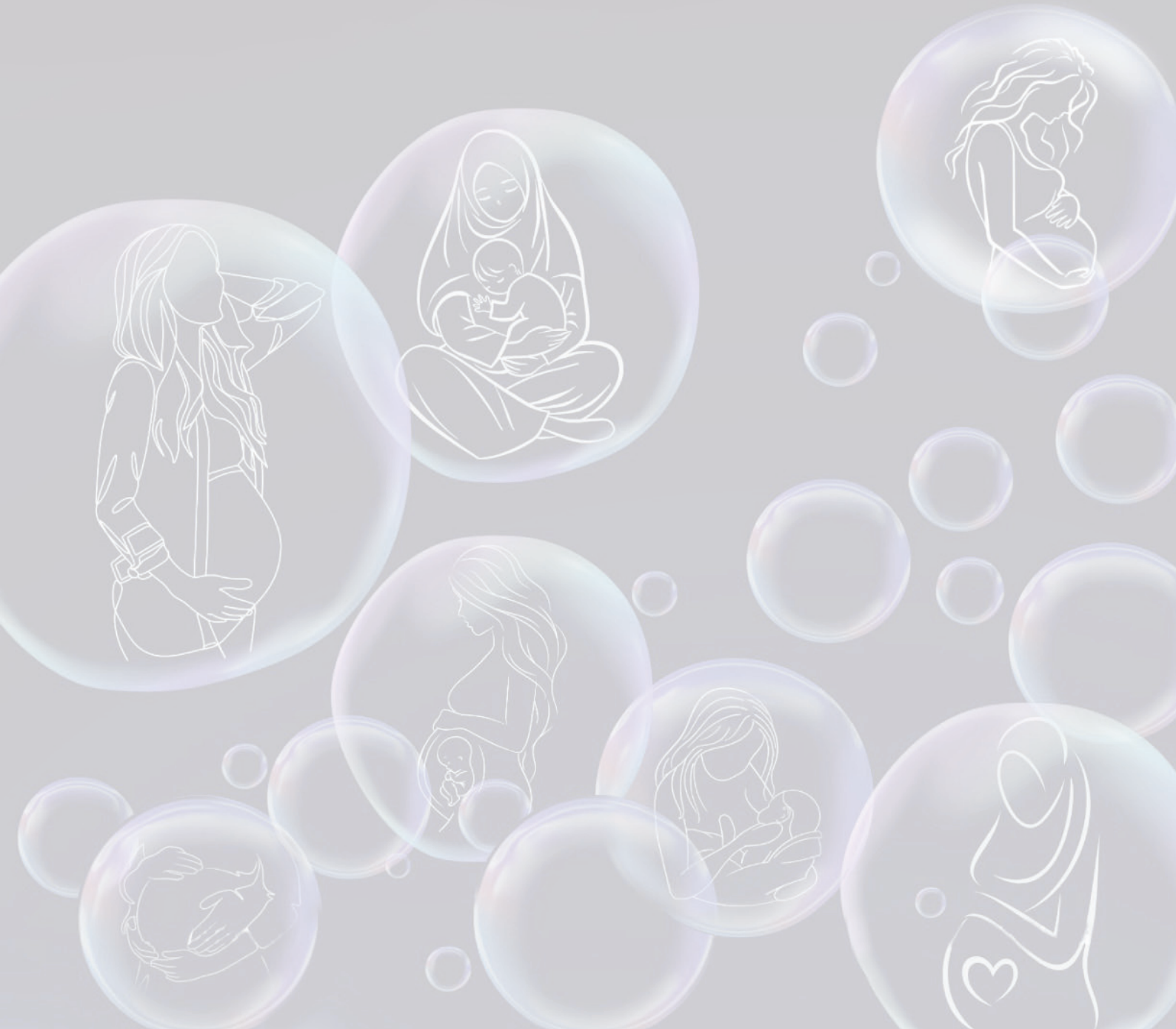
Teamwork:
Crucial for preventing management delays during the acute event

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8.0

UTERINE INVERSION



8.0 UTERINE INVERSION

8.1 Introduction

Acute uterine inversion is a rare but life-threatening complication of the third stage of labour. The incidence varies widely between 1 in 2000 and 1 in 50,000 deliveries, largely dependent upon the standard of management of the third stage of labour (Munro Kerr's Operative Obstetrics, 2020).

8.2 Learning Objectives

a. To define uterine inversion and the classification of uterine inversion
b. To identify risk factors for uterine inversion
c. To recognise the clinical signs of uterine inversion
d. To learn the management strategies for the reduction of uterine inversion

8.3 Definition

Uterine inversion is the inversion of the fundus of the uterus into the endometrial cavity with or without a placenta being attached, turning the uterus partially or completely inside out (Handbook of Obstetrics Guideline, 2024). It is a rare but life-threatening obstetric emergency. It usually occurs during or after the third stage of labour, often following delivery of the placenta. This condition leads to severe haemorrhage and shock, and prompt recognition and management are crucial to prevent maternal morbidity and mortality.

8.4 Classification

Uterine inversion can be classified by both the extent of the inversion and the timing of occurrence:

8.4.1 Based on Degree of Inversion

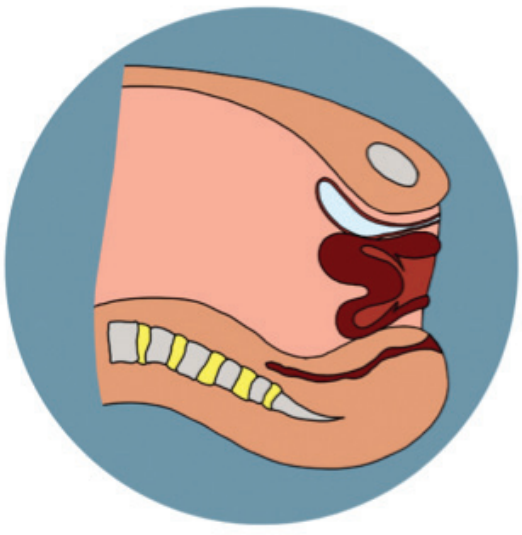
a. First-degree (Incomplete Inversion)
The fundus of the uterus is inverted but remains within the uterine cavity as shown in **Figure 37**.

Figure 37: First degree uterine inversion



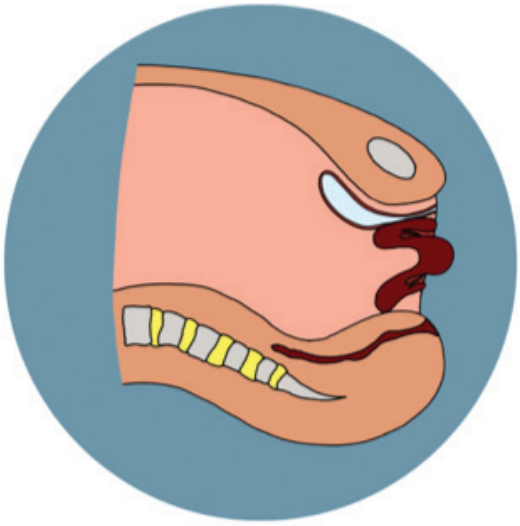
b. Second-degree (Complete Inversion)
The inverted fundus protrudes through the cervical os but does not reach the introitus (vaginal opening) as shown in **Figure 38**.

Figure 38: Second degree uterine inversion



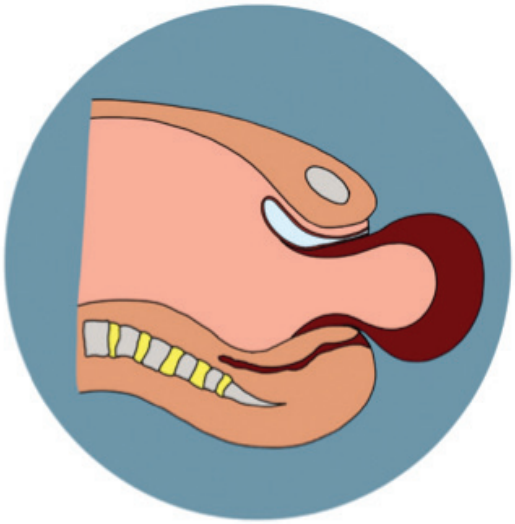
c. Third-degree (Prolapsed Inversion)
The fundus protrudes out of vaginal introitus (**Figure 39**).

Figure 39: Third degree uterine inversion



d. Fourth-degree (Total Inversion or Total Prolapse)
Both the uterus and vaginal walls are inverted and protrude outside the vulva (**Figure 40**). This is extremely rare.

Figure 40: Fourth degree uterine inversion



8.4.2 Based on Time of Occurrence

a. Acute Inversion: Occurs within 24 hours of delivery (most common and most dangerous).
b. Subacute Inversion: Occurs after 24 hours but within 4 weeks postpartum.
c. Chronic Inversion: Inversion persists more than 4 weeks postpartum and is often associated with less bleeding but may cause chronic pelvic symptoms.

8.5 Pathophysiology

8.5.1 The exact mechanism of uterine inversion is not fully understood, but uterine inversion typically involves three key elements:

a. Relaxation of the uterine wall: Atony (lack of tone) in the uterine muscle can make it more susceptible to inversion.
b. Prolapse or indentation of a portion of the uterine wall: The fundus or a section of the uterine wall begins to collapse inward.
c. Simultaneous downward traction or pressure on the fundus: This pulling force, often from the placenta still attached to the fundus, exacerbates the inversion. Applying excessive manual pressure to the uterine fundus from the abdomen (fundal pressure), especially before the placenta has detached, can also push the fundus inward and initiate inversion.

8.5.2 Simultaneous Events and Progression:

a. The process often begins with a localised indentation or dimpling of the fundus into the uterine cavity.
b. If this indentation progresses and the uterus remains relaxed, the entire fundus can then prolapse through the dilated cervix and even extend out of the vagina.
c. Once the uterus inverts, the cervix may constrict around the inverted fundus, creating a "constriction ring" that traps the inverted uterus and makes manual repositioning more difficult over time.

8.6 Risk Factors

The risk factors associated with uterine inversion are detailed in **Table 27**.

TABLE 27: Risk factors for uterine inversion

CATEGORY	RISK FACTORS
Obstetric Factors	• Fundal implantation of the placenta (especially in cases of placenta accreta spectrum) • Short umbilical cord • Precipitous labour and delivery • Uterine atony
Iatrogenic Factors	• Excessive or inappropriate traction on the umbilical cord • Manual removal of the placenta • Improper fundal pressure during the third stage of labour
Maternal Factors	• Multiparity • Uterine anomalies or malformations • Previous history of uterine inversion • Connective tissue disorders (e.g., Ehlers-Danlos syndrome, Marfan syndrome)

8.7 Clinical Presentation

Uterine inversion typically presents acutely, often within minutes after delivery of the placenta. The hallmark features are listed in **Table 28**.

TABLE 28: Clinical presentation of uterine inversion

CATEGORY	DESCRIPTION
Symptoms	• Severe vaginal bleeding (postpartum haemorrhage) • Sudden onset of lower abdominal or pelvic pain • Sensation of a mass protruding from the vagina, if inversion is complete (often described as "something coming down") • Syncope or presyncope
Signs	• Uterine fundus not palpable abdominally • Smooth, round, firm mass seen or felt through the cervix or in the vagina • Haemodynamic instability (hypotension, tachycardia, or paradoxical bradycardia due to neurogenic shock) – may be disproportionate to visible blood loss • Pallor, anxiety, diaphoresis (sweating)

SHOCK IN UTERINE INVERSION CAN BE NEUROGENIC (VASOVAGAL), HYPOVOLAEMIC OR BOTH.

8.8 Diagnosis

8.8.1 Clinical Diagnosis

Diagnosis is primarily **clinical** and **requires prompt recognition**:

a. Physical examination:
   i. Palpation of the abdomen reveals an absent or displaced fundus.
   ii. Vaginal examination reveals a smooth, round, often purplish mass within or protruding from the vagina.

**CLINICAL SUSPICION:
ANY PATIENT PRESENTING WITH SHOCK AND ABDOMINAL PAIN WITH OR WITHOUT POSTPARTUM HAEMORRHAGE SHOULD BE EVALUATED FOR UTERINE INVERSION.**

8.8.2 Imaging (if necessary)

a. Ultrasound: While the diagnosis is usually made clinically, ultrasound can be used to confirm the diagnosis if the clinical picture is equivocal, showing an abnormal uterine fundal contour and a homogenous globular mass (i.e. inverted fundus) within the uterus.

8.9 Management

8.9.1 Management must be **immediate** and **aggressive** to correct inversion, control haemorrhage and prevent maternal death.

8.9.2 Goal:

a. To stabilise patient
b. Replace the uterine fundus to its correct position
c. Manage postpartum haemorrhage and shock, if present
d. Prevent recurrent inversion

8.9.3 Resuscitation and Stabilisation

a. Call for **help** and initiate **code red** – involvement of senior obstetrician/ consultant and anaesthetic team.
b. Preparation:
   i. Mother in lithotomy position.
   ii. Catheterise bladder.
   iii. Alert Operation Theatre (OT).
c. Initiate **resuscitation**:
   i. Check pulse, airway, and breathing, and CPR if necessary.
   ii. High-flow oxygen.
   iii. Two large-bore IV lines for rapid fluid and blood product administration.
   iv. Fluid resuscitation (crystalloids) and blood transfusion as needed, activate MTP (Massive Transfusion Protocol) if necessary.
   v. Discontinue all uterotonics agents (such as oxytocin) to allow the uterus to relax, making manual repositioning easier.
   vi. Continuous monitoring of vital signs and urine output.
   vii. Provide analgesia or anaesthesia immediately due to the extreme discomfort and vagal stimulation.

8.9.4 Repositioning of the Uterus

LAST THING OUT, FIRST THING IN.

DO NOT ATTEMPT TO REMOVE THE PLACENTA UNTIL AFTER UTERINE REPOSITIONING TO AVOID WORSENING HAEMORRHAGE.

a. Manual Reduction of uterus – Johnson Manoeuvre

i. The sooner manual replacement is undertaken, the more likely it will succeed with relative ease.

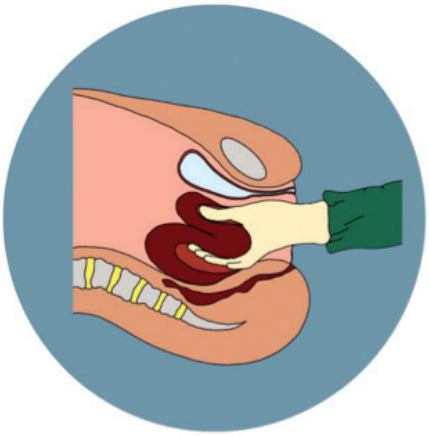
ii. **Figure 41** until **43** describe the steps of the Johnson Manoeuvre.

Figure 41: Step 1 of Johnson Manoeuvre



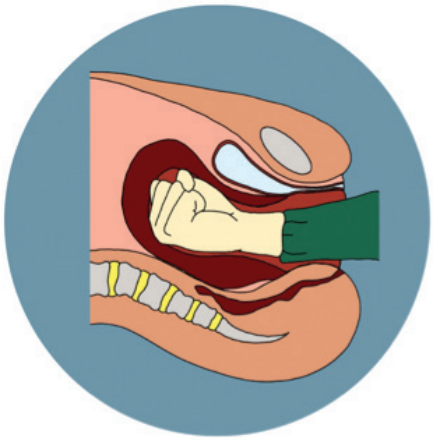
- Insert fingers of the dominant hand and cup the fundus of prolapsed uterus.
- Place the other hand on top of the uterus in the abdomen.

Figure 42: Step 2 of Johnson Manoeuvre



- Gently push the inverted uterus through the cervix towards the umbilicus to its normal position.

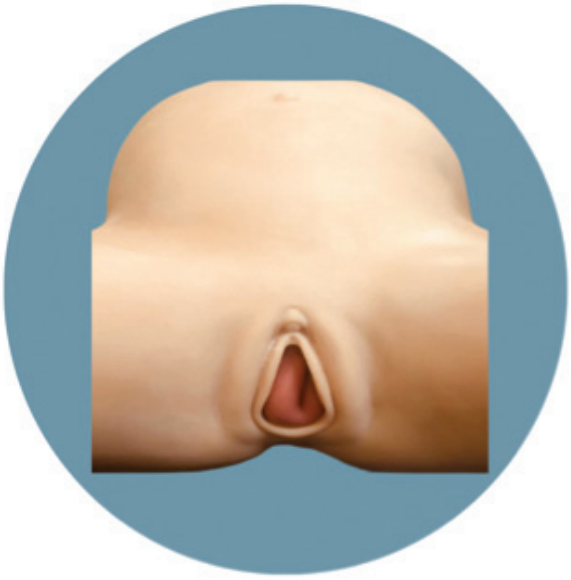
Figure 43: Step 3 of Johnson Manoeuvre



- Hold the uterus in its reduced position with the fist for 3 to 5 minutes and administer uterotonic to sustain contractions.
- Tocolytic drugs such as terbutaline may be used to make replacement easier.
- Once the uterus contracts, perform MRP.
- Keep the hand in the uterus until the uterus is firmly contracted surrounding the fist.
- Subsequently, gradually remove the hand.

b. If manual reduction fails, use **O'Sullivan Hydrostatic Method** as shown in **Figures 44 – 48.**

Figure 44: Step 1 of O'Sullivan Hydrostatic Method



- Place mother in lithotomy position.

Figure 45: Step 2 of O'Sullivan Hydrostatic Method



- Use 1.0 L or more of warm sterile saline/water bag attached to a wide bore giving set.
- A silicon cup can be used as an alternative.
- The sterile solution should be ideally at 150 cm above the vagina to allow for rapid infusion of fluids.
- Up to 4.0 L of fluid may be required.

Figure 46: Step 3 of O'Sullivan Hydrostatic Method



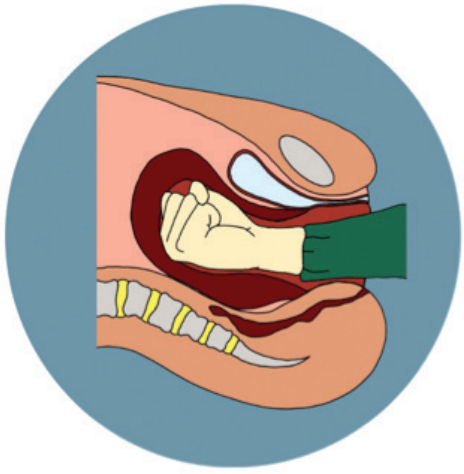
- Insert the giving nozzle deep into the vagina.

Figure 47: Step 4 of O'Sullivan Hydrostatic Method



- Oppose the labia tightly to prevent leakage.

Figure 48: Step 5 of O'Sullivan Hydrostatic Method



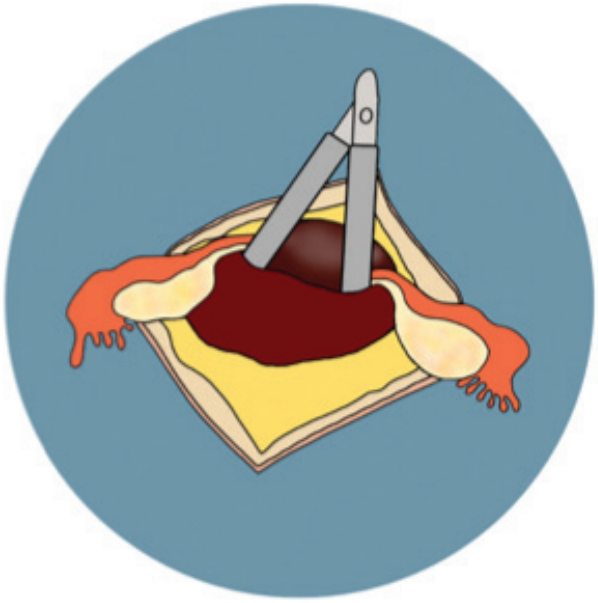
- Once uterus has been replaced, perform digital exploration to confirm that the uterus is empty.
- Keep one hand inside the uterus until uterotonic started and uterus starts contracting until a firm contraction is sustained.
- IV oxytocin 10 IU bolus followed by infusion should be considered to help with uterine contraction.

c. Surgical Intervention

Indicated if manual and hydrostatic techniques fail.

i. Huntington procedure: Gentle traction on the inverted uterus via laparotomy (as shown in **Figure 49**).

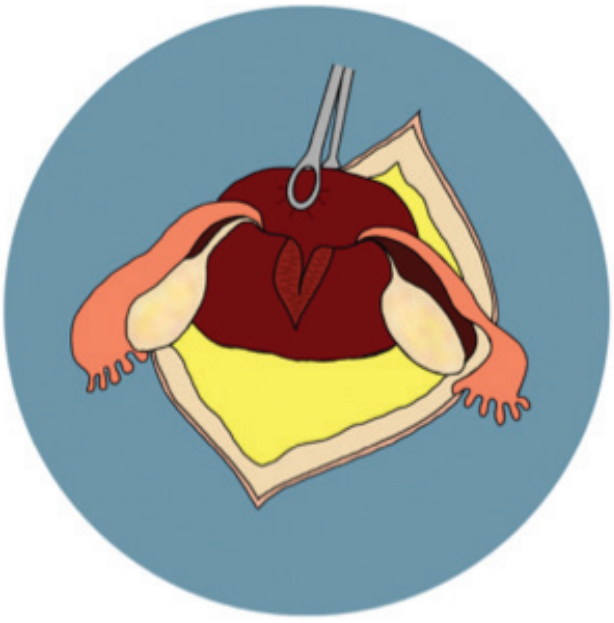
Figure 49: Huntington procedure



1. Laparotomy
2. Place 2 Allis forceps within the dimple of the inverted fundus
3. Use gentle upward traction in a progressive manner

ii. Haultain procedure: Incision of the constriction ring on the cervix posteriorly to allow repositioning (as shown in **Figure 50**).

Figure 50: Haultain procedure



1. Laparotomy
2. Make an incision in the posterior aspect of the constriction ring
3. Manually reduced the inversion
4. Repair the incision after reduction

iii. **Hysterectomy**: May require hysterectomy in severe, irreducible, or necrotic cases.

8.9.5 After Repositioning

a. Administer uterotonics (e.g., oxytocin, ergometrine) to maintain uterine tone.
b. Monitor for recurrence or continued bleeding.
c. To consider intrauterine balloon tamponade to prevent recurrent inversion.
d. Broad-spectrum antibiotics should be given to reduce the risk of infection due to the exposure and manipulation of the uterine tissue.
e. Provide emotional support.

8.10 Complications

When the uterus inverts, it can lead to severe complications as listed in **Table 29**.

TABLE 29: Clinical complications of uterine inversion

COMPLICATIONS	DESCRIPTION
Postpartum Haemorrhage / Haemorrhagic Shock	• The invaginated uterus is unable to contract effectively. • The stretched, inverted endometrium worsens bleeding from placental separation sites, causing severe and rapid postpartum haemorrhage.
Neurogenic Shock	• Stretching of the pelvic parasympathetic nerves may trigger a strong vasovagal response, leading to profound bradycardia and hypotension, often disproportionate to actual blood loss.
Tissue Necrosis	• Prolonged inversion may impair uterine blood supply, potentially leading to ischaemia and tissue damage.
Pain	• Severe lower abdominal pain is common due to acute stretching and distension of uterine and pelvic structures.
Recurrent Uterine Inversion	• Even after successful repositioning, inversion can recur. Use of uterotonics or intrauterine tamponade balloons may help prevent recurrence (GTG No. 57, 2022).

8.11 Prognosis

8.11.1 The prognosis for uterine inversion largely depends on the speed of diagnosis and intervention. With prompt and appropriate management, maternal mortality has significantly decreased, although it remains a serious complication. The main cause of death is massive haemorrhage. The overall maternal survival rate is generally high with timely intervention.

8.12 Recurrence

8.12.1 A woman who has experienced uterine inversion in a previous pregnancy has a small risk of recurrence. It is crucial for these women to inform their healthcare providers about their history of uterine inversion so that appropriate precautionary measures can be taken during future deliveries.

8.13 Risk Management

8.13.1 The primary risk management strategy is prevention, focusing on careful management of the third stage of labour.

8.13.2 Risk is mitigated by rapid diagnosis and simultaneous resuscitation, which often begins before definitive treatment. Thus, it is crucial to have regular training and obstetric drills.

8.13.3 Conduct a formal debrief with the patient and husband following any delivery complicated with uterine inversion. The discussion must clarify the sequence of the emergency, the interventions required for uterine replacement, and the implications for future obstetric care.

8.13.4 Proper and detailed documentation regarding intrapartum events is crucial.

Take home messages:

- Rapid and accurate recognition of the condition is essential.
- Timely and effective resuscitation is vital for survival.
- Every birth attendant should be competent in managing uterine inversion.
- Ensure clear communication, proper documentation and post-event debriefing.

Uterine Inversion: Emergency Management Guide

RISK FACTORS & CLINICAL RECOGNITION

Identify High-Risk Categories

Obstetric (uterine atony, short cord)

Iatrogenic (excessive cord traction)

Maternal (multiparity, previous inversion)

Clinical Hallmark Signs

Shock "neurogenic or hypovolaemic"

Severe Pain

Absent Abdominal Uterine Fundus

Clinical Suspicion Rule
Evaluate any patient with shock and abdominal pain for inversion, regardless of bleeding.

STEP-BY-STEP MANAGEMENT AND REDUCTION

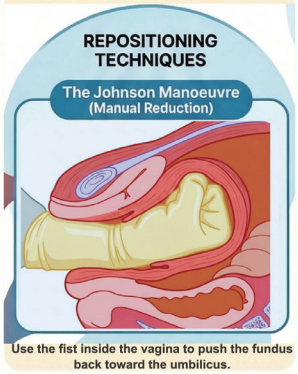
STEP 1: IMMEDIATE STABILISATION

- Initiate **"CODE RED"**, start fluid resuscitation.
- **STOP** all uterotonics to allow relaxation.
- Stabilise patient.



STEP 2: MANUAL REDUCTION (Johnson Manoeuvre)

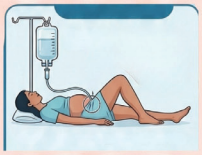
Cup the fundus and push it through the cervix toward the umbilicus.



Use the fist inside the vagina to push the fundus back toward the umbilicus.

STEP 3: FAILED MANUAL USE O'SULLIVAN METHOD

Use 1.0-4.0L of warm sterile saline via vaginal pressure to hydrostatically reposition the uterus.



SURGICAL ESCALATION

- **Huntington**: Gentle upward traction on the fundus via laparotomy.
- **Haultain:** Incising the cervical constriction ring to allow repositioning.
- **Hysterectomy**: Last resort for severe, necrotic, or irreducible cases.

TAKE-HOME MESSAGE AND POST-CARE



THE "LAST OUT, FIRST IN" PRINCIPLE
Reposition the uterus before attempting to remove an attached placenta.



POST-REDUCTION STABILISATION
Administer uterotonics (Oxytocin) only after reduction to maintain tone and prevent recurrence.

"COMPETENCE SAVES LIVES:
Rapid recognition and effective resuscitation by skilled attendants are vital for maternal survival.

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9.0

SHOULDER DYSTOCIA

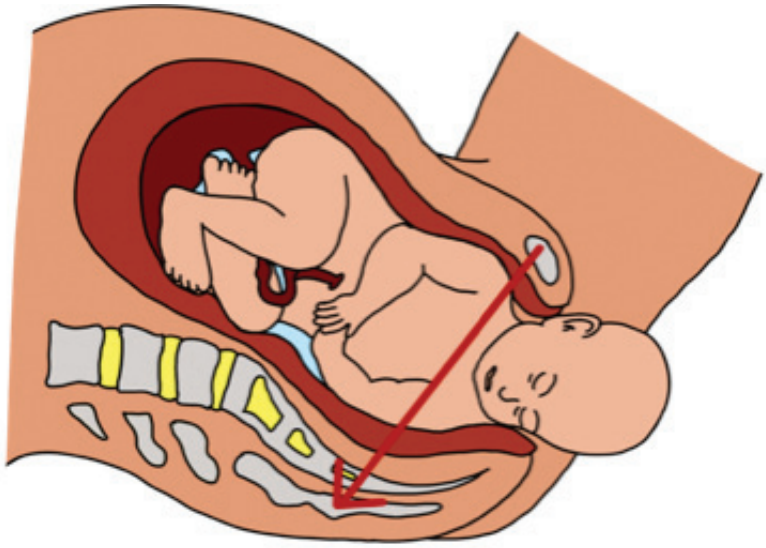


9.0 SHOULDER DYSTOCIA

9.1 Introduction

Shoulder dystocia is a rare but serious obstetric emergency. The incidence is between 0.58 % and 0.70 % (GTG No.42, 2017). It occurs when the foetal shoulders fail to deliver shortly after the head, typically due to impaction of the anterior shoulder behind the maternal pubic symphysis, as shown in **Figure 51**. It may lead to medicolegal complaints.

Figure 51: Impacted anterior shoulder of foetus behind the maternal pubic symphysis



It can be either unilateral, which involves only the anterior shoulder, or bilateral where both the anterior and posterior shoulders are involved.

This condition requires prompt recognition and intervention to prevent significant maternal and neonatal morbidity and even mortality. One of the most important foetal complications is brachial plexus injury (BPI), where the incidence is about 2.3 % to 16 % following shoulder dystocia (GTG No.42, 2017).

SHOULDER DYSTOCIA IS MOSTLY UNPREDICTABLE AND GENERALLY UNPREVENTABLE.

Effective management relies on the timely application of specific manoeuvres to relieve the obstruction and minimise trauma.

9.2 Learning Objectives

a. To define shoulder dystocia
b. To identify risk factors for shoulder dystocia and describe its complications
c. To recognise the clinical signs of shoulder dystocia
d. To describe the specific manoeuvres employed in the management of shoulder dystocia
e. To apply knowledge in clinical scenarios to demonstrate prompt recognition and interventions to ensure maternal and foetal safety

9.3 Definition

Vaginal delivery that requires additional obstetric manoeuvres to release the foetal shoulder after gentle axial traction failed (GTG No. 42, 2017).

9.4 Risk Factors

While shoulder dystocia is frequently unpredictable, its likelihood may be increased by certain risk factors as listed in **Table 30**.

TABLE 30: Risk factors for shoulder dystocia

PRE-LABOUR	INTRA-PARTUM
Foetal macrosomia > 4 kg	Prolonged first stage of labour
Previous shoulder dystocia – of similar weight	Prolonged second stage of labour
Diabetes Mellitus	Operative vaginal delivery
Maternal BMI > 30 kg/m^2	Oxytocin augmentation
Induction of labour	

9.5 Early Recognition of Shoulder Dystocia

9.5.1 Head bobbing sign

- Baby's head retracted back in between contraction while descending at the perineum.

9.5.2 Turtle neck sign (**Figure 52**)

- Baby's head is being drawn tightly against perineum.

9.5.3

Failure or restitution

- Baby's head remains looking straight up or down after delivery instead of turning sideways.

9.5.4 Failure of shoulder to descend after gentle axial traction

Figure 52: Turtle neck sign



*When shoulder dystocia happens, AVOID 5 Ps as described in **Table 31**.

TABLE 31: 5 Ps to avoid in shoulder dystocia

Panic	Stay calm and call for help
Pushing	Maternal pushing may exacerbate the impacted shoulder
Pulling	Excessive traction is associated with complications such as nerve injury and clavicle fracture
Pressure at uterine fundus	Fundal pressure may lead to neonatal complications or even uterine rupture (GTG No. 42, 2017)
Pivoting (Excessive lateral or downward traction)	Ineffective to release the impacted shoulder, putting the baby at risks of the complications from shoulder dystocia

9.6 Management

9.6.1 Advanced Life Support in Obstetrics (ALSO) course introduced the mnemonic HELPERR for the management of shoulder dystocia and has been published in the American Family Physician in 2004 (**Figure 53**).

9.6.2 The green top guideline number 42 on shoulder dystocia also provided its RCOG algorithm for the management of shoulder dystocia and has been shown to improve perinatal outcomes, refer **Appendix 10**.

Figure 53: HELPERR mnemonic



9.6.3 **H**: Call for **H**ELP – obstetric team, nursing staff, paediatrics team.

a. Ideally 3 assistants and 1 accoucheur.
b. Stop maternal pushing.
c. Break the bed or bring the buttocks to the edge of the bed.

9.6.4 **E**: Consider **E**pisiotomy

a. An episiotomy would not release the bony obstruction in shoulder dystocia.
b. The aim is to provide more space to facilitate the accoucheur to perform the internal manoeuvres.

9.6.5 L: Legs – **McRoberts manoeuvre**

a. Hyper-flexion and abduction of the maternal hips (**Figure 55**).
b. Positioning the maternal thighs to abdomen.
c. This manoeuvre increases the anteroposterior diameter of the pelvis by flattening the lumbosacral curve as demonstrated in **Figure 54**.
d. McRoberts manoeuvre has a success rate of up to 90 % (GTG No. 42, 2017).

Figure 54: Flattening of the lumbosacral curve

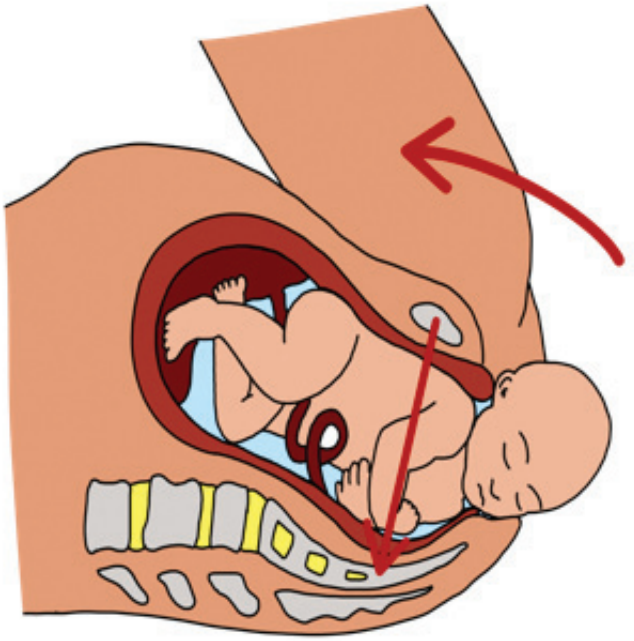


Figure 55: McRoberts manoeuvre



*Source: British Journal of Midwifery, 2017

9.6.6 **P**: Suprapubic **P**ressure – **Rubin I manoeuvre**

a. Assistant using the heel of hand to apply firm downward and oblique pressure at the suprapubic area towards the direction where the baby is facing (**Figure 56**).
b. The pressure can be given either in a rocking manner or continuous pressure.
c. The aim is to dislodge the impacted anterior shoulder from pubic symphysis by reducing bisacromial diameter and to rotate the shoulder into the oblique diameter.

Figure 56: Rubin I manoeuvre (Suprapubic pressure)

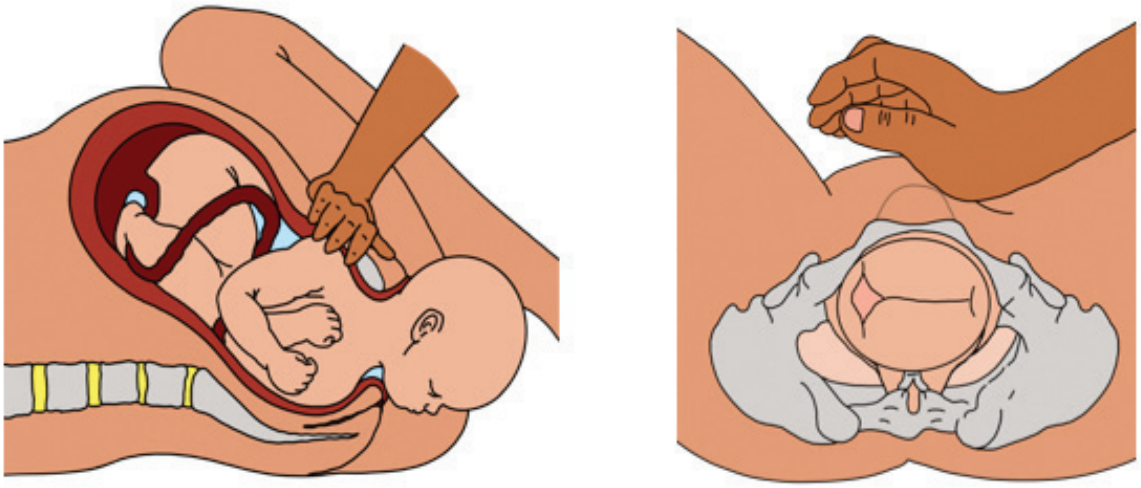
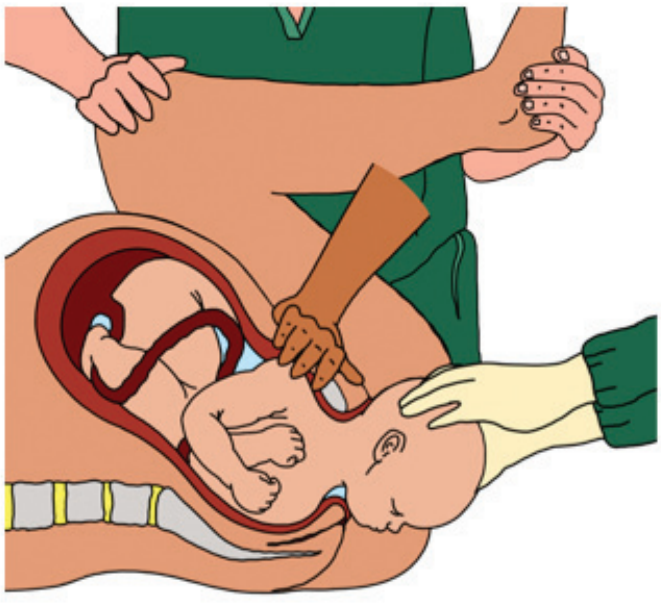


Figure 57: Combination of McRoberts and Rubin I manoeuvre



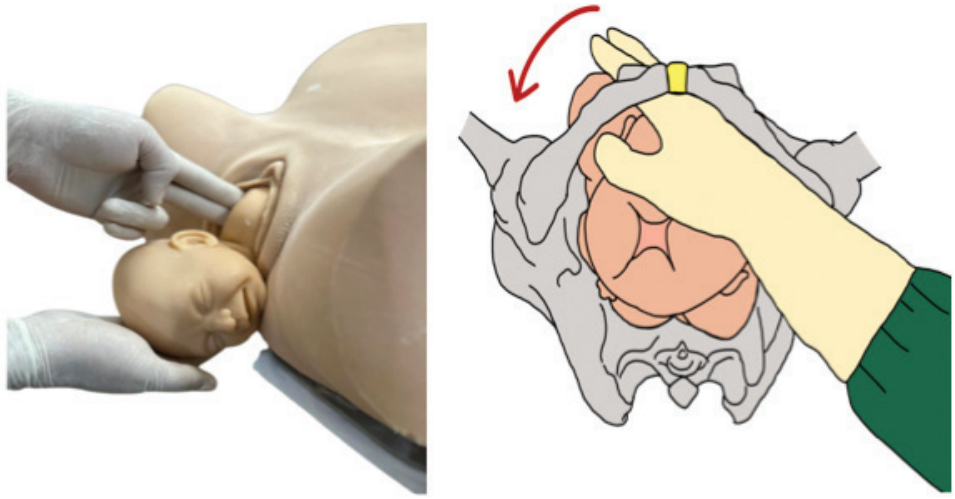
Combine together with McRoberts manoeuvre as shown in **Figure 57**, to increase the success rate (GTG No. 42, 2017).

9.6.7 Internal manoeuvres

a. E: **E**nter manoeuvres – Rubin II, Woods Screw and Reverse Woods Screw

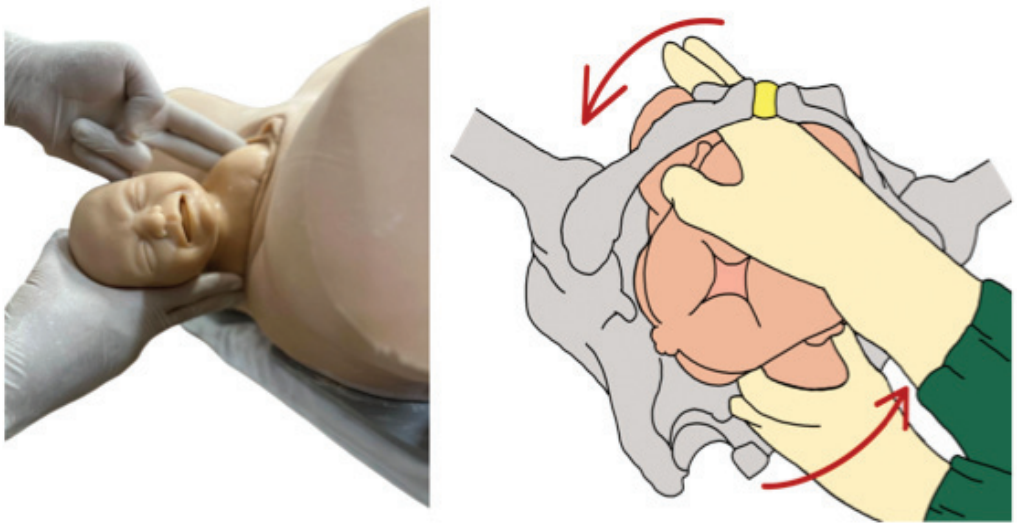
i. Rubin II manoeuvre (as shown in **Figure 58**):
- Place fingers on the posterior aspect of the ANTERIOR shoulder.
- Push the shoulder towards the baby's chest.
- This will adduct and rotate the shoulders into the wider oblique diameter.

Figure 58: Rubin II manoeuvre



ii. Woods Screw manoeuvre is demonstrated in **Figure 59**:
- Keep fingers on the posterior aspect of the anterior shoulder (following Rubin II).
- Place fingers to the anterior aspect of the posterior shoulder.
- Rotate 180 degrees in unison.
- This will adduct and rotate the shoulders into the wider oblique diameter.

Figure 59: Woods Screw manoeuvre



iii. **Reverse Woods Screw manoeuvre** is shown in **Figure 60:**
- Place fingers on the anterior aspect of the ANTERIOR shoulder.
- Place the other fingers at the posterior aspect of the POSTERIOR shoulder.
- Rotate 180 degrees in unison.
- This will adduct and rotate the shoulders into the wider oblique diameter.

Figure 60: Reverse Woods Screw manoeuvre



9.6.8 **R:** **R**emove the posterior arm – Delivery of posterior arm and Posterior axillary sling traction

a. **Delivery of posterior arm** as demonstrated from **Figure 61** until **64**:
   i. Trace the posterior arm until the level of the elbow.
   ii. Flex the baby's elbow by applying pressure on the antecubital fossa.
   iii. Follow the arm until can grasp the wrist.
   iv. Sweep the hand across the baby's chest and face.
   v. Deliver the posterior arm.
   vi. This will reduce the diameter of the baby's shoulders by the width of the arm.
   vii. Incidence of humeral fractures ranges from 2 to 12 % (GTG No. 42, 2017).
   viii. Randomised controlled trials are not available to compare the delivery of the posterior arm with internal rotations (enter manoeuvres).

Figure 61: Delivery of posterior arm (A)

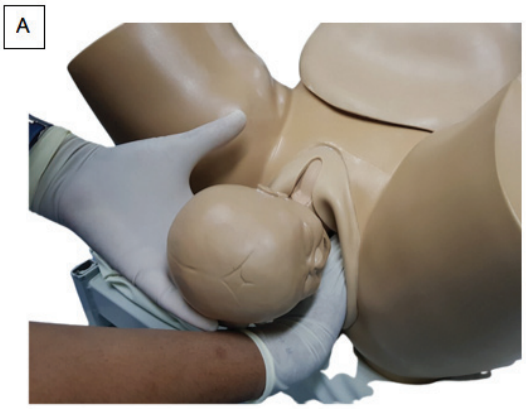


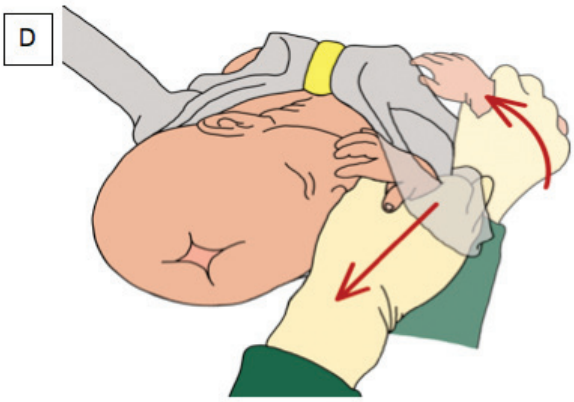
Figure 62: Delivery of posterior arm (B)



Figure 63: Delivery of posterior arm (C)



Figure 64: Delivery of posterior arm (D)



b. Posterior axillary sling traction

i. Place fingers from both hands or by using a suction catheter or Foley's catheter under the posterior axilla as illustrated in **Figure 65**.

ii. Deliver posterior shoulder and arm.

iii. The aim is to reduce the diameter of the baby's shoulders by the width of the arm.

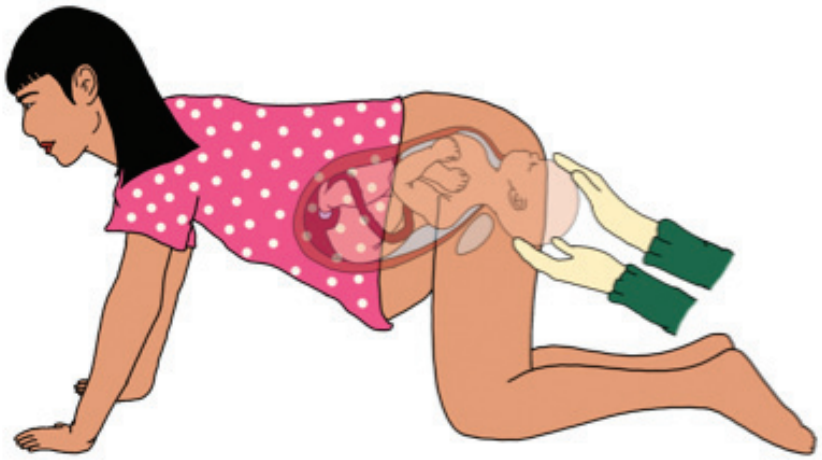
Figure 65: Posterior axillary sling traction



9.6.9 R: Roll over – **All-fours position or Gaskin manoeuvre (Figure 66)**

a. Place the patient on hands and knees.
b. The flexibility of the sacroiliac joints increases the sagittal diameter of the pelvic outlet.
c. The posterior shoulder is delivered first.
d. The aim is to increase the pelvic diameter.
e. The success rate mentioned in one case series was up to 85 % (GTG No. 42, 2017).

Figure 66: All-fours position or Gaskin manoeuvre



9.6.10 To consider the following options in **Table 32** after failed repeated set of manoeuvres.

TABLE 32: Additional manoeuvres after failed repeated manoeuvres

TECHNIQUE	PROCESS	AIM
Cleidotomy	• Intentional clavicular fracture • Blunt manipulation is recommended	• To release the impacted shoulder by reducing the diameter • Difficult with risk of vascular injury
Symphysiotomy	• Dividing symphyseal ligaments	• To increase the pelvic diameter and release the impacted shoulder • High incidence of serious maternal morbidity and poor neonatal outcome
Zavanelli manoeuvre (Cephalic replacement)	• Rotate foetal head to direct OA • Flex the neck • Push the head gently into the vagina • Maintain constant pressure over foetal head • Perform caesarean section	• To deliver baby via caesarean section • Usually for bilateral shoulder dystocia – difficult to disimpact the shoulders at the pubic symphysis anteriorly and sacral promontory posteriorly vaginally • Maternal safety is unknown

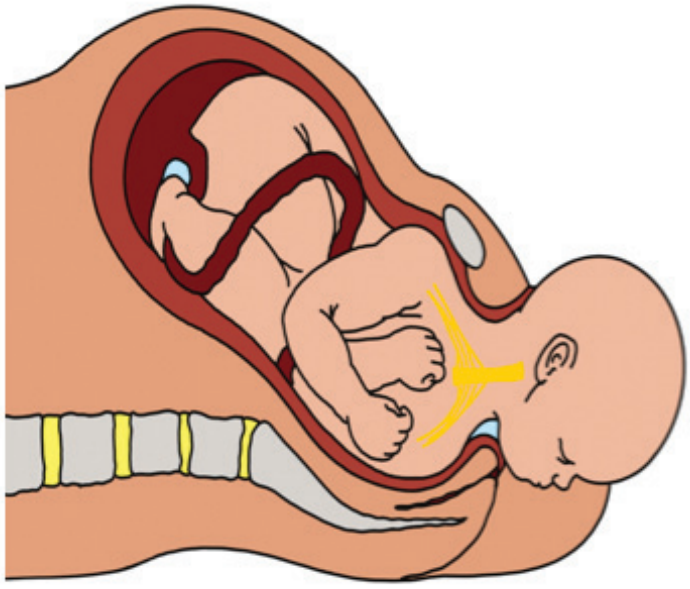
9.7 Complications

Shoulder dystocia has been known to be associated with both foetal and maternal complications (**Table 33**). The head-to-body delivery interval does not predict foetal hypoxia or even death, although a systematic approach to deliver the shoulders based on the manoeuvres above may help in reducing both perinatal and maternal morbidity.

TABLE 33: Complications from shoulder dystocia

FOETAL	MATERNAL
Hypoxic ischaemic encephalopathy	Postpartum haemorrhage
Clavicle & Humerus fracture	Genital tract trauma
Neurologic: Brachial plexus injury (**Figure 67**), Erb's palsy, facial nerve injuries, Horner syndrome	OASIS
Foetal death	Brachial plexus injury from shoulder dystocia

Figure 67: Brachial plexus injury from shoulder dystocia



9.8 Post Event Management

TABLE 34: Post event management

Anticipate complications	**1. PPH** • Shoulder dystocia is associated with prolonged second stage of labour and may also be associated with macrosomic baby. Thus, putting the patient at risk of postpartum haemorrhage secondary to uterine atony. In addition, shoulder dystocia can cause maternal genital tracts injuries which may contribute to the PPH as well. **2. OASIS** • During the delivery of the foetal shoulders, there is risk of genital tract injuries including the obstetric anal sphincter injuries. **3. Foetal complications requiring resuscitation** • ***HIE***: the foetus is at risk of hypoxia in shoulder dystocia, especially when the impacted shoulder takes more time to be released and this will be reflected in the umbilical cord blood gas. • ***Brachial plexus injury***: Excessive tractions during the delivery of the shoulders may contribute to the nerve injury, in about 2.3 to 26 % of cases of shoulder dystocia (RCOG, 2020). Although the majority of the cases of BPI are transient, there is about 10 % risk of permanent neurological deficit (Gherman RB et al, 1998). • ***Clavicular fracture***: Other reported neonatal morbidity includes fracture of clavicle and even humerus.
Counselling	• Regarding intrapartum events. • Regarding complications: maternal and foetal. • Risk of recurrence in future pregnancy - recurrence rate is between 1 to 25 % (GTG No. 42, 2017). • Include patient and her husband/partner.
Documentation	To record: • Persons involved. • Timing of the event. • Position of anterior and posterior shoulders. • Procedure and sequence involved. • Apgar score. • Cord pH. *Refer to **Appendix 11** • Detailed documentation of the events are essential due to high risk for medicolegal complaints.

9.9 Risk Management

9.9.1 Since shoulder dystocia is mostly unpredictable and generally unpreventable, it is crucial that all birth attendants are skilled in the necessary delivery techniques. They should be able to diagnose shoulder dystocia and be skilful with the manoeuvres or techniques required to help with the delivery.

9.9.2 Regular training and obstetric drills will help recollect the birth attendants' knowledge and keep them familiarised with the manoeuvres required in shoulder dystocia as this is a rare obstetrics emergency.

9.9.3 Detailed documentation of the events and complications is essential for medicolegal purposes and for auditing, to improve future shoulder dystocia management.

9.9.4 Debriefing plays a crucial role both between the birth attendants involved in order to identify what are the areas that can be improved later on. Debriefing of the couple also will ease their worries and resolve their enquiries regarding their baby, in particular those babies and/or mothers with complications from shoulder dystocia.

Take home messages:

- Prompt recognition of shoulder dystocia and immediate call for help are essential.
- All birth attendants must be equipped with clinical skills to manage shoulder dystocia; this is enhanced by regular obstetric drills.
- Conduct a debriefing after the event to identify team strengths and areas for improvement.
- Detailed documentation is paramount.

Emergency Management of Shoulder Dystocia

'SHOULDER DYSTOCIA IS MOSTLY UNPREDICTABLE AND GENERALLY UNPREVENTABLE.'

⚠ Critical Safety: Avoid the 5 Ps

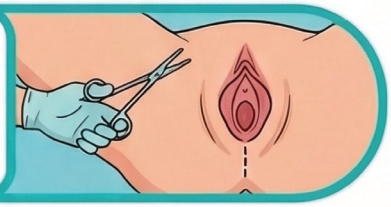
- Panic
- Pushing
- Pressure at uterine fundus
- Pulling
- Pivoting

MANAGEMENT (HELPERR MNEMONIC)



H: Call for HELP
Activate the obstetric team, nursing staff, and paediatrics team.

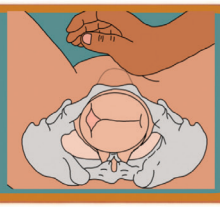
E: Consider Episiotomy
To provide more space for internal manoeuvres.





L: Legs (McRoberts Manoeuvre)
Hyper-flexion and abduction of the maternal hips.

P: Suprapubic Pressure
Rubin I manoeuvre to dislodge the impacted anterior shouider.

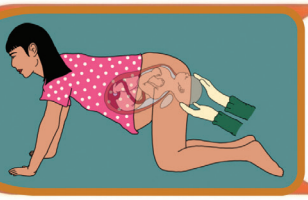




E: Enter Manoeuvres
- Woodscrew, reverse woodscrew and rubin II manoeuvres.

R: Remove the Posterior Arm
Delivery of the posterior arm to reduce shoulder diameter.





R: Roll Over (Gaskin Manoeuvre)
Move the patient to an all-fours position.

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10.0

OPERATIVE VAGINAL DELIVERY



10.0 OPERATIVE VAGINAL DELIVERY

10.1 Introduction

Operative vaginal delivery includes vacuum and forceps assisted delivery. The practice of operative vaginal delivery has been reducing for the past three decades, where the recent incidence is about 4 % of vaginal deliveries in Malaysia (National Obstetric Registry Report, 2018-2020). The reasons are the fear of the complications arising from the usage and the lack of training. Forceps assisted delivery is more frequently related to perineal trauma and foetal injury as compared to vacuum assisted delivery, which instead has a higher rate of failure. However, the correct usage of instruments can avoid caesarean section that is invasive and carries even higher risks. Therefore, it is crucial to master operative vaginal delivery skills in Obstetrics to provide more efficient delivery.

10.2 Learning Objectives

a. To understand the principles of safe operative vaginal delivery
b. To discuss the limitations and risks of operative vaginal delivery
c. To apply clinical knowledge to competently perform appropriate operative vaginal delivery in relevant clinical scenarios

10.3 Definition

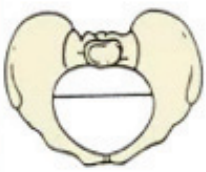
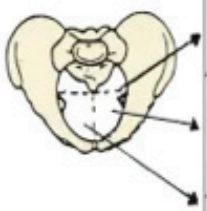
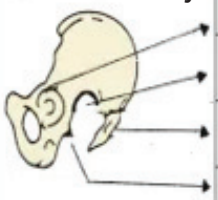
Vacuum assisted delivery, also known as ventouse extraction, is defined as a procedure that uses a vacuum device to deliver a baby during the second stage of labour. Forceps assisted delivery is defined as a procedure that uses a forceps device to deliver a baby during the second stage of labour.

10.4 Anatomy and Physiology

10.4.1 Knowledge on the anatomy of female pelvis and foetal head is paramount to increase the success rate of performing operative vaginal delivery.

10.4.2 The maternal pelvis differs in shapes and dimensions. There are four major types: gynaecoid, anthropoid, android and platypelloid as demonstrated in **Table 35**.

TABLE 35: Types of female pelvis

		 Gynecoid	 Anthropoid	 Android	 Platypelloid
Pelvics inlet 	Widest transverse diameter of inlet	12 cm	< 12 cm	12 cm	12 cm
	Anteroposterior diameter inlet	11 cm	> 12 cm	11 cm	10 cm
	Forepelvis	Wide	Divergent	Narrow	Straight
Pelvic midcavity 	Side walls	Straight	Narrow	Convergent	Wide
	Sacrosciatic notch	Medium	Backward	Narrow	Forward
	Inclination of sacrum	Medium	Wide	Forward (lower third)	Narrow
	Ischial spines	Not prominent	Not prominent	Not prominent	Not prominent
Pelvic outlet 	Subpubic arch	Wide	Medium	Narrow	Wide
	Transverse diameter of inlet	10 cm	10 cm	10 cm	10 cm

*Source: Modified from *Blueprints in Obstetrics and Gynecology*. 1998

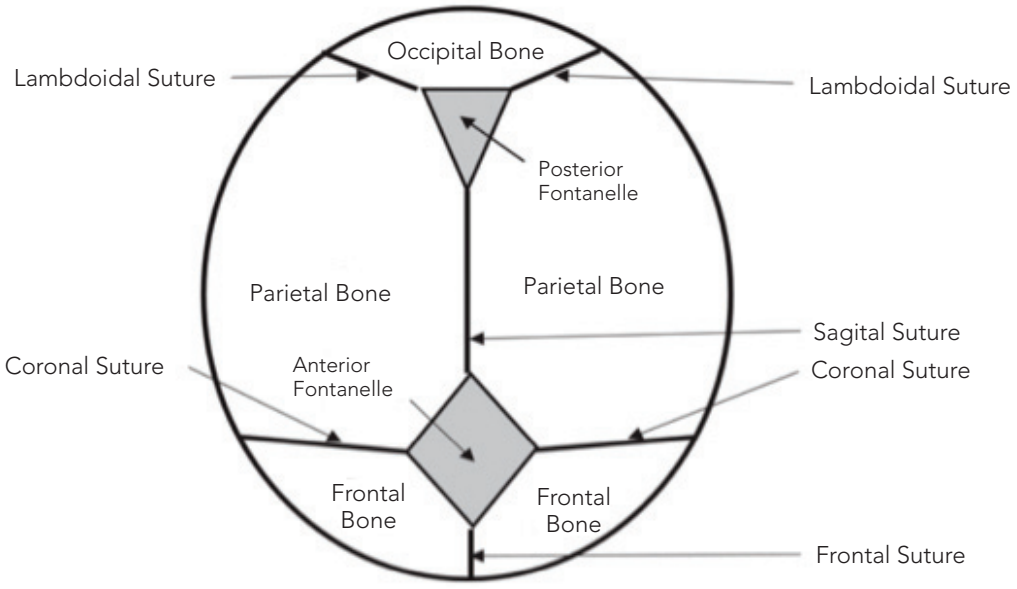
10.4.3 Gynaecoid pelvis is the commonest type among the four. The types of female pelvis which are suitable for vaginal delivery are gynaecoid and anthropoid because of the wide antero-posterior diameter of the inlet. Narrow pelvic inlet in the type of anthropoid and platypelloid is more likely to cause cephalo-pelvic disproportion.

10.4.4 Determination of foetal head and position is a basic skill in Obstetrics and it is required before applying vacuum or forceps devices.

10.4.5 The posterior fontanelle can be located by feeling the midline sagittal suture which connects the parietal bones. The posterior fontanelle is surrounded by the bilateral lambdoid sutures, whereas the anterior fontanelle is surrounded by frontal suture and 2 coronal sutures. The anterior fontanelle is in a diamond shape, and the posterior fontanelle is in triangular shape. The favourable foetal position is in occipital anterior, where the anterior fontanelle of the foetal skull is palpable on the posterior aspect of the maternal pelvis.

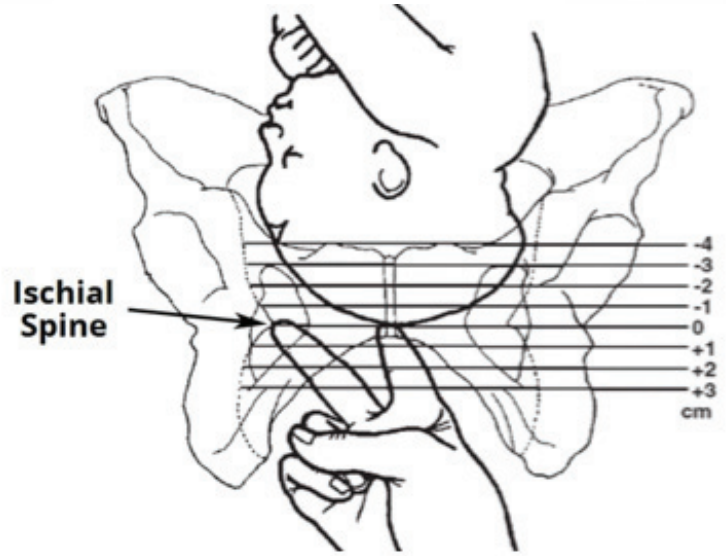
10.4.6 When assessing the station, it is important to exclude caput succedaneum which is a swelling over the foetal scalp and only evaluate the foetal skull. Landmark of foetal skull are shown in **Figure 68** and reference point in **Figure 69**.

Figure 68: Landmark of the foetal skull used to determine foetal position



*Source: Photo from Journal of Midwifery and Women's Health, 2020

Figure 69: Assessing foetal station



- The ischial spine is the reference point. Foetal skull palpable above it, the station is negative whereas below it, the station is positive.

CORRECT ASSESSMENT OF FOETAL POSITION AND STATION IS IMPORTANT FOR A SUCCESSFUL INSTRUMENTAL DELIVERY.

10.5 Indications

The indications of performing operative vaginal delivery are divided into maternal and foetal indications. After all, no indication is absolute, and clinical judgement is required in all situations as listed in **Table 36**.

TABLE 36: Indications for operative vaginal delivery

MATERNAL	FOETAL
Prolonged second stage of labour • **Nulliparous**: two hours of active second stage with regional anaesthesia, or one hour without regional anaesthesia. • **Multiparous**: one hour of active second stage with or without regional anaesthesia.	Abnormal foetal heart rate at second stage of labour
To shorten second stage • NYHA Class III or IV cardiac disease • Hypertensive crisis • Myasthenia Gravis • Spinal cord injury • Maternal exhaustion	Delivery of after-coming head in breech delivery (Forceps assisted delivery)

10.6 Contraindications

Contraindications for operative vaginal delivery are as listed in **Table 37**.

TABLE 37: Contraindications for operative vaginal delivery

MATERNAL
Head palpable per abdomen > 1/5
Evidence of relative or absolute cephalopelvic disproportion (e.g., suspected macrosomia)
Cervix not fully dilated
Station above ischial spine
Unable to determine foetal position
Abnormal presentation except for after-coming head in vaginal breech delivery
Vacuum should not be performed for gestation less than 34 weeks (higher risk of subgaleal haemorrhage and scalp trauma)
Confirmed or high probability of foetal bleeding disorders (e.g., maternal alloimmune thrombocytopenia)
Foetal predisposition to bony fracture e.g., osteogenesis imperfecta
Relative contraindication: Unskilled professionals, maternal blood borne infections.

10.7 Choices of Instruments

The choice of instrument depends on the clinical situation, clear communication with the patient and expertise of the healthcare personnel as listed in **Table 38**.

TABLE 38: Choices of Instruments

	FORCEPS	VACUUM
Types	• Simpson, Neville-Barnes (low/ mid-cavity) • Wrigley's (outlet) • Kielland (rotational) • Piper (aftercoming head of breech presentation)	• Soft/silicone cup • Metal: Malmstrom/Birds • Kiwi Omni cup • Medela
Benefits	• Does not require chignon formation. • More likely to succeed especially in maternal exhaustion. • Useful in the after-coming head of breech delivery.	• Easier learning curve. • Can be used in foetal occipital transverse position. • Less risk of genital tract trauma compared to forceps.
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: 1-15/10,000 • Foetal death: very rare	

*Source: Handbook of Obstetrics Guideline, 2024

10.8 Prerequisites

Table 39 shows the prerequisites for operative vaginal delivery.

TABLE 39: Prerequisites for operative vaginal delivery	
F	**F**ully dilated os
O	**O**cciput anterior or posterior (for forceps) **O**perating theatre available (if caesarean section is needed in unsuccessful attempt)
R	**R**upture of membranes
C	**C**ephalopelvic disproportion excluded **C**aput and moulding < 2+ **C**ontractions adequate **C**onsent (Verbal)
E	**E**ngagement of head (≤ 1/5 head palpable per abdomen) **E**mpty bladder **E**pisiotomy- mediolateral (if perineum is resistant or short)
P	**P**ain relief (local anaesthesia or pudendal block) **P**elvis adequate **P**aediatric team standby
S	**S**kills **S**upervision **S**terility

ALL PREREQUISITES MUST BE MET BEFORE PERFORMING INSTRUMENTAL DELIVERY.

10.9 Classification of Operative Vaginal Delivery

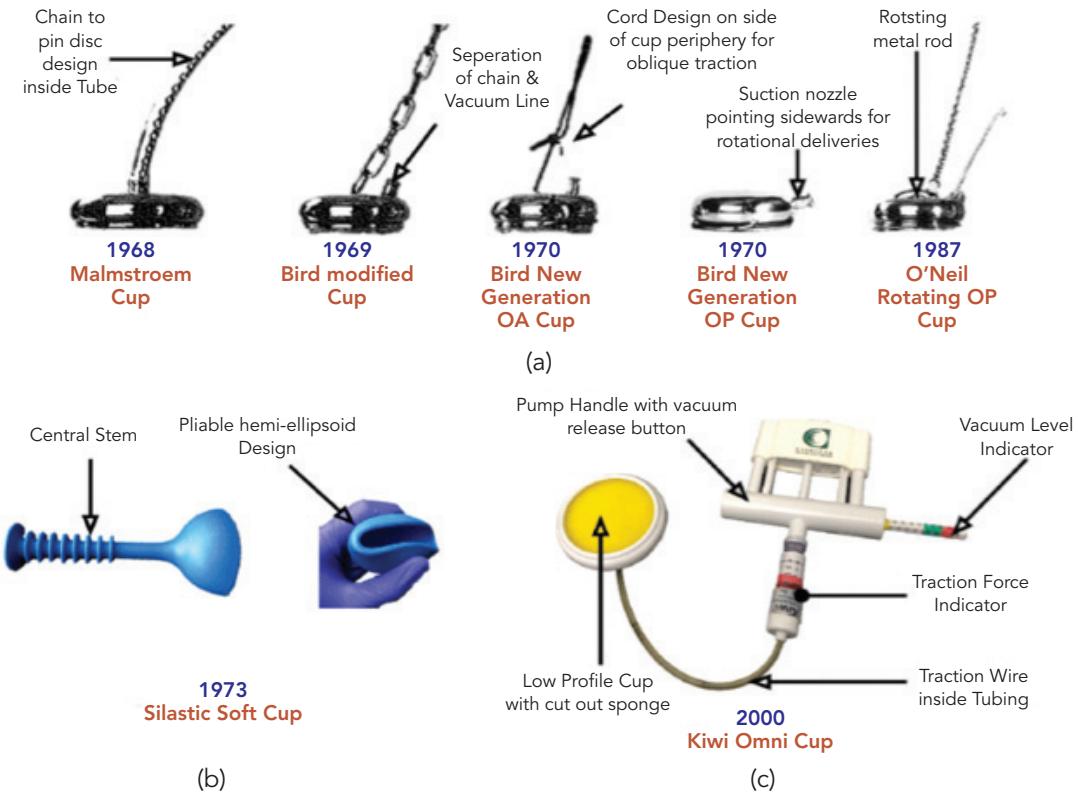
Table 40 shows the classification of operative vaginal delivery.

TABLE 40: Classification of operative vaginal delivery	
Outlet	• Foetal skull on the perineum • Foetal 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
Mid	• Foetal head no more than 1/5 palpable per abdomen • Leading point of the skull at station 0 or +1
High	• Foetal head is 2/5 or more palpable per abdomen • Leading point of skull above ischial spines • **NOT RECOMMENDED** for operative vaginal delivery

10.10 Vacuum Assisted Delivery

10.10.1 Types of Vacuum Cup are illustrated in **Figure 71**.

Figure 70: Evolutionary trail of modern vacuum devices



*Source: Photo from PubMed, 2020

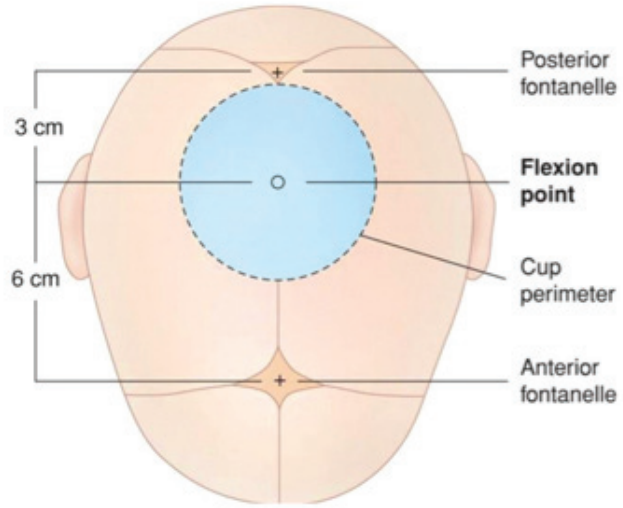
Figure 71: Medela vacuum cup



10.10.2 Procedure of Vacuum Assisted Delivery

a. Fulfil the prerequisite criteria for instrumental delivery.
b. Identify the flexion point which is over the sagittal suture and 3 cm anterior to the posterior fontanelle.
c. The centre of the vacuum cup should be over the flexion point, as shown in **Figure 72**.
d. Apply the vacuum cup by increasing the suction pressure stepwise or rapidly.
e. Make sure there is no surrounding vaginal or cervical tissue caught in between the cup.
f. Assist the delivery by aiding the momentum of the maternal expulsive efforts, rather than pulling the baby out independently.
g. The dominant hand pulls the metal chain/traction wire/central stem, while the thumb of the non-dominant hand applies counter pressure to monitor the progress of descent and to prevent cup detachment.
h. Apply traction following the pelvic curvature with the maximum of 3 pulls.
i. Consider episiotomy with local anaesthesia during crowning of the foetal head.
j. Remove the vacuum cup by releasing the suction pressure (to off the suction machine rather than disconnecting suction tubing from either the cup or machine to allow gradual reduction to reduce foetal scalp injury) and allow for spontaneous detachment.

Figure 72: Flexion point for vacuum cup application



*Source: Photo taken from Archives of Gynaecology and Obstetrics website, 2023

ROCKING MOVEMENTS AND APPLYING TORQUE DURING A VACUUM-ASSISTED DELIVERY ARE NOT RECOMMENDED BECAUSE THEY INCREASE THE RISK OF FOETAL INJURY, SUCH AS CRANIAL TRAUMA AND SCALP LACERATIONS.

10.11 Forceps Assisted Delivery

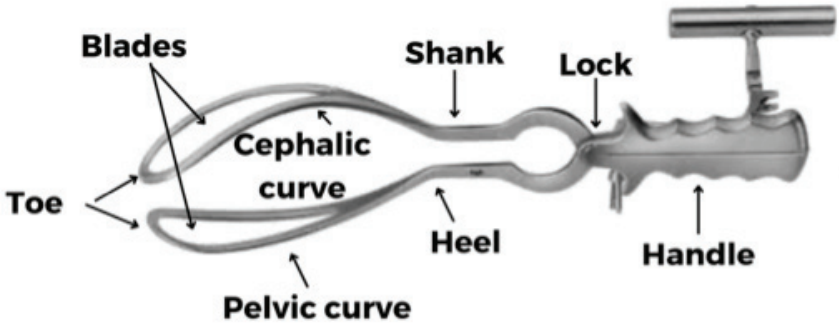
10.11.1 **Figure 73** illustrates the different types of forceps available.

Figure 73: Types of forceps



10.11.2 **Figure 74** shows the anatomy of forceps.

Figure 74: Anatomy of forceps



10.11.3 **Table 41** shows the procedure and different types of forceps.

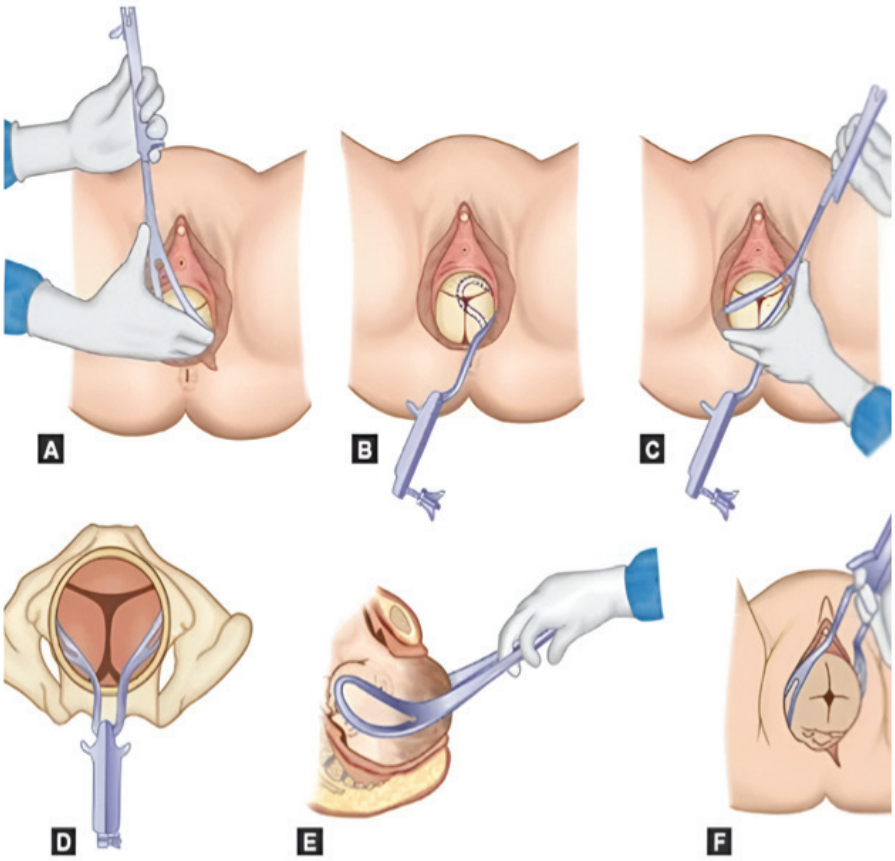
TABLE 41: Procedures and different types of forceps

Outlet delivery	Wrigley
Caesarean section	Wrigley
Low forceps delivery	Neville Barnes, Kielland (rotational)
Midcavity delivery	Kielland, Simpson
Breech with after-coming head	Piper

10.11.4 Procedure of Forceps Assisted Delivery (as illustrated in **Figure 75**)

a. Fulfil the prerequisite criteria for instrumental delivery.
b. Lubricate the forceps blades.
c. Hold the handle of the left blade like a pencil with the left hand (A).
d. Gently insert the right hand to protect the vaginal wall.
e. Gently slide and swing the left blade along the pelvic curve (B).
f. Repeat the same for the right blade (C).
g. Lock the blade (D).
h. Ensure the suture lies in the midline with the shank.
i. Make sure there is no surrounding vaginal or cervical tissue caught in between the forceps.
j. Apply the traction perpendicular to the handle and downwards (Pajot's Manoeuvre) (E).
k. Once the posterior fontanelle is below the symphysis pubis, the handles are elevated in a 'J' direction.
l. Consider episiotomy at crowning with local anaesthesia.
m. Remove the blade after the head is delivered (F).

Figure 75: Steps on how to perform forceps assisted delivery



DO NOT FORCEFULLY LOCK THE FORCEPS AS IT MAY CAUSE FOETAL SKULL FRACTURE.

10.12 Complications

10.12.1 **Table 42** lists the complications of operative vaginal delivery.

TABLE 42: Complications of operative vaginal delivery

MATERNAL	FOETAL
Genital tract trauma	Shoulder dystocia
Postpartum haemorrhage	Subgaleal haematoma
	Cephalohaematoma
	Intracranial haemorrhage
	Facial nerve palsy
	Facial/scalp laceration, abrasion
	Retinal haemorrhage

10.13 Post Procedure

a. Examine and treat perineal tears accordingly.
b. Consider giving a single dose of parenteral broad-spectrum antibiotic within an hour of delivery.
c. Provide analgesics.
d. Documentation: persons involved, timing of the procedures, types of perineal tear, outcome and complications if any. Refer **Appendix 12** for sample documentation for operative vaginal delivery.
e. Explain to the couple regarding the intrapartum event.
f. Team debriefing in complicated cases.
g. Ensure mother can void normally 6-12 hours post-delivery.
h. Arrange for follow up in complicated cases as required.

10.14 Conditions to Revert to Caesarean Section

10.14.1 **Procedure abandoned** due to:

a. Difficulty in applying instruments.
b. Unable to place properly.
c. Failure to generate adequate suction.
d. Unable to lock forceps.

10.14.2 Failed instrumentation:

a. No progressive descent after 20 minutes or three correct pulls.
b. The ventouse cup slips off twice.

10.14.3 Sequential use of instruments is discouraged, and the risk of failure should be balanced against the risk of second stage caesarean section. The decision should be made by a specialist.

10.15 Risk Management

10.15.1 Debrief couple regarding delivery process and complication if they occur.

10.15.2 Detailed documentation regarding the indication and procedure.

Take home messages:

- Operative vaginal delivery provides advantages to both mother and baby when applied properly and appropriately.
- All medical personnel in obstetrics practice should be trained and credentialed in performing instrumental deliveries.

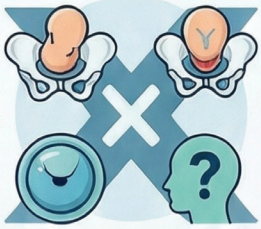
Operative Vaginal Delivery: Clinical Essentials

Clinical Selection Criteria

Operative vaginal delivery involves using vacuum or forceps to assist in the second stage of labour, requiring strict indications and safety checks.



Indications for Intervention
Used for prolonged second-stage labour, maternal exhaustion, or non-reassuring foetal heart rates.



Key Contraindications
Do not proceed if the head is unengaged, the cervix is not fully dilated, or the position is unknown.



Vacuum Gestation Limit
Vacuum extraction is contraindicated for fetuses under 34 weeks due to high risk of haemorrhage.

When to Revert to Caesarean Section

Abandon the Procedure If Application Fails
Stop if instruments cannot be placed properly or if vacuum suction fails.

Failed Instrumentation
Revert if no descent occurs after 20 minutes or three correct pulls.

Limit Vacuum Cup Detachments
The procedure is considered failed if the ventouse cup slips off twice.

Complications of OVD



Discourage Sequential Instrument Use

Potential Maternal & Foetal Complications

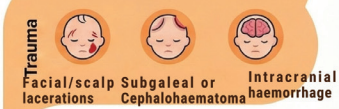
Maternal



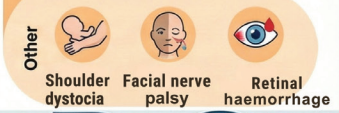


Foetal

Trauma



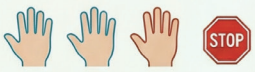
Other



F.O.R.C.E.P.S.



Fully dilated os | Occiput position confirmed | Ruptured membranes | Cephalopelvic disproportion excluded | Confirm head engagement | Pain relief / Paediatric standby | Necessary skills



The Rule of Three Pulls
Abandon the procedure if there is no progressive descent after three correct pulls.



Abandonment and Safety
Stop immediately if the cup slips twice or instruments cannot be locked easily.



Take-Home Message
Proper application benefits mother and baby; all personnel must be trained and credentialed.



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11.0

TEAM DEBRIEFING



11.0 TEAM DEBRIEFING

11.1 Introduction

The rapid pace of obstetrics and gynaecology work can leave team members feeling unsettled, uncertain, fatigued, or experiencing sadness, grief, or guilt. Integrating team debriefing into routine clinical practice strengthens team coordination, promotes patient safety, enhances quality of care, and supports ongoing staff learning. In view of the substantial benefits associated with routine team debriefing, this practice has been formally incorporated into the training programme. Regular implementation of these sessions is essential to ensure that all team members acquire meaningful learning and insights. Team debriefing should not only focus on difficult or traumatic events but it should be encouraged to highlight good outcome events.

11.2 Learning Objectives

a. To understand the role of team debriefing
b. To learn how to conduct team debriefing session
c. To develop competence in effectively closing the debriefing session

11.3 Definition

Team debriefing is defined as a structured, reflective discussion occurring after a clinical event, in which team members involved and appointed leader (can be senior most member, specialist or consultant) examine what happened, including actions, decisions, thoughts and feelings. This is to analyse performance, identify the gaps, draw learning points and translate that lesson into improved future practices (National Library of Medicine, 2023).

11.4 Optimising Team Dynamic

11.4.1 The Roles of Leader and Team Member

All team members must be competent in handling adverse events and aware of relevant local protocols and guidelines. Everyone must clearly understand their roles, responsibilities and limitations.

a. Responsibilities of the Team Leader:

i. Effective Delegation: Assign appropriate tasks to specific members, ensuring seamless coordination.
ii. Situational Control: Maintain a calm environment during adverse events, proactively mitigate chaos, conflict and loss of situational awareness.
iii. Clear Communication: Deliver precise instructions with professional courtesy.
iv. Oversight: Practice constructive intervention and continuous cross-monitoring of team performance.
v. Tactful Correction: Intervene professionally if incorrect order is executed, redelegate tasks tactfully without emotional escalation.
vi. Environmental Management: Manage the immediate surroundings and control non-essential personnel (crowd control).

b. Responsibilities of the Team Members:

i. Acknowledgement and Clarification: Immediately acknowledge all instructions and seek clarification if unclear.
ii. Closed Loop Communication: Execute assigned tasks promptly and verbally confirm completion to the team leader.

11.5 Team Debriefing Process

11.5.1 **Figure 76** and **Table 43** illustrate team debriefing processes.

Figure 76: Team debriefing process

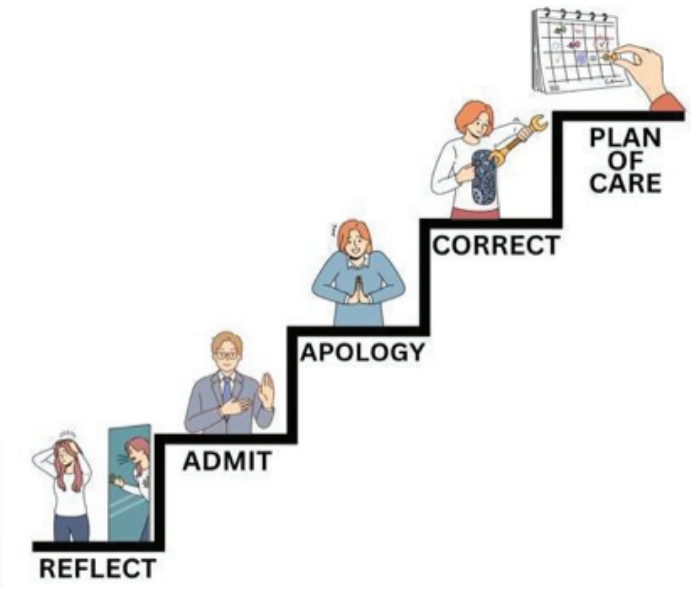


TABLE 43: Team debriefing process	
Reflect	• Reflection must be conducted within a safe, non-punitive environment to foster honest disclosure and mitigate any fear of blame. • Team members must be accurately and objectively recounting the key events. • All members should include an honest review of personal reactions and emotional responses experienced during the event. • Members are required to objectively analyse their own actions or inactions and the impact of those behaviours on the overall outcome. • Adherence to these steps inherently empowers and facilitates critical thinking regarding systemic improvements and future performance.
Admit	• These steps are essential components of effective risk management and patient safety. • The process must clearly identify organisational strengths, existing challenges, areas of weakness and any mistakes that occurred. • It should reflect an honest and transparent admission of the truth.
Apology	• These steps include the acknowledgement of any mistakes or harms that may have resulted from an unanticipated event. • Such acknowledgement should be offered sincerely during a team debriefing session and must not be interpreted as an admission of legal liability. • This process does not constitute disclosure to the patient or family until a transparent investigation has been conducted, if required. • Speculation should be strictly avoided.
Correction	• Identify key lessons learned to improve future educational and training initiatives. • Establish specific solutions or changes to address identified issues and support ongoing improvement.
Plan of care	• Responsibilities must be formally assigned to specific team members or roles. • A plan for team improvement must be determined and executed within the stipulated timeframe. • Reassessment of performance and/or required retraining must be conducted where necessary to address skill gaps or underperformance.

11.6 Quick Guideline on Team Debriefing Session

11.6.1 Core Principles

The debriefing session must adhere to the following core principle to ensure a constructive, forward-looking outcome as described in **Table 44**.

TABLE 44: Core principles for debriefing session

CORE PRINCIPLE	FORMAL REQUIREMENT
Prioritise actionable insight	The primary focus must be on generating specific, implementable changes and lessons, rather than merely reviewing the event.
Avoid blame and finger-pointing	The environment must be non-punitive and psychologically safe. The review must focus solely on processes and outcomes, not individual failures.
Allocate time effectively	The leader must strictly adhere to a pre-defined agenda and time allocation to ensure all critical points are covered efficiently.

- **A TEAM DEBRIEFING SESSION SHOULD BE ARRANGED AND CONDUCTED AS SOON AS POSSIBLE AFTER THE EVENT.**
- **DELAYED DEBRIEFING MAY RISK THE LOSS OF CRITICAL OBSERVATIONS**

11.6.2 Arranging Team Debriefing Session

Discussion must follow a structured approach to ensure comprehensive coverage as demonstrated in **Table 45**.

TABLE 45: Steps on how to conduct team debriefing

STEPS	DESCRIPTION
1. Set a clear aim and objective	The session's specific goal must be established and clearly communicated to all members at the start of team debriefing.
2. Create a conducive and safe environment	The leader must affirm the confidentiality and non-punitive nature of the discussion to encourage honest and open thoughts from all members.
3. Address challenges	Insufficient preparation, lack of open communication, ineffective time management and resistance to change must be pre-emptively mitigated through clear pre-briefing, resources allocation and defined session rules.
4. Discuss strengths and good points	Ask about: • What went well? • What was the best decision or action derived from the process?
5. Discuss weaknesses and limitations	Ask about: • What did not go well? • What could have been better and why? • Were the expectations met?
6. Address wrongdoings and challenges	Ask about: • What were the factors (root cause) that led to the adverse event or result? • What was the most challenging or difficult part of the overall process?
7. Lessons learned	Ask about: • For good practice: How could we replicate this result consistently in the future? • For substandard practice: What can we do to avoid repeating the same error leading to the adverse event?
8. Future aim and improvement	Ask about: • What can we do better next time?
9. Conclude the session	The leader should summarise all the important points which include the strengths, weaknesses, challenges identified and conclude the session by fostering team dynamic and clearly state future plan or aim derived from the debriefing outcomes.

11.7 Best Practices for Team Debriefing Session

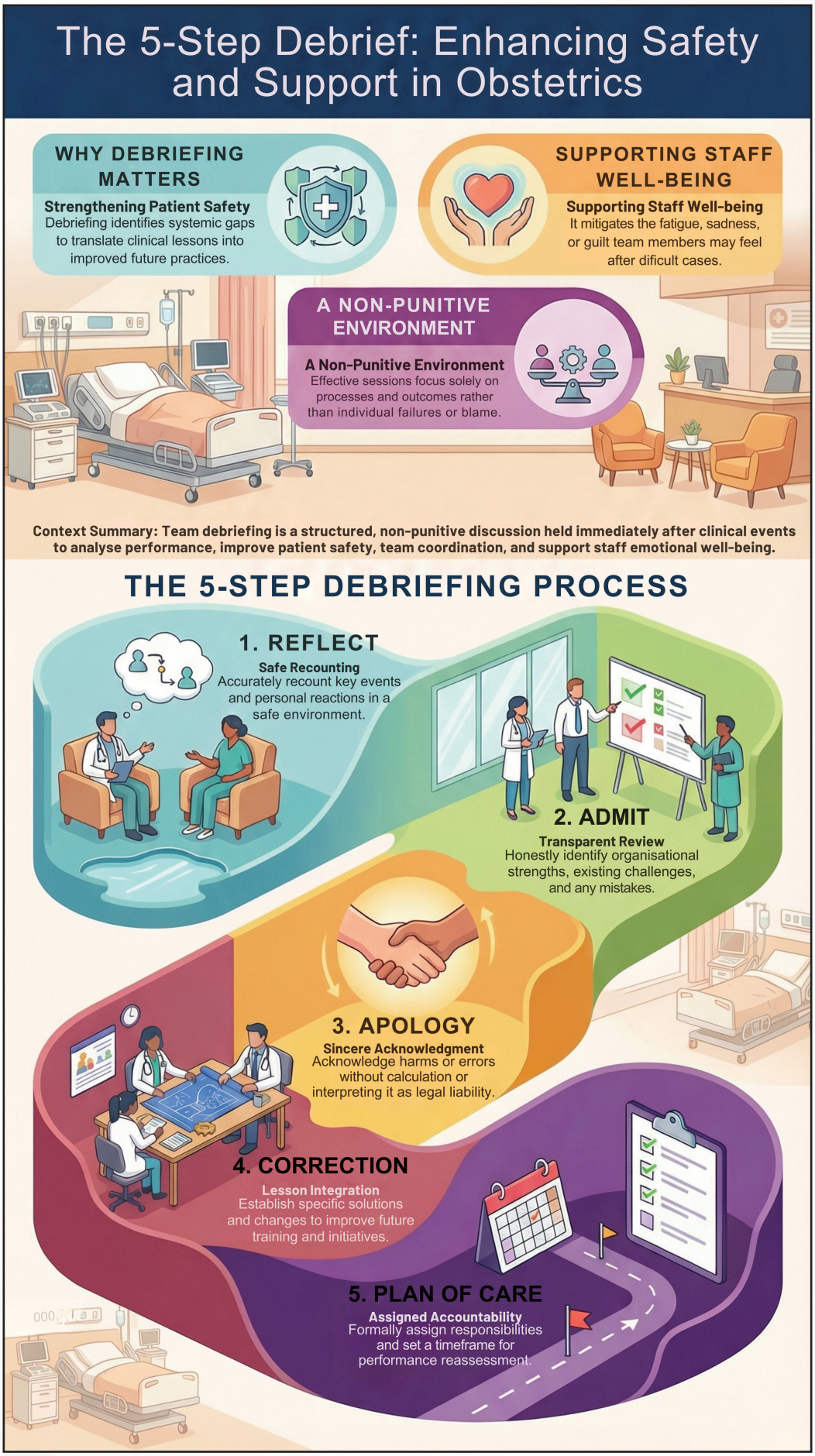
11.7.1 Foster psychological safety by creating a non-blaming, supportive and respectful environment where team members feel comfortable expressing their thoughts and emotions.

11.7.2 Ensure the leader or facilitator receives proper training so they can guide the debriefing process effectively, manage group dynamics and encourage meaningful reflection.

11.7.3 Engage an experienced leader to conduct debriefing sessions following major, acute or traumatic events to ensure the members involved receive appropriate support.

Take home messages:

- Team debriefings are intended to improve the quality of care and promote continuous staff learning.
- Sessions should be conducted in a supportive manner that avoids blame or finger-pointing.
- State objectives clearly and summarises all conclusions, action plans and improvement measures before ending the session.

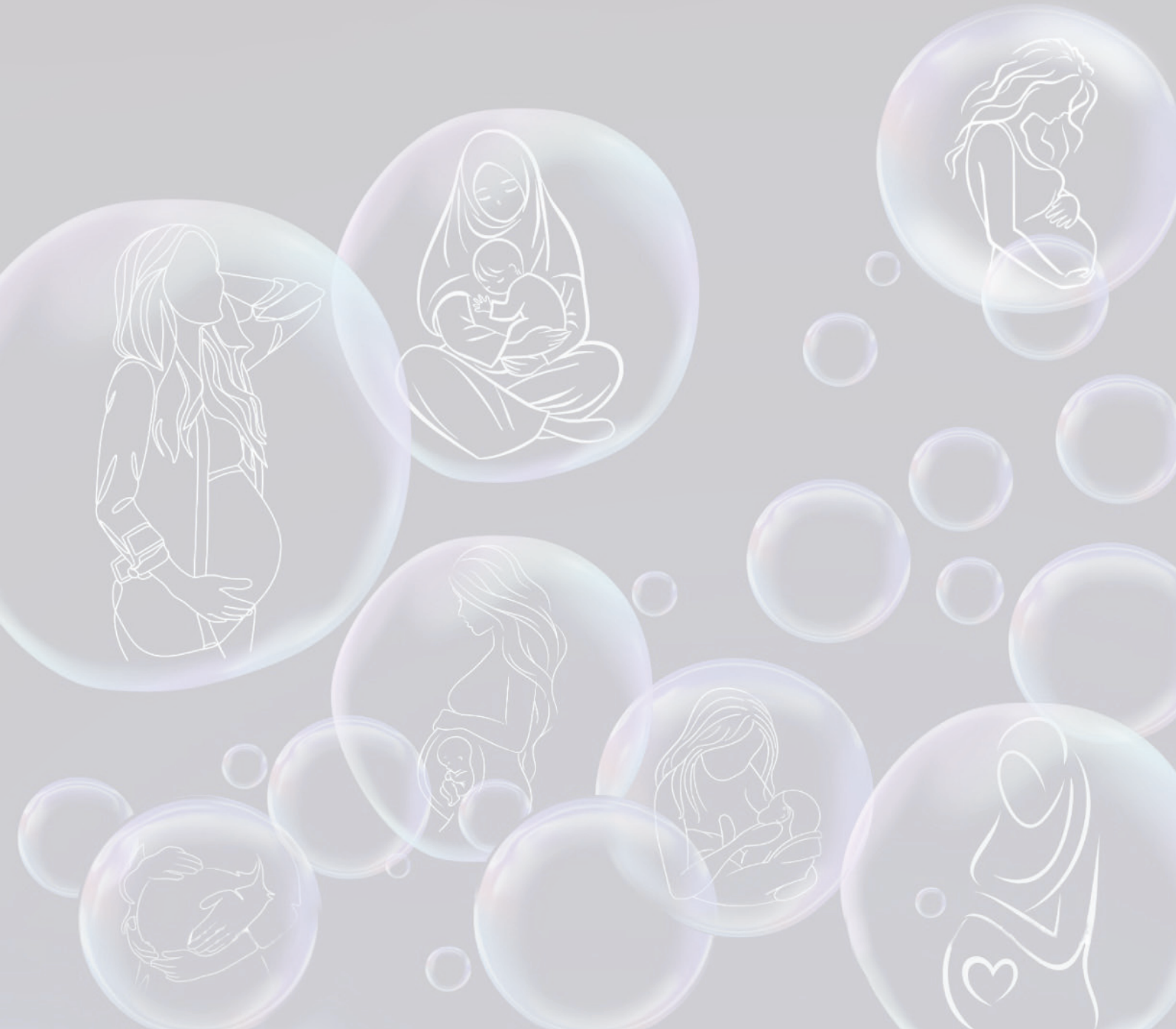

The 5-Step Debrief: Enhancing Safety and Support in Obstetrics
WHY DEBRIEFING MATTERS
Strengthening Patient Safety
Debriefing identifies systemic gaps to translate clinical lessons into improved future practices.
SUPPORTING STAFF WELL-BEING
Supporting Staff Well-being
It mitigates the fatigue, sadness, or guilt team members may feel after dificult cases.
A NON-PUNITIVE ENVIRONMENT
A Non-Punitive Environment
Effective sessions focus solely on processes and outcomes rather than individual failures or blame.
Context Summary: Team debriefing is a structured, non-punitive discussion held immediately after clinical events to analyse performance, improve patient safety, team coordination, and support staff emotional well-being.
THE 5-STEP DEBRIEFING PROCESS
1. REFLECT
Safe Recounting
Accurately recount key events and personal reactions in a safe environment.
2. ADMIT
Transparent Review
Honestly identify organisational strengths, existing challenges, and any mistakes.
3. APOLOGY
Sincere Acknowledgment
Acknowledge harms or errors without calculation or interpreting it as legal liability.
4. CORRECTION
Lesson Integration
Establish specific solutions and changes to improve future training and initiatives.
5. PLAN OF CARE
Assigned Accountability
Formally assign responsibilities and set a timeframe for performance reassessment.

References

1. Irim S, John TP. Debriefing the interprofessional team in medical simulation. National Library of Medicine; 2023.
2. Harvard Business Publishing. Teaching with simulations: debriefing simulations. Boston (MA): Harvard Business Publishing. Available from: https://www.hbsp.harvard.edu/educator-training/teaching-with-simulations/debriefing-simulations

12.0

BLOOD TRANSFUSION IN OBSTETRIC EMERGENCY



12.0 BLOOD TRANSFUSION IN OBSTETRIC EMERGENCY

12.1 Introduction

During pregnancy and peripartum period, a woman may require a blood transfusion for several critical reasons, primarily related to haemorrhage (severe blood loss). Given that blood flow to the uterus is high (around 700 ml/minute at term), obstetric haemorrhage can be rapidly life-threatening, requiring prompt and proper management.

In emergencies, timely and effective communication between the clinical team and the blood transfusion laboratory, is essential for the rapid provision and correct use of blood and blood components.

12.2 Learning Objectives

a. To understand role of blood transfusion in obstetric emergencies
b. To recognize types of blood components used in obstetric emergencies
c. To understand the role of massive transfusion protocol (MTP)

12.3 Definition

12.3.1 Blood transfusion is a potentially life-saving medical procedure that involves administering blood or blood components intravenously into an individual's circulation.

12.3.2 While generally safe and common, its use in the setting of pregnancy requires careful consideration due to the unique physiological changes and potential risks to both the mother and the developing foetus.

12.3.3 The decision to transfuse, as well as the assessment of its outcomes, should be determined by the patient's clinical condition and guided by relevant laboratory findings.

12.4 Choice of Blood in Cases of Life-Threatening Bleeding

12.4.1 Options of blood available:

a. Uncrossmatched group O RhD positive packed red blood cells (Safe O)

i. In Malaysia, where RhD negative phenotype is not common, uncrossmatched group O RhD positive packed red blood cells are provided as 'Safe O'. Safe O can be used for resuscitation in dire emergencies while waiting for group specific or crossmatch compatible blood to be available.

ii. A sample of the patient's blood should be taken before initiation of Safe O transfusion for the purpose of determining the patient's actual blood group, and for subsequent management e.g., retrospective compatibility testing.

b. Uncrossmatched group-specific packed red blood cells

i. If the blood group of the patient is known, uncrossmatched group-specific blood may be given.

c. Emergency crossmatch (also known as immediate spin or saline phase crossmatch)

i. If the blood is required to be supplied within 30 minutes, units of blood that are found to be compatible at immediate spin after 5-minute incubation at room temperature may be issued. The hospital blood bank shall proceed to complete the compatibility testing and antibody screening of the blood issued. Clinicians will be notified if the unit issued is found incompatible for appropriate action.

12.5 Types of Blood Components

12.5.1 **Table 46** describes the types of blood components:

TABLE 46: Types of blood components

BLOOD COMPONENT	VOLUME PER UNIT	SUGGESTED NO. OF COMPONENT FOR TRANSFUSION	EXPECTED LEVEL OF INCREMENT
Packed red blood cells (PRBCs)	350 – 450 ml	Based on clinical judgement	1 unit of PRBC increases 1 g/dL haemoglobin (Hb), 3-4 % haematocrit
Random platelet concentrates	60 – 70 ml	Typically, 4-6 units (1 unit of platelet concentrate per 10-15 kg of body weight)	1 unit of random platelet increases platelet count by 5–10 x 10^9 /l
Fresh frozen plasma (FFP)	150 – 250 ml	Typically, 4 units (10-20 ml/kg of body weight)	10–20 ml/kg of FFP increases 20-30 % factor II, V, VII, VIII, IX, XI
Cryoprecipitates	30 – 40 ml	Typically, 5 -10 units	1 unit/ 5–10 kg increases fibrinogen level by 0.07-0.1 g/L

*Source: MOH Handbook of Clinical Use of Blood, 2020

12.6 Duration for Transfusion of Blood and Blood Components

12.6.1 The duration for transfusion of each blood component is as described in **Table 47**:

TABLE 47: Duration for transfusion

TYPE OF BLOOD COMPONENT	ADMINISTRATION OF TRANSFUSION	RECOMMENDED DURATION OF TRANSFUSION
Packed red blood cells (PRBCs)	Should be transfused within 30 minutes of removal from the blood refrigerator.	• The transfusion of each unit should not exceed 4 hours. • Chronic pulmonary diseases • Caution in patients with: o Cardiac failure o Renal failure
Random platelet concentrates	Should be transfused as soon as possible.	Transfusion of each unit of platelet concentrate should not exceed 30 minutes.
Fresh frozen plasma (FFP)	Should be transfused as soon as possible.	Transfusion rate of FFP is typically 10-20 ml/kg/hour. More rapid transfusion may be appropriate when treating coagulopathy in major haemorrhage.
Cryoprecipitates	Should be transfused as soon as possible. If delay is unavoidable, components should be stored at ambient room temperature and used within 4 hours.	Cryoprecipitates transfusion should be carried out at a rate that the patient can tolerate.

*Source: MOH Handbook of Clinical Use of Blood, 2020

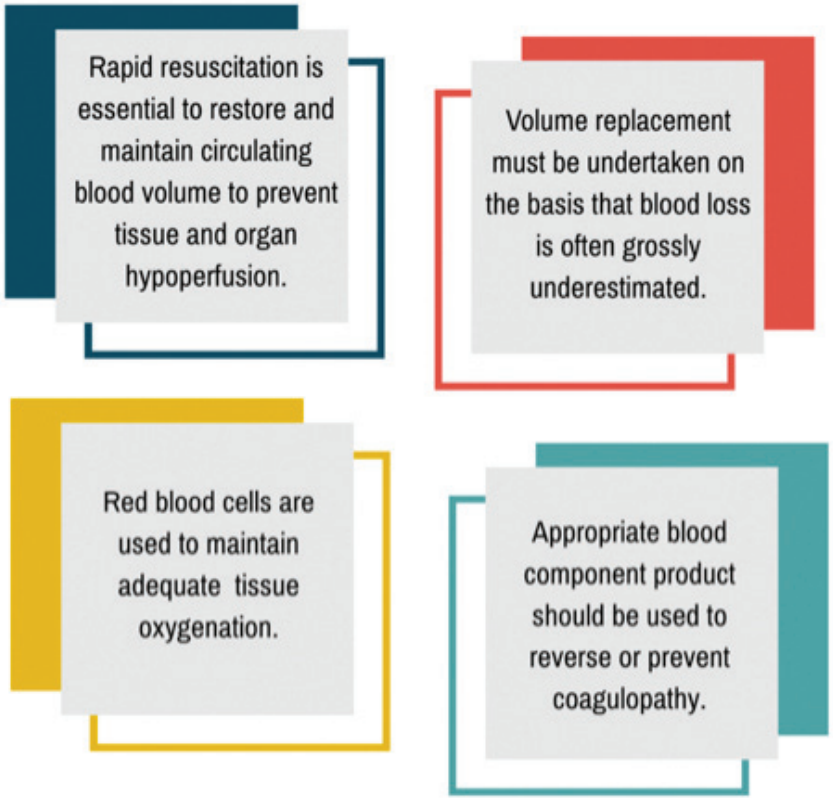
12.6.2 Important notes:

a. Blood warmer should be used to prevent hypothermia in a massively transfused patient.
b. Whenever available, a rapid infuser should be used to facilitate the transfusion of blood and blood components in a massive haemorrhagic event.

12.7 The Principles of Blood Product Transfusion in Obstetric Haemorrhage

12.7.1 **Figure 77** describes the principles of blood product transfusion.

Figure 77: Principles of blood transfusion in obstetric haemorrhage



12.7.2 In cases of obstetric haemorrhage, early resuscitation should be initiated with crystalloids and/or colloids, along with adequate oxygenation, while simultaneously implementing all appropriate measures to control bleeding and minimise transfusion requirements.

12.7.3 Major obstetric haemorrhage protocols should include the provision of emergency blood, with the immediate issue of Safe O blood followed by a transition to group-specific blood as soon as feasible or the initiation of massive transfusion protocol (MTP) where available.

12.8 Massive Transfusion Protocol (MTP)

12.8.1 The massive transfusion protocol (MTP) is a guideline that outlines the process of blood transfusion management in the event of exsanguination or a massively bleeding patient. The protocol is based on a fixed ratio of packed red blood cells (PRBCs), platelets, fresh frozen plasma (FFP), and cryoprecipitates in each package/cycle (1:1:1:1 ratio) (MOH Consensus Statement on PBM, 2024).

12.8.2 The main management goals in managing massive haemorrhage are:

a. Identify source of bleeding & securing haemostasis.
b. Restoration of circulatory volume.
c. Improving tissue oxygenation.
d. Correction of coagulopathy.
e. Consider activating MTP based on local policy.

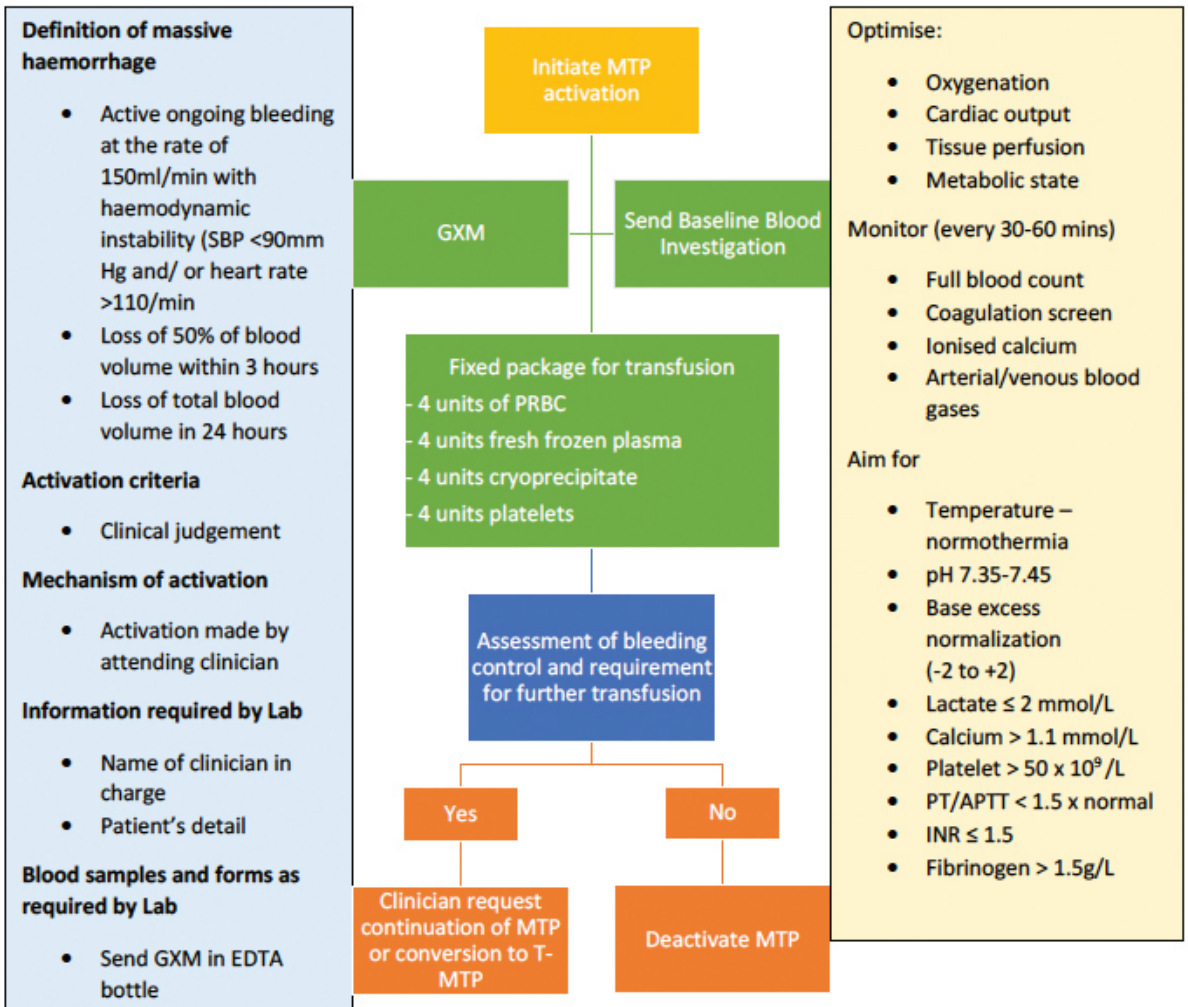
ACCORDING TO MOH HANDBOOK OF CLINICAL USE OF BLOOD 2020, CONSIDER ACTIVATING MTP FOR:

- **PATIENT WHO REQUIRES (OR ANTICIPATED) GREATER THAN 3 UNITS OF BLOOD IN 1 HOUR**
- **PATIENT WITH LOSS OF MORE THAN 50 % OF TOTAL BLOOD VOLUME WITHIN 3 HOURS**
- **IF OBSTETRIC SHOCK INDEX (OSI) > 1.4 - REFER TO PPH CHAPTER**

12.8.3 Each hospital should develop its own local MTP. A multidisciplinary team should be established to develop the protocol.

PLEASE ENSURE THAT THE MTP IS DEACTIVATED ONCE HAEMOSTASIS IS ACHIEVED.

Figure 78: MTP activation protocol



Availability of blood		
Cross matched safe O	Availability on site or blood band	Transportation
First stage cross matched blood	Within 30 minutes	In blood box WITH ice pack (2-10 °C)
Full cross matched blood	Within 45 minutes	
Fresh Frozen Plasma	Within 30 minutes	
Cryoprecipitate	Within 30 minutes	In blood box WITHOUT ice (20-24°C)
Platelets	Immediate	

*Source: Consensus of Statement on Patient Blood Management, 2024

12.9 Disseminated Intravascular Coagulation (DIVC)

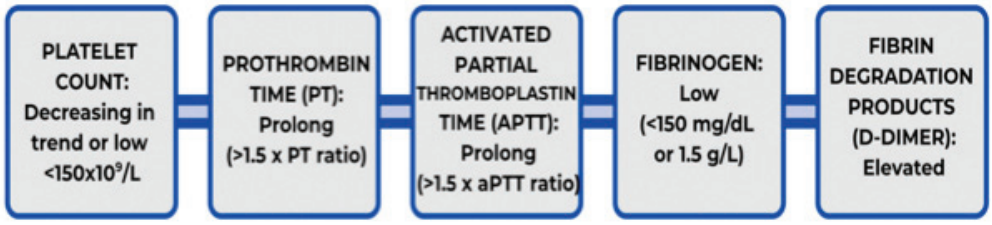
12.9.1 Introduction

a. DIVC is characterized by systemic activation of the blood coagulation system. This leads to widespread fibrin deposition and formation of microvascular thrombi in multiple organs, resulting in impaired tissue perfusion and multiorgan dysfunction. Concurrently, consumption and severe exhaustion of clotting factors and platelets may occur, predisposing the patient to significant and potentially life-threatening bleeding.

b. The principles of management are:
   i. Identify coagulopathy.
   ii. Correct the coagulopathy or replace blood and blood products.
   iii. Treat the underlying cause or remove the trigger factors (e.g., sepsis-remove the source, abruptio placentae - delivery).
   iv. Manage complications.

12.9.2 Criteria to diagnosis DIVC is as described in **Figure 79**.

Figure 79: Diagnosing DIVC



**CLINICAL JUDGEMENT OF DIVC IS ESSENTIAL.
DO NOT DELAY INTERVENTION
UNTIL LABORATORY CONFIRMATION!**

12.9.3 Management of coagulopathy

a. Blood

i. The decision for transfusion of packed red blood cells should be based on clinical judgement, as laboratory confirmation may not be immediately available, especially in an emergency setting.

ii. Haemodynamic instability and rapid, on-going blood loss are essential factors of consideration, rather than the estimated blood loss.

b. Fresh frozen plasma (FFP)

i. FFP is used to correct derangement of coagulation profile in bleeding patients, either PT, aPTT or both.

ii. The dosage for FFP transfusion is 12–15 ml/kg of body weight.

c. Cryoprecipitates

i. Contain fibrinogen and is beneficial in correcting hypofibrinogenaemia, which is common in patients with massive haemorrhage.

ii. The dosage is 1–2 unit/10kg of body weight.

d. Platelets

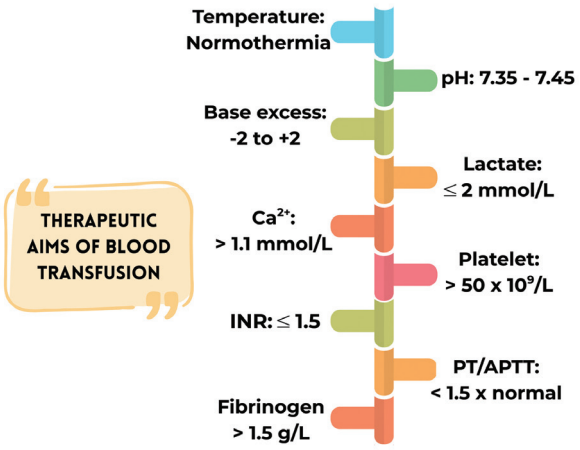
i. Consider platelet transfusion if the levels are below 50x10^9/L in a bleeding patient.

ii. One unit of platelet concentrate will increase the count by 5-10x10^9/L.

12.10 Therapeutic Aim of Management

12.10.1 The therapeutic aim of blood transfusion is to improve tissue oxygenation, correct haemostatic abnormalities and support circulatory stability. The goals of transfusion are depicted in **Figure 80**.

Figure 80: Therapeutic aim of management

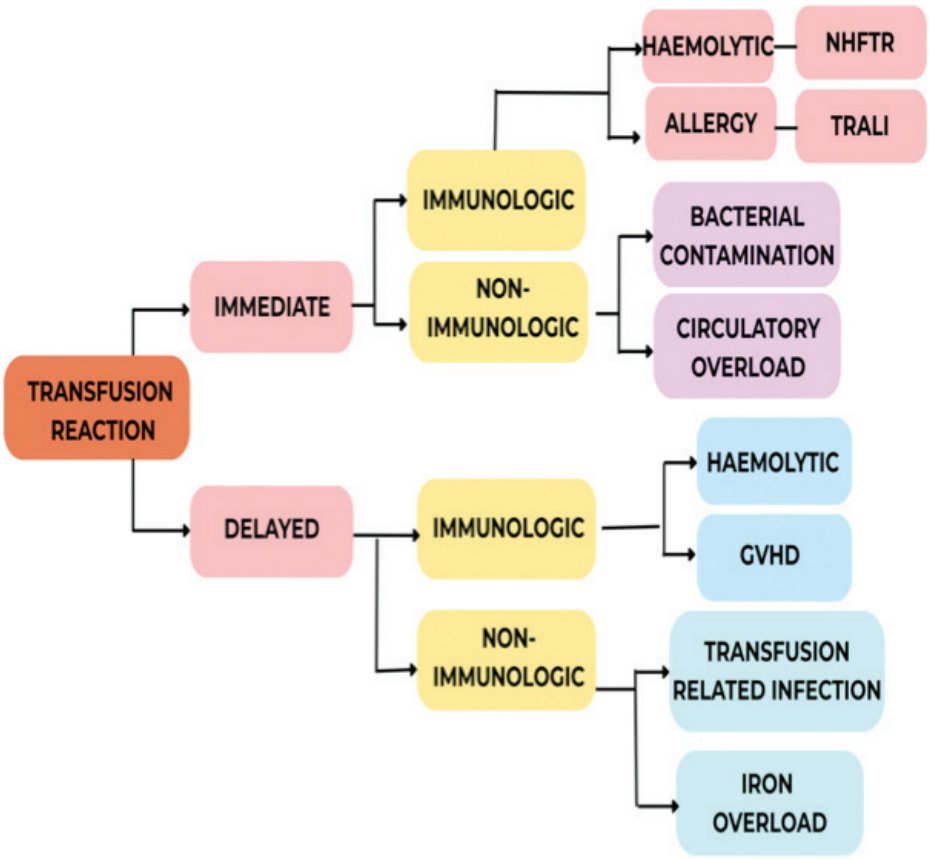


* Source: Consensus Statement on Patient Blood Management, 2024.

12.11 Complications of Blood Transfusion

12.11.1 Blood transfusion is a life-saving intervention commonly used in obstetrics practise. Despite its proven benefits transfusion is not without risks as per **Figure 81**.

Figure 81: Complications of blood transfusion



FNHFTR: Febrile Non-haemolytic Febrile Transfusion Reaction
TRALI: Transfusion Related Acute Lung Injury
GVHD: Graft-Versus-Host Disease

12.12 Classification of Acute Transfusion Reaction

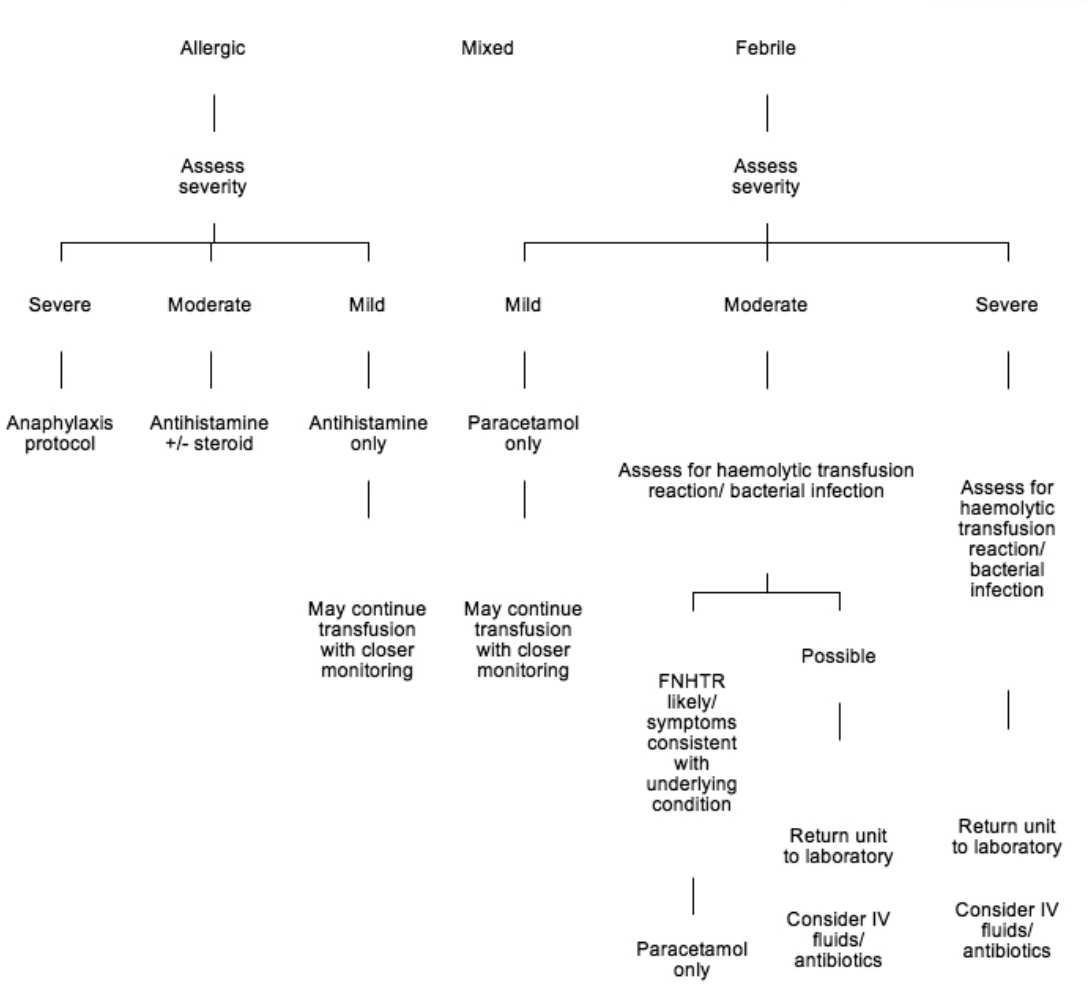
12.12.1 Acute transfusion reaction occurs during or shortly after blood transfusion and may present with wide spectrum of clinical severity as described in **Table 48**.

TABLE 48: Classification of acute transfusion reaction

	MILD	MODERATE	SEVERE
Febrile type reaction	A temperature ≥ 38° C and a rise between 1-2° C from pre transfusion values, but no other symptoms and signs.	A rise in temperature of ≥ 2° C or fever ≥ 39° C or rigors, chills or other inflammatory symptoms/signs such as myalgia or nausea in which precipitate stopping of transfusion.	A rise in temperature of ≥ 2° C or fever ≥ 39° C or rigors, chills or other inflammatory symptoms/ signs such as myalgia or nausea in which precipitate stopping of transfusion, prompt medical review and/or directly results in, or prolong hospital stay.
Allergic type reaction	Transient flushing urticarial or rash.	Wheeze or angioedema with or without flushing/urticarial/ rash but without respiratory compromise or hypotension.	Bronchospasm, stridor, angioedema or circulatory problems which require urgent medical intervention **AND/OR**, directly results in or prolong hospital stay, or anaphylaxis (severe, life threatening, generalised or systemic hypersensitivity reaction with rapidly developing airway **AND/ OR** breathing **AND/OR** circulation problems, usually associated with skin and mucosal changes).
Reaction with both allergic and febrile	Features of mild febrile and mild allergic reaction.	Features of both allergic and febrile reactions, at least one of which is in the moderate category.	Features of both allergic and febrile reactions, at least one of which is in the severe category.
Hypo-tensive reaction		Isolated fall in systolic blood pressure of 30 mmHg or more occurring during or within one hour of completing transfusion and a systolic blood pressure 80 mmHg or less in the absence or anaphylactic systems. No/ minor intervention required.	Hypotension, as previously defined, leading to shock (e.g., acidaemia, impairment of vital organ function) without allergic or inflammatory symptoms. Urgent medical intervention required.

12.12.2 The following is the algorithm to help identify type of febrile, allergic and hypotensive transfusion reaction (FAHR) reaction and management (**Figure 82**).

Figure 82: Algorithm on the management of transfusion reaction



*Source: Annual Serious Hazards of Transfusion Report, 2021

HYDROCORTISONE IS NOT NEEDED FOR MILD ALLERGIC REACTION. HYDROCORTISONE AND ANTIHISTAMINE HAVE NO BENEFIT IN FEBRILE REACTIONS.

Take home messages:

- Obstetric haemorrhage is a leading cause of maternal mortality; timely blood transfusion can be life-saving.
- Do not wait for laboratory confirmation if a woman is in shock- start the transfusion based on clinical condition.
- Massive transfusion protocols (MTP) should be activated early in severe haemorrhage to prevent DIVC.

Life-Saving Transfusion: Obstetric Emergency Blood Protocols



In obstetric emergencies, where uterine blood flow reaches 700ml/min, blood transfusion is a critical, time-sensitive intervention.

This manual outlines the transition from emergency 'Safe O' blood to structured Massive Transfusion Protocols to manage life-threatening haemorrhage and prevent coagulopathy.

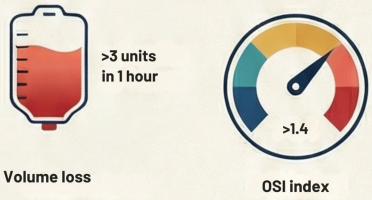
Emergency Blood Selection and MTP Activation



Start with 'Safe O' Blood

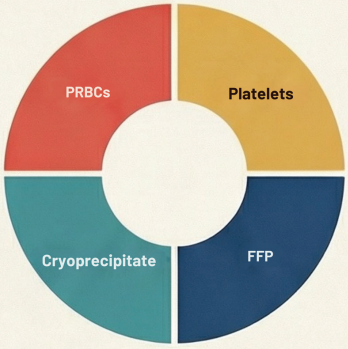
Use uncrossmatched group O RhD positive red cells immediately in dire emergencies while waiting for specific blood.

Activate MTP for Massive Loss



Trigger the Massive Transfusion Protocol If a patient requires >3 units in 1 hour or OSI >1.4.

The 1:1:1:1 Balanced Ratio
Administer a fixed ratio of PRBCs, Platelets, FFP, and Cryoprecipitate in each cycle during massive bleeding.



Therapeutic Targets and Monitoring

Clinical Over Laboratory Judgment



Start transfusions based on shock symptoms and ongoing loss; do not delay for laboratory confirmation.

Watch for DIVC Triggers



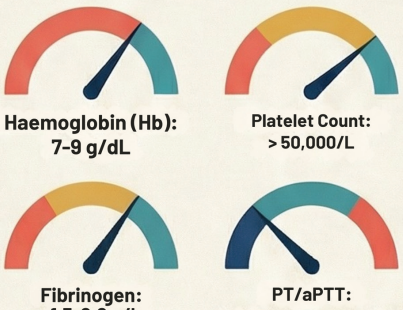
Systemic coagulation activation can cause widespread microvascular thrombi and severe exhaustion of clotting factors.

Manage Acute Reactions



Categorise reactions as Allergic, Febrile, or Mixed; treat severe anaphylaxis immediately and return unit to lab.

Therapeutic Goals



References

1. Ministry of Health. Handbook of Clinical Use of Blood. Putrajaya: Ministry of Health Malaysia; 2020
2. Ministry of Health. Transfusion Practice Guidelines for Clinical and Laboratory Personnel. Putrajaya: Ministry of Health Malaysia; 2016
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4. Haemovigilance Report 2022-2023. National Transfusion Medicine Service in Malaysia. November 2024. Accessed December 22, 2025. https://www.moh.gov.my/moh/resources/Penerbitan/Laporan/Umum/ Haemovigilance _Report_PDN_2022-2023.pdf

13.0

MANUAL REMOVAL OF PLACENTA (MRP)



13.0 MANUAL REMOVAL OF PLACENTA (MRP)

13.1 Introduction

A retained placenta is a significant cause of postpartum haemorrhage (PPH) and maternal morbidity. Therefore, proficiency in this life-saving procedure is essential for all medical officers involved in obstetric care.

13.2 Learning Objectives

a. To be able to recognise patient at risk of retained placenta
b. To identify the indications for manual removal of the placenta
c. To understand the necessary preparations prior to MRP, including patient communication and consent
d. To describe the step-by-step procedure for manual removal of the placenta
e. To recognise and manage potential complications associated with the procedure

13.3 Definition of Retained Placenta

Retained placenta is defined as a placenta that remains in the uterus 30 minutes after active management of the third stage or 60 minutes after conservative management of the third stage (WHO, 2019). This occurs in 2-3 % of all deliveries and is a risk factor for postpartum haemorrhage (PPH).

13.4 Risk factors for Retained Placenta

The risk factors for retained placenta can be divided into maternal and obstetric risks as listed in **Table 49**.

TABLE 49: Risk factor for retained placenta

MATERNAL	OBSTETRIC
Age more than 35 years old	Previous retained placenta
Multiparity	Preterm delivery
Uterine anomaly	Previous uterine surgery or caesarean section
	Intrauterine infection

EXERCISE CAUTION FOR ANY PATIENT WITH HISTORY OF PREVIOUS UTERINE SURGERY, WHICH INCLUDE:
- **CAESAREAN SECTION**
- **PREVIOUS MYOMECTOMY**
- **HYSTEROTOMY**
- **CURETTAGE**

13.5 Indications for MRP

13.5.1 Manual removal of the placenta is indicated in the following situations:

a. **Retained Placenta**: The placenta has not been delivered within 30 minutes of the baby's birth, despite active management of the third stage of labour.
b. **Incomplete Placenta**: A portion of the placenta is missing after delivery, either cotyledon or membrane and there is ongoing bleeding.

BEWARE OF PLACENTA ACCRETA SPECTRUM IN CASES OF RETAINED PLACENTA.

13.6 Procedure Steps

13.6.1 Listed below in **Table 50** are the procedure steps on how to perform MRP.

TABLE 50: Procedure steps on how to perform MRP

Patient communication and consent	• Clearly explain the procedure to the patient, including the reason for the procedure and the potential risks. • Obtain informed written consent.
Preparation for MRP	• Start IV oxytocin 40 units infusion if the patient is actively bleeding while arranging for MRP. • The procedure should be performed under adequate anaesthesia to ensure the patient's comfort and to facilitate uterine relaxation. • Give prophylactic antibiotic-preferred regime is a single dose of IV cefazolin 2 g and IV metronidazole 500 mg (NAG, 2024).
Performing MRP	• Put the patient in a lithotomy position. • Catheterised the bladder to ensure it is empty. • Stop oxytocin infusion if started earlier. • Form a cone shape with one hand (usually the dominant hand) by keeping the fingers together and the thumb tucked into the palm. • Gently introduce the hand into the vagina and then into the uterine cavity, following the umbilical cord. • Place the other hand on the abdomen to support the fundus of the uterus. This helps to stabilise the uterus and prevent uterine inversion. • Identify the plane of cleavage between the placenta and the uterine wall. • Use a gentle, side-to-side "sawing" or "slicing" motion to separate the placenta from the uterine wall. • Once the placenta is completely separated, grasp it & remove it in one bulk while withdrawing the hand from vagina. • After removal of placenta, re-explore the uterine cavity to ensure that no placental fragments or membranes are left behind. • Carefully examine the placenta and membranes to ensure completeness. • Once empty, start IV oxytocin 40 units, infuse at 125 ml/hr over 4 hours.
Immediate post-procedure care	• Gently massage the uterine fundus to encourage contraction. • Inspect the cervix and vagina for any lacerations and repair if necessary. • Clean the perineal area and apply a pad

IDEALLY, MRP SHOULD BE DONE IN THE OPERATING THEATER TO ENSURE:
- **ADEQUATE ANALGESIA FOR PATIENT'S COMFORT**
- **RELAXATION OF UTERUS**
- **PROPER RESUSCITATION BY ANAESTHETIC TEAM**

13.7 Complications of MRP

13.7.1 Postpartum haemorrhage (PPH): retained placenta will impair effective uterine contraction which will predispose the patient to PPH.

13.7.2 Uterine perforation can happen when incorrect techniques are applied during the procedure.

13.7.3 Uterine inversion may occur due to poor uterine support during removal of placenta.

13.7.4 Endometritis: intrauterine exploration during the procedure puts the patient at risk of endometritis, thus it is necessary to cover with antibiotics prior to the procedure.

13.8 Risk Management

13.8.1 Counsel the patient regarding the postpartum event and the need for MRP.

13.8.2 Training and simulation should be conducted regularly.

UMBILICAL VEIN INJECTION OF OXYTOCIN IS RECOMMENDED FOR THE TREATMENT OF RETAINED PLACENTA ONLY IN THE CONTEXT OF RIGOROUS RESEARCH (WHO, 2025).

13.9 Placenta Accreta Spectrum (PAS)

13.9.1 Definition

a. Placenta accreta spectrum, refers to the range of pathologic adherence of the trophoblast into the myometrium of the uterine wall (UpToDate, 2025). Depending on the depth of villous tissue invasiveness, placenta accreta can be further divided into:
   i. Accreta: where the villi attach to the myometrium (rather than decidua).
   ii. Increta: where the villi penetrate into the myometrium.
   iii. Percreta: where the villi penetrate through the myometrium to the uterine serosa or adjacent organs.

b. Cases of placenta accreta are also often subdivided into total, partial or focal according to amount of placental tissue involved and the different depths of accreta placentation have been found to co-exist in the same case (GTG No 27a, 2018).

13.9.2 Risk factors

a. History of accreta in previous pregnancy
b. Previous caesarean delivery
c. Other uterine surgery (endometrial curettage)

13.9.3 Diagnosis

a. Antenatal diagnosis of placenta accreta spectrum (PAS) is crucial in planning its management and has been shown to reduce maternal morbidity and mortality (GTG No 27a, 2018).
   i. Screening of risk factors: previous caesarean delivery and the presence of anterior-low lying or placenta previa should alert the obstetric team of the higher risk of PAS.
   ii. Ultrasound imaging: highly accurate when performed by a skilled operator with experience in diagnosing PAS. Ultrasound features include (GTG No 27a, 2018):
      - Loss of the 'clear zone'
      - Abnormal placental lacunae: large, irregular, often containing turbulent flow
      - Bladder wall interruption
      - Myometrial thinning less than 1 mm or undetectable
      - Placental bulge into neighbouring organ
      - Focal exophytic mass in the bladder
      - Uterovesical hypervascularity
      - Subplacental hypervascularity
      - Bridging vessels
   iii. MRI: may be used to complement ultrasound to assess the depth of invasion and lateral extension of myometrial invasion.

13.9.4 Management

a. In cases where unsuspected PAS is encountered, possible features include:
   i. Bulging of placenta mass and hypervascularity on uterine surface noted during caesarean section.
   ii. Unable to deliver placenta with controlled cord traction.
   iii. Difficulty to identify a clear plane during manual removal of placenta.

b. Accurate identification of PAS before delivery can guide planning, ensure appropriate surgical expertise is available, and significantly reduce the risk of life-threatening haemorrhage.

Take home messages:
- MRP is a time-sensitive, life-saving procedure requiring swift recognition, proper analgesia and strict sterile technique.
- Always be vigilant for Placenta Accreta Spectrum in cases of a retained placenta.

Clinical Procedure: Manual Removal of Placenta (MRP)

Manual Removal of Placenta (MRP) is a time-sensitive, life-saving procedure indicated for a retained or incomplete placenta. It requires swift recognition, proper stabilisation, and a specific two-handed technique to prevent postpartum haemorrhage (PPH) and ensure maternal safety.



1. Patient Consent and Comfort
Obtain written consent and ensure adequate anaesthesia for patient comfort and uterine relaxation.



2. Position and Bladder Care
Place the patient in the lithotomy position and catheterise the bladder until empty.





3. Clinical Prophylaxis

Administer a single dose of IV prophylactic antibiotics and stop any oxytocin infusions.

The Two-Handed Technique

4. The Internal "Cone" Hand

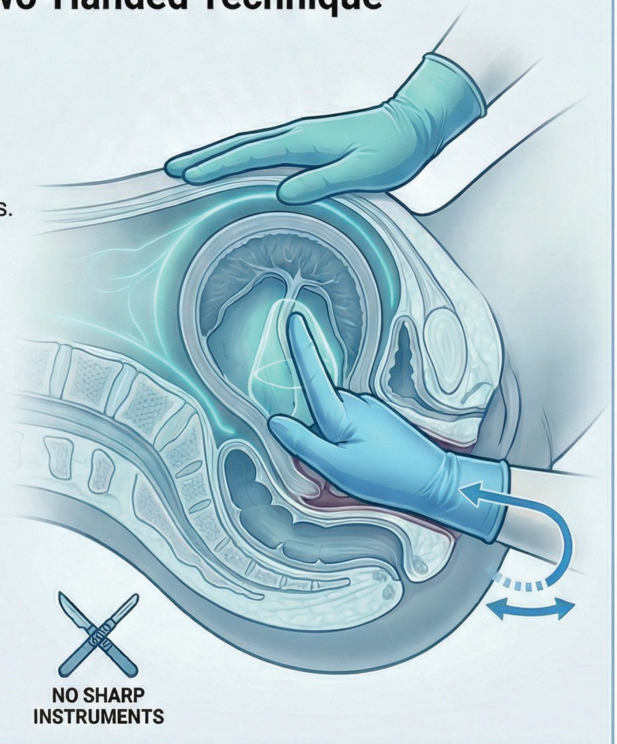
Form the dominant hand into a cone shape, pointing it directly toward the fundus.

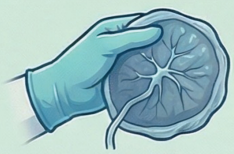
5. External Fundal Stabilisation

Place the non-dominant hand on the anterior abdomen to stabilise the uterine fundus.

6. The Sawing Motion

Identify the cleavage plane and use a side-to-side "sawing" motion to separate the placenta.





7. Removal and Exploration

Grasp the placenta to remove it in bulk, then re-explore for remaining fragments.

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14.0

OBSTETRIC RETRIEVAL TEAM



14.0 OBSTETRIC RETRIEVAL TEAM

14.1 Introduction

Obstetric retrieval teams are essential for managing high-risk pregnancies and deliveries, especially when patients are far from a specialised hospital. These teams provide care in either retrieving a patient directly from the community or transferring a patient from a lower-level healthcare facility. Each situation has unique challenges that require a well-coordinated and prepared response.

14.1.1

a. Retrieval from the community typically begins with an emergency services call to the Malaysian Emergency Response Services 999 (MERS999). Information is often limited to the standard questions from the MECC triage protocol and there is no reasonable means of obtaining further information. As there is no trained medical professional on-site, time is of the essence, and a rapid and appropriate response is crucial.

b. As a general rule, emergency calls to the MECC are attended by the ETD team. However, for obstetric cases, certain hospitals may prefer to activate the obstetric retrieval team together with the ETD team for better management. This will depend on the manpower available and protocols in place for each hospital.

i. Team Activation and Personnel

Every hospital should have a clear protocol for activating an obstetric retrieval team. This protocol should specify the personnel to be dispatched based on the initial diagnosis. For example:

- For a patient in **labour**, a **midwife** may be sufficient.
- For a patient with **postpartum haemorrhage (PPH)** or other severe bleeding, a **medical officer and a midwife** should be sent.
- In both situations, at least one Medical Assistant (MA) from the ETD team should still accompany the obstetric team. This is because the obstetric team may not be familiar with the workings of the ambulance service.
- The activation workflow should be efficient, with a goal of dispatching the team within **5 minutes**. All team members must have direct contact with the on-call O&G specialist to facilitate quick consultation if needed.

TEAM ACTIVATION SHOULD BE BASED PURELY ON INITIAL DIAGNOSIS. THERE SHOULD NOT BE ANY ATTEMPT TO CLARIFY THE DIAGNOSIS AND RISK DELAYING HELP.

- Suggested personnel to send according to diagnosis (**Table 51**):

TABLE 51: Suggested personnel for retrieval team

MEDICAL OFFICER	MIDWIFE
Maternal collapse	Patients in labour
Eclampsia	Mild APH or PPH
Moderate to severe PPH or APH	Mild hypertension
Moderate to severe hypertensive crisis	Born Before Arrival (BBA)
Preterm labour	
Ruptured ectopic pregnancy	
Miscarriage with profuse bleeding	

ii. Retrieval Kits and Equipment

Two types of retrieval kits are recommended for community calls: a basic kit for midwives and an advanced kit for medical officers. These kits should be standardised, regularly checked for expired items, and restocked after each use.

- **Basic Retrieval Kit (For Midwives)**
  - For Delivery: Delivery set, pads, cord clamps, scissors, perineal repair set, and related supplies.
  - For the Baby: Suction catheter, baby's towel/wrap, newborn checklist, and identification tags.
  - IV Line Related: Cannulas, syringes, needles, extension tubing, and swabs.
  - Medications: Oxytocin, Syntometrine, and other essential drugs for managing common obstetric emergencies.
  - Miscellaneous: Micropore tape, plastic bags, Foley's catheter, vital signs chart, and a list of specialist contact numbers.

- **Advanced Retrieval Kit (For Medical Officers)**
  This kit includes everything in the basic kit, plus:
  - IV Line Related: Larger cannulas (14 gauge), pressure infusion bag, colloids, blood tubes.
  - Medications: Intravenous anti-hypertensives and additional medications for resuscitation and more severe conditions, such as IV noradrenaline and adrenaline.
  - Miscellaneous (depending on local setting): Bakri balloon, Kiwi cups, and laminated resuscitation protocols.

- Refer to **Appendix 14** for a sample checklist for retrieval kits.

14.1.2 Retrieval from Another Healthcare Facility

a. Obstetric emergencies often require transferring a patient from a district hospital or health facility to a tertiary centre with specialised resources. In such situations, the onus to stabilise and transfer the patient remains with the initial healthcare centre managing the patient. Early and appropriate referral cannot be overemphasised.

b. In-depth knowledge of local logistics is required to make the best decision in a given scenario. Transfer may occur via land, water or air and mode of transport may also differ depending on time of the day. All these should be taken into consideration before making a decision to transfer or retrieve a patient.

c. Sometimes, after appropriate referral and discussion with a specialist centre, a decision may be made to send a retrieval team from the receiving centre to the location of the patient instead of sending the patient directly to the specialist centre. This decision should ideally be made at consultant/senior specialist level.

14.2 Purpose and Considerations for a Retrieval Team

14.2.1 A retrieval team serves two main purposes:

a. On-site Stabilisation: To help stabilise a patient at the referring facility before transfer.
b. Mid-point Rendezvous: To meet the patient at a halfway point to provide earlier, advanced care.

14.2.2 Before deploying a retrieval team, several factors must be considered:

a. The retrieval team should provide a level of service or capability that is not available at the referring hospital.
b. The retrieval team should include appropriate personnel, equipment, and medications (including blood products) needed to support the retrieval.
c. Deployment of the retrieval team should not result in an unnecessary delay to patient care.

A RETRIEVAL TEAM IS NOT A "SCOOP AND RUN" SERVICE. IF THE REFERRING FACILITY CAN SAFELY STABILISE AND TRANSFER THE PATIENT, IT IS OFTEN MORE EFFICIENT TO SEND THE PATIENT DIRECTLY WHILE THE TERTIARY CENTRE PREPARES TO RECEIVE THEM.

14.3 Scenarios for Retrieval Team Activation

14.3.1 The following examples highlight how retrieval should only be used in very specific situations with specific benefits in mind. Deploying a retrieval team will tax the manpower and also pose additional risks to the healthcare workers involved and the decision should not be made lightly. Each hospital should also have a standard workflow for activating the retrieval team as well as a target time for deployment.

a. Scenario A (Short Distance):

i. A patient with a stable ruptured ectopic pregnancy presents to a district hospital which is 1 hour away from a tertiary centre.
ii. It would be more efficient and safer to transfer the patient immediately, as the time it takes to deploy a retrieval team could be longer than the travel time itself.
iii. Sending a team to perform the surgery in the district centre may not be necessary as the patient is currently stable enough for transfer. In the same amount of time needed for the team to reach the district hospital, the patient would have reached the tertiary centre. In this case, performing the surgery in a tertiary centre with better support is safer than doing the surgery in a district setting.
iv. In unstable patients, a retrieval team may still be considered.

b. Scenario B (Long Distance):

i. A patient with suspected placenta abruption presents to a district hospital 4 hours away from a tertiary centre. She is currently stable for transfer but has the potential to deteriorate further.
ii. In this situation, consideration can be given to meeting the patient at a halfway hospital (normally also a non-specialist hospital along the way). The district hospital should stabilise the patient and start the transfer to the midway hospital. A retrieval team with an anaesthetist, an O&G specialist and blood products should also be deployed to the midway hospital.
iii. Emergency surgery can be performed at the midway hospital, providing care sooner than if the patient had to travel the entire distance.

c. Scenario C (Surgical Complication):

i. A patient presents to a district hospital with an O&G specialist with acute foetal distress. Emergency caesarean section is done and surgery is complicated with massive PPH. The district specialist encounters difficulty securing the bleeding and calls a tertiary centre for help.
ii. A retrieval team with a more senior specialist, an anaesthetist, and blood products can be deployed to assist, as transferring the unstable patient would be too risky.

d. Scenario D (Patient Deterioration):

i. A patient delivers in a district hospital but has a retained placenta and there is no personnel trained for manual removal of placenta. She is planned for transfer to a tertiary centre but starts to bleed and becomes unstable.

ii. A retrieval team with additional resources, an O&G specialist and an anaesthetist can be deployed to help stabilise the patient, though if the patient responds to initial resuscitation, direct transfer may still be the best option.

14.4 Basic Consideration During Patient Transfer

14.4.1 Proper planning is vital for a safe transfer.

14.4.2 Pre-Transfer Planning

a. Stabilise the Patient:

i. Ensure the patient is as stable as possible before moving.

ii. Early and appropriate referral is crucial and can provide important insights to assist with stabilisation and successful transfer.

iii. Transferring an unstable patient can cause more harm than good.

b. Consent:

i. Inform the patient's family about the risks and benefits of the transfer and document their consent.

ii. Although transfer is always aimed at better care for the patient, there are inherent risks in transferring a patient, including the possibility of road traffic accidents.

c. Personnel:

i. A minimum of two healthcare workers should be present during the transfer.

ii. There should always be at least one healthcare worker in the same compartment as the patient during transfer for close monitoring.

iii. Family members should not ride in the ambulance if possible as this may impede any resuscitation process required. Additional family members also increase the responsibilities of the transfer team.

d. Equipment and Drugs:

i. Most ambulances are equipped with only basic resuscitation equipment.
ii. In certain states, transferring patients involves express boats or helicopters.
iii. The escorting personnel must anticipate potential complications and bring all necessary equipment and emergency drugs. Emergency drugs can be pre-diluted and properly labelled in a tray to enable immediate usage if necessary.
iv. Ensure adequate battery supply or extension wires for power during the trip.
v. Ensure all monitors and infusion pumps or machines are securely lashed down to prevent malfunction or accidental injuries caused by falling equipment.
vi. Ensure all lines and catheters are appropriately secured.
vii. If a patient is on oxygen, ensure adequate supply is brought along. A pharmacist or ETD physician would be able to calculate the number of tanks required for a particular journey depending on the patient's requirement.

e. Logistics:

i. Confirm the patient's destination upon arrival (ETD or Labour ward) and provide an estimated time of arrival.
ii. Keep a list of contact numbers for the receiving hospital and all hospitals along the route.

f. Administrative Aspects:

i. Tertiary hospitals should have pre-established protocols for transfer and retrieval with the district hospitals under their coverage. This can streamline the referral process and clarify responsibilities.
ii. Retrieval cases should be regularly audited to review timelines, evaluate team performance and make continuous improvements to the retrieval process.
iii. Regular multidisciplinary drills should be conducted to ensure smooth activation and understanding of individual roles within the retrieval team.
iv. Post event debriefing should also be conducted especially after a traumatic retrieval experience.

14.5 Summary and Conclusion

14.5.1 Effective obstetric retrieval is a critical component of maternal healthcare, ensuring that patients receive timely and appropriate care, regardless of their location. Whether responding to an emergency in the community or coordinating a transfer between healthcare facilities, a well-organised and well-equipped team is essential.

14.5.2 By having clear protocols for activation, standardised retrieval kits, and a considered approach to when and how to deploy a retrieval team, hospitals can significantly improve patient outcomes. The decision to send a retrieval team should be deliberate, based on the specific needs of the patient and the resources available. When a transfer is initiated, meticulous planning regarding stabilisation, equipment, and communication is vital for a safe and successful journey.

14.5.3 Ultimately, the goal of an obstetric retrieval team is to bridge the gap between a patient's location and the specialized care they need. This chapter provides a framework to help healthcare facilities develop and refine their own protocols, ensuring that every obstetric emergency is met with a swift, organized, and effective response.

Take home messages:

- Each hospital should have personalised protocols, clear workflows, and standardised kits for deploying a retrieval team.
- A retrieval team should only be deployed when there are clear benefits over direct transfer.
- It is often more efficient to transfer a stable patient directly to a specialist centre.

Obstetric Retrieval Team: Specialised Emergency Response Protocols

Standardised workflow, personnel requirements, and safety considerations for the mobilisation and operation of an obstetric retrieval team.



RAPID ACTIVATION & PERSONNEL DEPLOYMENT





5-Minute Dispatch Goal
Activate teams based on initial diagnosis without delaying for further clarification.



Triage-Based Staffing



- Labour
- Mild Hypertension
- BBA

Deploy Midwives for labour/mild cases.



Triage-Based Staffing



- Maternal Collapse
- Eclampsia
- Moderate to Severe PPH/APH

Medical Officer + Midwife for PPH, eclampsia, or maternal collapse

Standardised Retrieval Kits



Basic Kit (Nurse)
Restocked and checked after every use.



Advanced Kit (Doctor)
Restocked and checked after every use.



STRATEGIC LOGISTICS & SAFE TRANSFER



Not a "Scoop and Run" Service
Use midpoint rendezvous or on-site stabilisation if direct transfer causes unnecessary delays.



Mandatory Pre-Transfer Stabilisation
Ensure patients are haemodynamically stable before movement to prevent deterioration during transport.



En-Route Monitoring Requirements
Minimum of two healthcare workers must escort, with one always in the patient compartment.

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4. Ministry of Health Malaysia. Handbook of Obstetrics Guideline. Putrajaya: Ministry of Health Malaysia; 202

APPENDICES



Appendix 1:

Initial Management of Maternal Sepsis Proforma

Patient Name: _____
IC No. : _____

1. Is the patient suspected/confirmed to have an infection?
   ☐ Yes (proceed to next question) ☐ No (Discontinue)
   Temp:_____ BP:_____ HR: _____

2. What is the suspected source of infection?
   ☐ Genital tract sepsis ☐ Pneumonia ☐ Mastitis
   ☐ Chorioamnionitis ☐ Skin/soft tissue infection ☐ Pharyngitis
   ☐ Urinary tract infection ☐ Gastroenteritis ☐ Others _____

3. Perform omqSOFA. (≥ 2 criteria is considered high risk of sepsis)
   ☐ Respiratory rate ≥ 25/min Systolic BP < 100 mmHg
   ☐ Altered mentation (GCS _____)

4. If patient is at high risk of sepsis (clinically)/omqSOFA score ≥ 2, escalate care and carry out HOUR-1 SEPSIS BUNDLE as below.

	Hour-1 Sepsis Bundle (5)	Time of diagnosis of sepsis:
1	Measure lactate level. (Repeat if 1st sample is > 2 mmol/L)	Time of 1st sample: Result: Time of 2nd sample: Result:
2	Obtain blood cultures before giving antibiotics.	Time taken: Specimen taken: Blood / Swabs / Sputum / Urine / Others _____
3	Administer broad-spectrum antibiotics.	Antibiotics given: Time given:
4	Fluid resuscitation with 20 ml/kg crystalloid for hypotension or lactate level ≥ 4 mmol/L.	Estimated weight: Total fluids for resuscitation: Time completed:
5	Start vasopressors if hypotensive during or after fluid resuscitation to maintain MAP ≥ 65 mmHg.	BP/MAP prior to starting: Vasopressor: Time started:

☐ Inform O&G Specialist/Consultant _____ (Name & Time)
☐ Refer to Anaesthetic team _____ (Name & Time)
☐ Refer to Medical/ ID Specialist/ Surgical/_ (depending on source of sepsis)

Other investigation results:

Hb	Na	pH	Bilirubin	UFEME
TWC	K	paO2	AST	Leu
Plt	Urea	paCO2	ALT	Nit
INR	Creat	BE	ALP	Ket
HPC		HCO3	Alb	Ery
CTG				
ECG				
CXR				

Signature: _____ Date & Time: _____

*Source: Sarawak Advances Life Support in Obstetric (SALSO), 2022

Appendix 2:

Infection Table

SUSPECTED INFECTION	SIGNS AND SYMPTOMS	RECOMMENDED ANTIBIOTIC *	SUBSEQUENT MANAGEMENT
Central nervous system			
Meningitis/ Meningo-encephalitis	• Photophobia, neck stiffness • Altered consciousness, seizures	IV Ceftriaxone 2g BD + IV Ampicillin 2g 4 hourly IV Meropenem 2g TDS if allergic to cephalosporins IV Acyclovir 10mg/kg TDS, if viral (Consider HSV)	• Lumbar puncture for C&S
Dermatological System			
Caesarean wound infection	• Bleeding/ Discharge from wound site. • Redness and pain around the wound site.	IV Cloxacillin 2g QID or IV Cefazolin 1-2g TDS or IV Ampicillin/Sulbactam 3g QID if patient is at high risk of gram negative/ anaerobic infection e.g., underlying diabetes	• Ensure rectus sheath is not breached. • May require wound exploration if pus collection is suspected.
Necrotising fasciitis	• Excruciating pain • Blisters and skin necrosis in late stage	• *Group A Streptococcus infection* IV Benzylpenicillin 200,000-300,000 units/kg/day in 4-6 divided doses (max 24 million units/day) + IV Clindamycin 30-40mg/ kg/day in 3-4 divided doses (max 2.7g/day) • *Staphylococcal infection* IV Cloxacillin 200mg/kg/day in 4-6 divided doses (max 2g/dose, 12q/day) + IV Clindamycin 30-40mg/ kg/day in 3-4 divided doses (max 2.7g/day)	• Surgical debridement

SUSPECTED INFECTION	SIGNS AND SYMPTOMS	RECOMMENDED ANTIBIOTIC *	SUBSEQUENT MANAGEMENT
Genitourinary System			
Endometritis	• History of ragged membranes. • Increased PV loss. • Lower abdominal pain. • Can occur post-delivery or post-abortion.	IV Amoxicillin/ Clavulanate 1.2g TDS or IV Ampicillin/Sulbactam 3g QID	• May require ERPOC if retained tissues are suspected.
Chorioamnionitis	• Leaking liquor • Irritable uterus • Foetal tachycardia • Maternal tachycardia	IV Ampicillin/Sulbactam 3g QID	• Will require delivery.
Septic miscarriage	• Period of amenorrhoea • Prolonged leaking liquor/PV bleeding • Lower abdominal pain • Foul-smelling PV discharge • Attempted self-abortion	IV Ampicillin/Sulbactam 3g QID + Tab Doxycycline 100mg BD	• S&C after adequate antibiotic coverage.
Toxic shock syndrome	• Can occur due to tampon usage/ skin infection/post vaginal delivery. • Generalised macular rash • Diarrhoea/ respiratory/ • confusion • Soft tissue necrosis	IV Vancomycin 60mg/kg/day in 3-4 doses (max 2d/day), if MRSA suspected	• I&D if presence of abscess.
Acute pyelonephritis	• Urinary frequency/ dysuria. • Loin pain.	IV Cefuroxime 750mg TDS or IV Ceftriaxone 2g OD	• U/S KUB.

SUSPECTED INFECTION	SIGNS AND SYMPTOMS	RECOMMENDED ANTIBIOTIC *	SUBSEQUENT MANAGEMENT
Cardiorespiratory system			
Pneumonia	• Cough/shortness of breath • Sick contact	IV Ceftriaxone 2g OD ± IV Azithromycin 500mg OD	• No contraindication for CXR. • Supportive care with hydration and oxygen
Influenza		Tab Oseltamivir 75mg BD for 5 days	
Covid-19		Tab Paxlovid (150mg/100mg), 3 tab BD for 5 days	
Infective Endocarditis	• Fever without obvious source • Cardiac murmur • History of valvular heart disease	IV Ampicillin 2g 4 hourly (12g/day) + IV Gentamicin 3mg/kg/dose OD	• Refer to cardiologist
Gastrointestinal system			
Acute gastroenteritis	• Diarrhoea/ vomiting	IV Metronidazole 500mg TDS	• Ensure adequate hydration
Appendicitis	• Acute abdomen • Positive McBurney's sign	IV Metronidazole 500mg TDS + IV Cefuroxime 1.5g TDS	• Surgical management
Cholecystitis / Cholangitis	• Right upper quadrant pain • Murphy's sign positive	Non sepsis: IV Ampicillin/Sulbactam 1.5-3g QID Sepsis: IV Piperacillin/Tazobactam 4.5g TDS-QID	• Antibiotics KIV cholecystectomy
Others			
Severe occult sepsis	• Fever + organ dysfunction but without obvious source of infection	IV Piperacillin/ Tazobactam 4.5g TDS-QID or IV Meropenem 1g TDS	• May require further investigations e.g., ECHO/ ultrasound abdomen.
Mastitis	• Breast tenderness and engorgement • Difficulty with breastfeeding	Inpatient: IV Cloxacillin 1-2g 4-6 hourly or IV Cefazolin 1-2g TDS Outpatient: Tab Cloxacillin 500mg QID	• Regular EBM with analgesia and warm compress. • May require I&D if abscess.

*Source: National Antimicrobial Guideline 2024 (Ministry of Health Malaysia), 2024

Appendix 3:

Preeclampsia Chart

PRE-ECLAMPSIA CHART
OBSTETRIC & GYNAECOLOGY DEPARTMENT
HOSPITAL : .....

NAME :	WEIGHT :
IC :	HEIGHT :
RN :	BMI :
DIAGNOSIS:	POA :

DATE!	TIME!	BP (mmHg)	MAP (mmHg)	PR (bpm)	RR (bpm)	SPO2 (%)	REFLEX	IMPENDING ECLAMPSIA SYMPTOM	CONTRACTION	URINE		PAIN		MEDICATION	PAD CHART	REMARK	NAME & SIGNATURE
										ALBUMIN	VOLUME	SCORE	SITE				

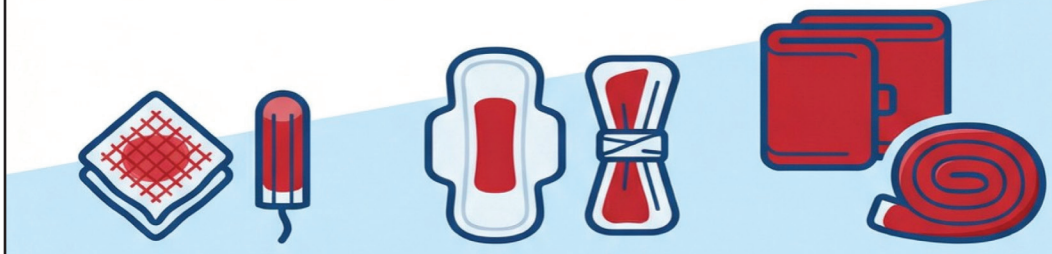
Appendix 4:

a. Pictogram for Visual Estimation of Blood Loss

Visual Estimation of Blood Loss (VEBL) Guide

This guide provides a standardised visual reference for estimating blood loss volume based on the saturation of common medical supplies and linens.
Estimates represent fully saturated items in cubic centimeters (cc).

Low to Moderate Volumes (50cc – 150cc)

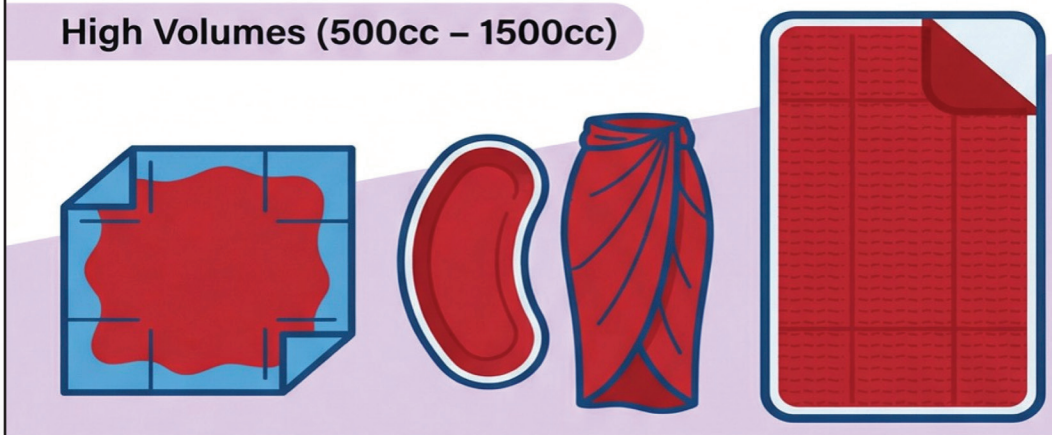


50cc
Estimated volume for a single fully saturated gauze sponge or tampon.

100cc
Represents the blood volume held by a standard saturated sanitary pad or vaginal packing.

150cc
The volume associated with a fully soaked abdominal pack or gamgee dressing.

High Volumes (500cc – 1500cc)



500cc
A single blue surgical sheet fully saturated with blood.

1000cc
Indicates a full kidney basin or a completely soaked sarong/wrap.

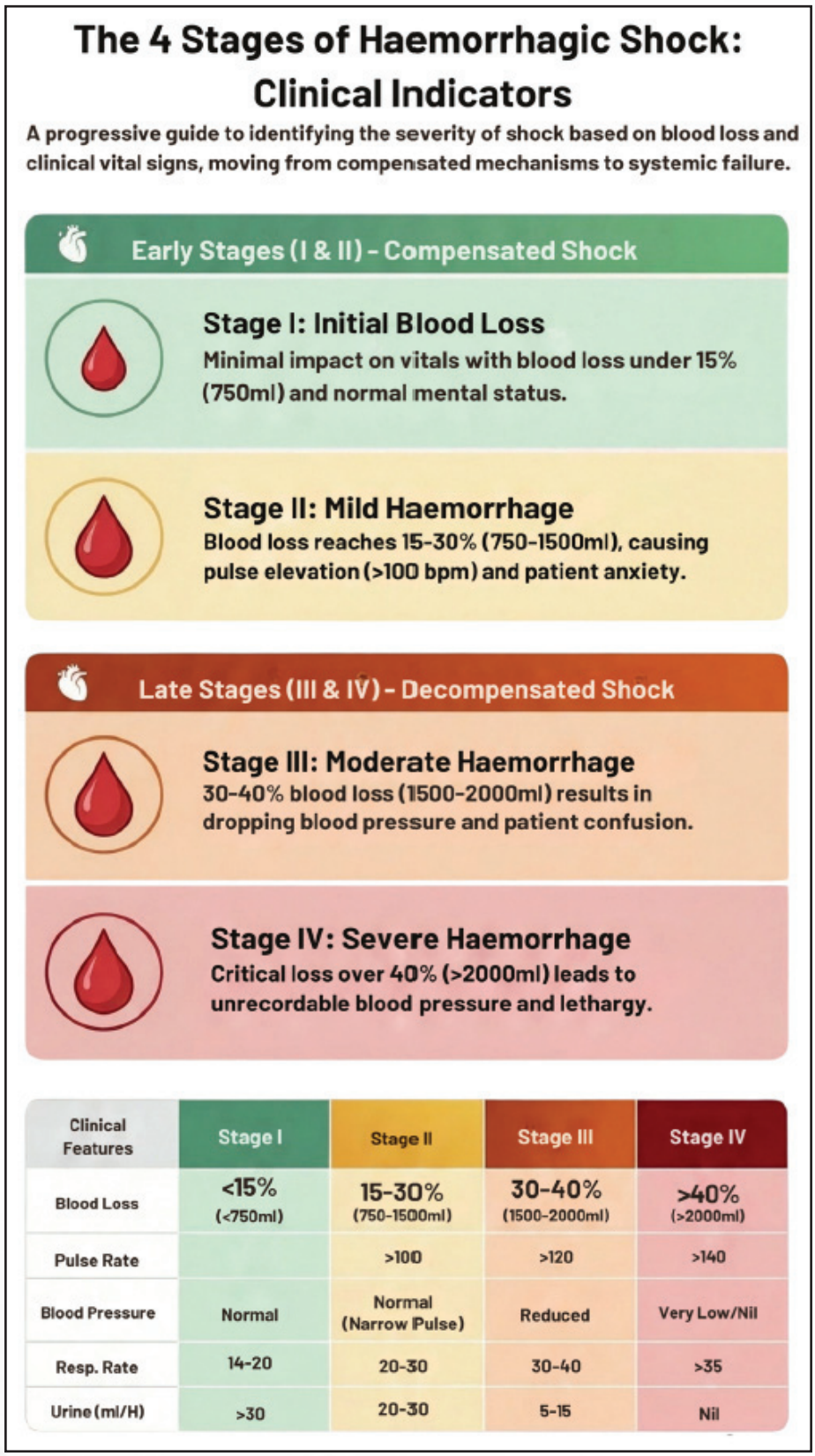
1500cc
Represents the highest visual estimate for a fully saturated large-scale linen protector.

b. Calibrated under-buttock drape during vaginal delivery



Appendix 5:

Stages of Shock Table



Clinical Features	Stage I	Stage II	Stage III	Stage IV
Blood Loss	<15% (<750ml)	15-30% (750-1500ml)	30-40% (1500-2000ml)	>40% (>2000ml)
Pulse Rate		>100	>120	>140
Blood Pressure	Normal	Normal (Narrow Pulse)	Reduced	Very Low/Nil
Resp. Rate	14-20	20-30	30-40	>35
Urine (ml/H)	>30	20-30	5-15	Nil

Appendix 6:

Cannula Size Chart

IV Cannula Specifications: Professional Reference Guide



Colour	Size (G)	Diameter (mm)	Flow Rate (mL/min)
Orange	14	2.1	240
Grey	16	1.8	180
Green	18	1.3	90
Pink	20	1.1	60

Inverse Relationship Between Gauge and Flow

Note that lower gauge numbers (e.g., 14G) represent larger diameters and significantly higher flow rates compared to higher gauge numbers (e.g., 20G).

Flow Rate Measured in mL/min

The flow rate indicates the volume of fluid the cannula can deliver per minute, which is vital for emergency volume replacement.

Appendix 7:

Patient Information Sheet for External Cephalic Version

BORANG PENERANGAN PROSEDUR/PEMBEDAHAN OBSTETRIK DAN GINEKOLOGI

Maklumat Pesakit	Ibubapa/Penjaga
Nama	Nama
.....	.....
No. K/P	No. K/P
.....	.....
Hospital RN	Hubungan
.....	.....

- Borang ini perlu dilampirkan bersama borang keizinan pembedahan/prosedur rasmi hospital.
- Borang ini hanya membantu pengamal perubatan memberi penerangan mengenai prosedur/pembedahan yang dicadangkan.
- Pengamal perubatan masih perlu menjelaskan maklumat di dalam borang ini kepada pesakit/penjaga dan mengurangkan kekhuatiran mereka secara peribadi
- Pengamal perubatan perlu memastikan pesakit/penjaga memahami maklumat di dalam borang ini dan menandatangani borang ini tanpa paksaan.

Nama pembedahan/prosedur yang disyorkan kepada pesakit:

EXTERNAL CEPHALIC VERSION (ECV)

- Kenyataan pengamal perubatan: Saya telah menerangkan pembedahan/prosedur yang disyorkan kepada pesakit. Secara khususnya, saya telah menerangkan isu-isu seperti berikut:

1. **Kebaikan yang diperolehi:**
   - Mengubah kedudukan bayi dalam kandungan dari kedudukan kepala bayi di atas (breech) kepada kepala bayi di bawah (cephalic) dengan pengurutan pada perut ibu
   - Mengurangkan kebarangkalian kedudukan kepala bayi di atas (breech) semasa sudah cukup bulan, sekaligus mengurangkan kadar Caesarean Section dan komplikasi berkaitan Caesarean Section

2. **Risiko serius yang mungkin terjadi:**
   - 1 dalam 200 memerlukan kelahiran Caesarean Section secara kecemasan akibat daripada pendarahan uri atau perubahan pada denyutan jantung bayi
   - 5 dalam 100 bayi mungkin akan bertukar kembali kepada keadaan songsang walaupun setelah ECV berjaya
   - Koyakan pada rahim: amat jarang
   - Kemasukan darah janin ke dalam peredaran darah ibu sebelum atau semasa bersalin: amat jarang
   - Risiko alahan ke atas ubat-ubatan

3. **Risiko yang mungkin berlaku pada kadar agak kerap:**
   - Kesakitan sewaktu melakukan prosedur dan prosedur terpaksa diberhentikan seketika
   - Perasaan berdebar sementara waktu akibat ubat tokolisis (mengurangkan kontraksi)
   - Prosedur ECV tidak berjaya

4. **Prosedur yang dicadangkan:**
   - ECV dilakukan pada minggu ke 36 hingga minggu ke 37
   - Pengurutan pada perut ibu akan dilakukan untuk mengubah kedudukan bayi daripada kepala di atas kepada kedudukan kepala di bawah
   - Tekanan darah dan nadi ibu akan diambil sebelum prosedur dijalankan
   - Pemantauan jantung bayi (CTG) akan dilakukan sebelum dan selepas prosedur
   - Imbasan scan bayi akan dilakukan sebelum, semasa dan selepas prosedur
   - Ubat tokolisis untuk meningkatkan kebarangkalian ECV berjaya, mungkin akan diberi sebelum prosedur. Ubat ini mungkin akan menyebabkan perasaan berdebar buat sementara waktu.

Saya telah menerangkan bahawa peratus kejayaan prosedur adalah 50 %.

Semua kaedah bius mempunyai risikonya sendiri Bagi kes elektif, pakar bius dapat menerangkan berkenaan jenis bius yang bersesuian kepada pesakit.

Saya juga telah membincangkan kebaikan serta kelemahan rawatan alternatif termasuk pilihan untuk tiada rawatan.

Tandatangan (Pengamal Perubatan): ……..……
Nama: ……..……
No. MPM: …..…….…….. Cap Jawatan:
Tarikh: ……..……

- **Kenyataan pesaki**t: Saya akui memahami semua penerangan yang telah diberikan oleh pengamal perubatan. Saya telah diberi peluang untuk membuat sebarang pertanyaan sebelum saya menandatangani keizinan menjalani prosedur / pembedahan yang telah dicadangkan.

Tandatangan pesakit: Nama: Tarikh:
……..... ....

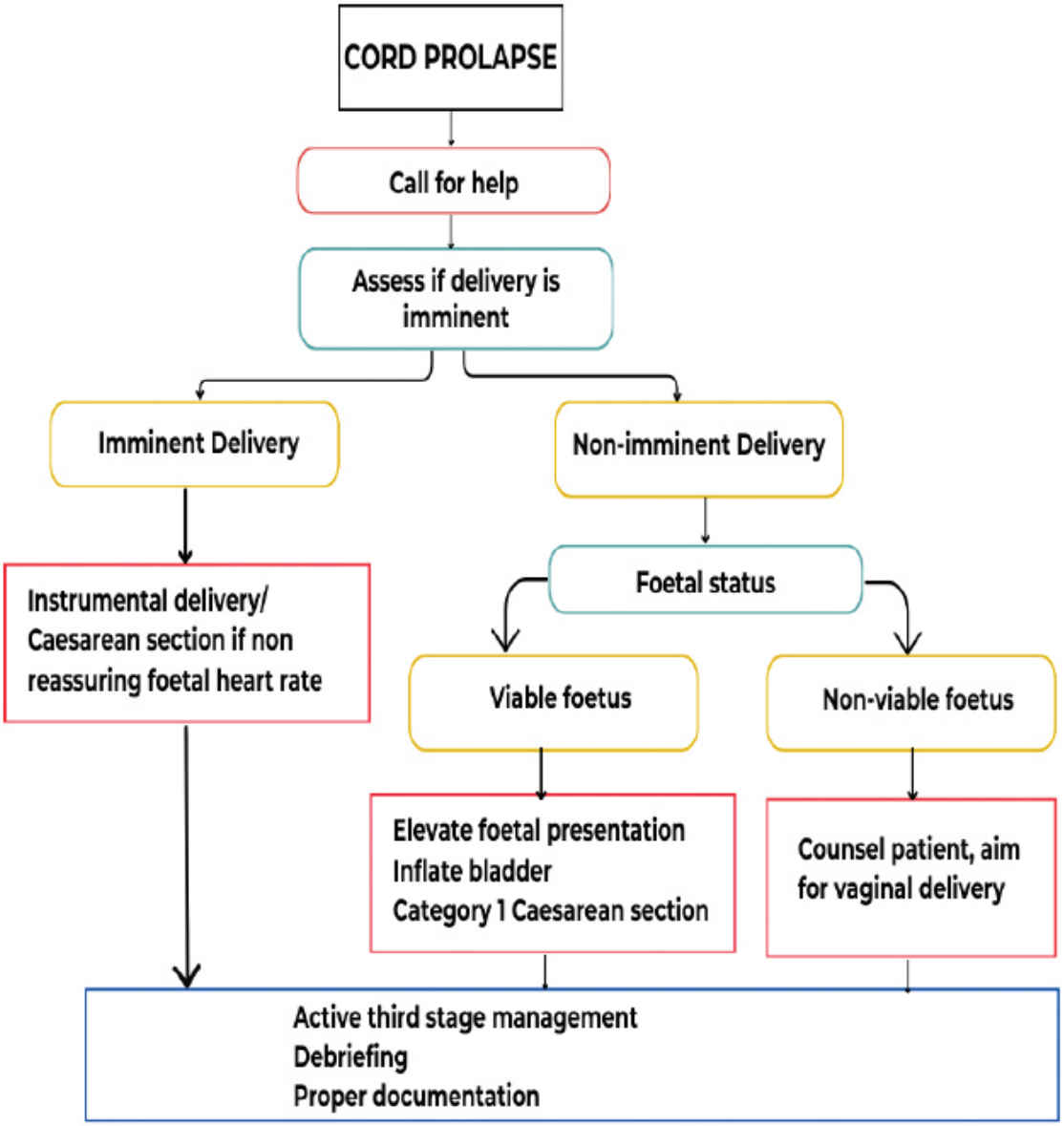
- **Kenyataan ibubapa/penjaga: (bagi pesakit yang di bawah umur 18 tahun atau kurang keupayaan mental.)** Saya akui memahami semua penerangan yang telah diberikan oleh pengamal perubatan. Saya telah diberi peluang untuk membuat sebarang pertanyaan sebelum saya menandatangani keizinan menjalani prosedur / pembedahan yang telah dicadangkan.

Tandatangan pesakit: Nama: Tarikh:
……..... ....

No KP/ID: Hubungan dengan pesakit:
……..... .....

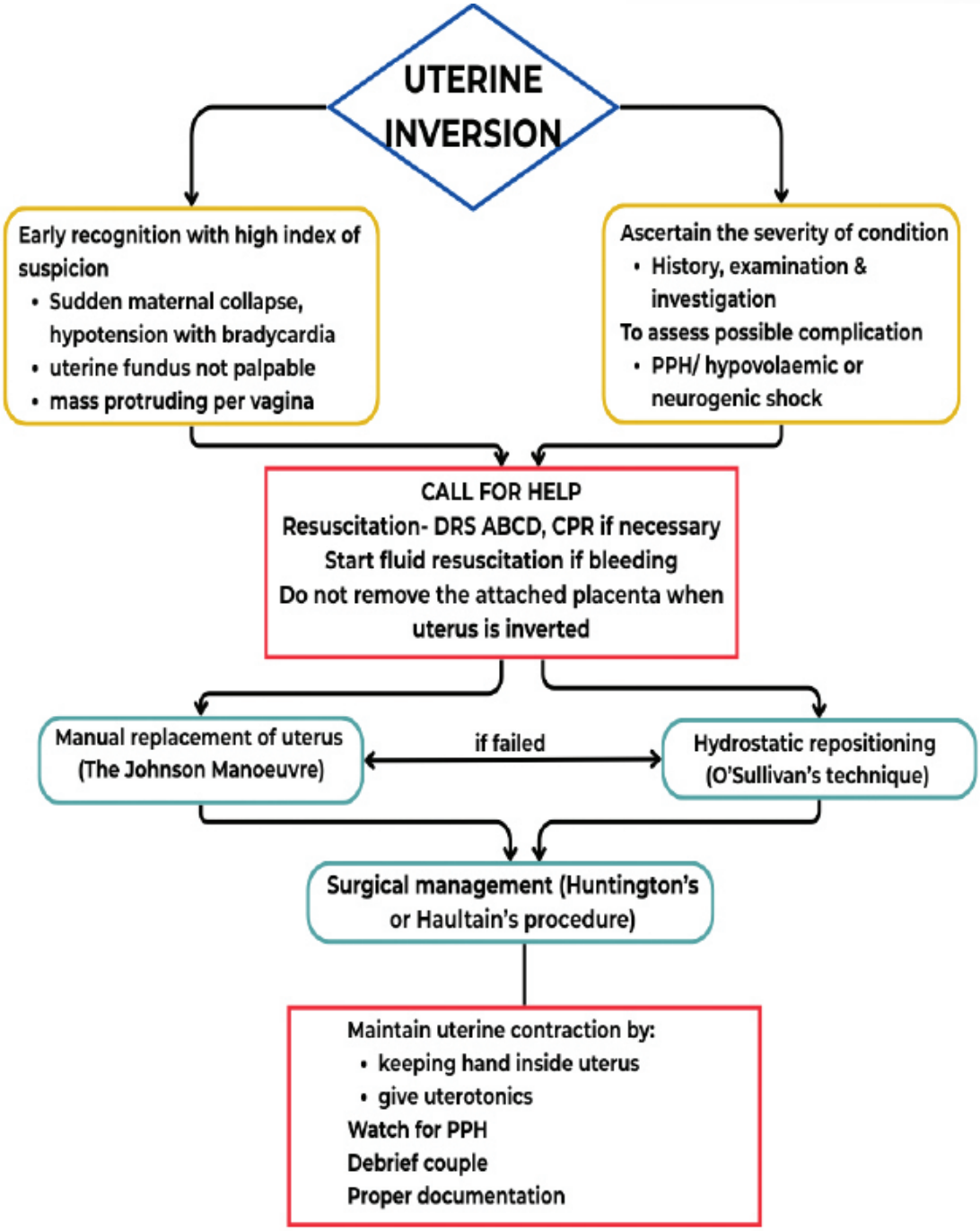
Appendix 8:

Management of Cord Prolapse: Flow Chart



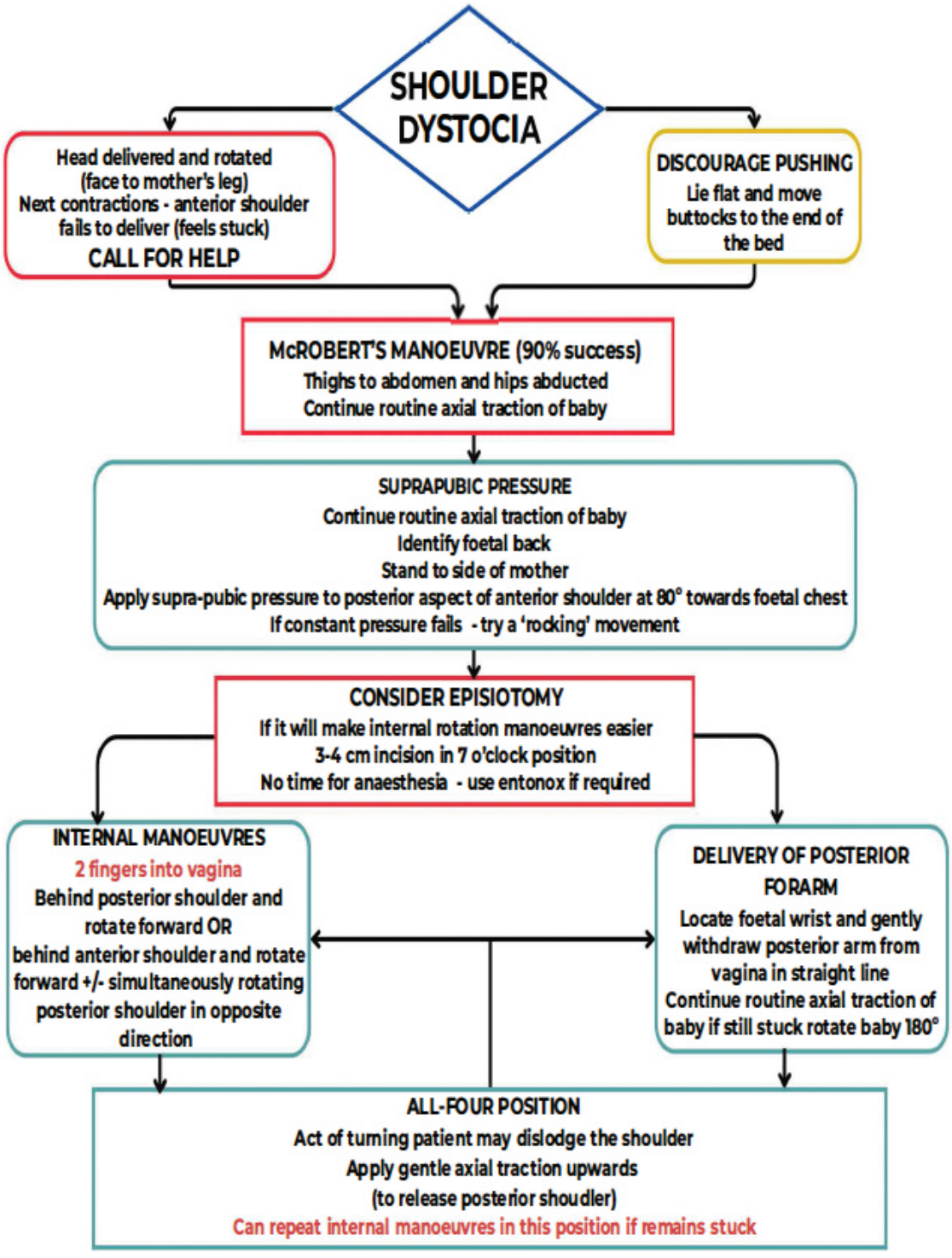
Appendix 9:

Management of Uterine Inversion: Flow Chart



Appendix 10:

Management of Shoulder Dystocia: Flow Chart



Appendix 11:

Shoulder Dystocia Proforma

HSIP/BK/044/12

SHOULDER DYSTOCIA DOCUMENTATION FORM

NAMA PESAKIT:_____

NO KP:_____RN :_____

DATE: TIME :

RED ALERT ACTIVATED	☐ YES ☐ NO *(IF NO WHY ?):*	TIME RED ALERT ACTIVATED	
STAFF CONDUCTED DELIVERY OF HEAD			
	NAME	**ROLE**	**TIME ARRIVED**
ADDITIONAL STAFF ATTENDING FOR DELIVERY OF SHOULDER	1.		
	2.		
	3.		
	4.		
	5.		
PAEDS INFORMED	TIME INFORMED	TIME ATTENDED	
PAEDS MO'S NAME	1.		
	2.		

PROCEDURES USED TO ASSIST DELIVERY	BY WHOM	TIME	ORDER	DETAILS	REASONS IF NOT PERFORMED
Mc ROBERTS' POSITION					
SUPRAPUBIC PRESSURE				FROM MATERNAL ☐ LEFT ☐ RIGHT *(PLEASE TICK)*	
EPISIOTOMY				☐ ENOUGH ACCESS ☐ TEAR PRESENT ☐ ALREADY PERFORMED *(PLEASE TICK)*	
DELIVERY OF POST ARM				☐ RIGHT ARM ☐ LEFT ARM *(PLEASE TICK)*	
INTERNAL ROTATIONAL MANOEUVRE					
DESCRIPTION OF ROTATION					
DESCRIPTION OF TRACTION	ROUTINE AXIAL *(AS IN NORMAL DELIVERY)* ☐ YES ☐ NO			REASON- *(IF NOT ROUTINE AXIAL)* :	

OTHER MANOEUVRES USED	

MODE OF DELIVERY OF HEAD	☐ SPONTANEOUS		INSTRUMENTAL : ☐ VACUUM ☐ FORCEPS		
TIME OF DELIVERY OF HEAD		TIME OF DELIVERY OF SHOULDER		HEAD TO BODY DELIVERY INTERVAL	
FOETAL POSITION DURING DYSTOCIA	☐	 HEAD FACING MATERNAL **RIGHT** OR **RIGH**T FOETAL SHOULDER ANTERIOR			
	☐	 HEAD FACING MATERNAL **LEFT** OR **LEFT** FOETAL SHOULDER ANTERIOR			
BIRTH WEIGHT		APGAR SCORE	1 MIN :	5 MIN :	10 MINS:

CORD BLOOD	PH :	PO2 :	PCO2 :	BICARB :	BASE EXCESS :
BABY EXAMINATION AFTER BIRTH	1. MORO COMPLETE ? ☐ YES ☐ NO			2. ANY BRUISES? ☐ YES ☐ NO	
	3. SIGN OF BONY FRACTURES ☐ YES ☐ NO			4.INTUBATED ☐ YES ☐ NO	
ADMITTED TO WAD	NICU SCN	☐ YES ☐ NO ☐ YES ☐ NO		DISCHARGED TO MUM	☐ YES ☐ NO

MATERNAL MOBIDITY	1. PPH	☐ YES	☐ NO	EBL (MLS)	
	2. O.A.S.I.S	☐ YES	☐ NO	REPAIRED IN OT	☐ YES ☐ NO

EXPLAINATION TO MUM		☐ YES ☐ NO	TIME	
EXPLAINATION TO HUSBAND		☐ YES ☐ NO	TIME	
SPECIALIST ON CALL INFORMED		☐ YES ☐ NO	TIME	

FOLLOW UP PPC CLINIC	☐ YES ☐ NO	DATE :
FOR DEPARTMENT AUDIT	☐ YES ☐ NO	

ADDITIONAL NOTES

DOCTOR SIGNATURE: _____ **DATE**: **TIME:**
MEDICAL OFFICER'S NAME :
MEDICAL OFFICER'S MMC NUMBER :

Revised March 2023

Appendix 12:

Operative Vaginal Delivery Proforma

Patient details
Name : .....
IC No.: .....
Age: ..... Gravida:..... Parity :.....
Gestation: .....

Operator Name: .....
Assistant Name: .....

Indication(s): .....

Classification of OVD: ☐ Outlet ☐ Low ☐ Midcavity
Rotation > 45º: ☐ Yes ☐ No
Foetal wellbeing: CTG: ☐ Normal ☐ Suspicious ☐ Pathological

Pre-requisites:

Examination

Per abdomen:	☐ 0/5	☐ 1/5		
Pelvimetry:	☐ Adequate	☐ Not Adequate		
Dilatation:	☐ Fully	☐ Not fully (.....)		
Position:	☐ OA	☐ ROA	☐ LOA	☐ OP
	☐ ROP	☐ LOP	☐ OT	
	☐ Not sure			
Station:	☐ -1	☐ 0	☐ +1	☐ +2
		☐ +3	☐+4	
Caput:	.....			
Liquor:	☐ Clear	☐ Meconium		

Place of delivery:	☐ Labour Room	☐ OT	
Analgesia:	☐ Local	☐ Pudendal	☐ Regional
Consent:	☐ Verbal	☐ Written	

Procedure:
Lithotomy position: ☐ Yes ☐ No
Bladder catheterised: ☐ Yes ☐ No

Instrument used:

Vacuum Extractor: □ Silastic □ Kiwi □ Metal □ Medela
Forceps: □ Neville Barnes □ Wrigley
Number of pulls: □ One □ Two □ Three
Traction: □ Easy □ Moderate □ Strong
Maternal effort: □ Minimal □ Moderate □ Good
Successful procedure: □Yes □ No

Episiotomy: □ Yes □ No
Perineal tear**:** □1st degree □2nd degree □3rd degree □4th degree
……..
Placenta: □CCT □Manual
EBL: .....

Paeds informed prior to delivery: □ Yes □ No
Paeds present during delivery: □ Yes □ No

Multiple instruments use: □ Yes □ No

Examination before second instrument
Per abdomen: .....
Position: .....
Station: .....
Moulding: .....
Caput:. .....
Reasons for second instrument:
If fail instrument (reasons): ……

Baby:
Gender: □ Boy □ Girl
Birth weight: ..... (kg)
Apgar: 1..... 5..... 10..... Cord pH:……
Foetal morbidity (if any) : ……

Post-delivery care:
1. Level of care: □ Routine □ Require close monitoring
2. Syntocinon infusion: □ Yes □ No
3. Sup Diclofenac 50 mg: □ Yes □ No
4. Analgesia prescribed: □ Yes □ No
5. Vaginal packing: □ Yes □ No
6. Explanation to mother/husband: □ Yes □ No ……

Signature: .....
Date: …… Time: .....

Appendix 13:

Blood Transfusion Consent

CONSENT FORM FOR BLOOD OR BLOOD COMPONENT TRANSFUSION

Date:
Patient's Name: Age:
Identity Card No.: Sex: ☐ Male ☐ Female
Address:
Attending Medical Practitioner: Dr.
Identity Card No.:

I, the above-named/ parent/ guardian/ spouse/ next of kin of the above-named*, have been informed of the need for a blood transfusion of the patient. The attending medical practitioner has explained to me the risk and benefits involved in the transfusion as well as answering all my inquiries satisfactorily.
I understand that despite testing and screening on the blood/blood components for HIV, Hepatitis B, Hepatitis C and Syphilis according to established standards, there are still risks of developing the disease. I also understand that unavoidable complications of transfusion may also occur.
I fully understood the above and hereby agree to the blood/ blood component transfusion.

…….. ……..
Signature of the patient/ parent/ guardian/ spouse/ next of kin*
Name of parent/ guardian/ spouse/ next of kin**:
Identity Card No. of the above:

……
Signature of Attending Medical Practitioner

I was present while the above matter was explained to the patient/ parent/ guardian/ spouse/ next of kin* whose signature appears above. In my opinion, the person referred to has understood the contents of this form and agreed to the transfusion willingly.

……..
Signature of witness
Name of witness:
Identity Card No.:
* delete appropriately
** if necessary

Appendix 14:

Suggested checklist for Retrieval Kits (depending on local settings)

Basic Retrieval Kit (For nurses)	Advance Retrieval Kit (For doctors)
For conducting delivery	
1. Delivery set x 1 2. Delivery pads x 1 3. Skin prep towel x 2 4. Cord scissors x 1 5. Episiotomy scissors x 1 6. Cord clamps x 6 7. Sanitary pad x 3 8. Vaginal pack x 3 9. KY jelly x 1 10. Chlorhexidine cream x 1 container	1. Delivery set x 1 2. Delivery pads x 1 3. Skin prep towel x 2 4. Cord scissors x 1 5. Episiotomy scissors x 1 6. Cord clamps x 6 7. Sanitary pad x 3 8. Vaginal pack x 3 9. KY jelly x 1 10. Chlorhexidine cream x 1 container
For conducting delivery	
1. Single pack needle holder x 1 2. 10cc Syringe x 2 3. Needle (blue and green) x 2 each 4. Lignocaine x 3 5. Absorbable suture 2/0 x 4 6. Perineal repair set x 1	1. Single pack needle holder x 1 2. 10cc Syringe x 2 3. Needle (blue and green) x 2 each 4. Lignocaine x 3 5. Absorbable suture x 4 6. Perineal repair set x 1
For baby	
1. Suction catheter for baby x 1 2. Baby towel x 2 pieces 3. Daptone and gel x 1 4. Plastic for TSH x 1 5. Extra batteries for daptone x 4 6. TSH tube x 4 7. G6PD form, TSH form 8. Baby tag, mother tag 9. Newborn checklist	1. Suction catheter for baby x 1 2. Baby towel x 2 pieces 3. Daptone and gel x 1 4. Plastic for TSH x 1 5. Extra batteries for daptone x 4 6. TSH tube x 4 7. G6PD form, TSH form 8. Baby tag, mother tag 9. Newborn checklist

Basic Retrieval Kit (For nurses)	Advance Retrieval Kit (For doctors)
For IV line related	
1. IV Cannula (16 gauge/18 gauge) x 4 each 2. Syringe 5/10/20cc x 4 each 3. Needles (blue and green) x 4 each 4. Water for injection x 5 5. Tegaderm x 5 6. Extension tubing x 2 7. Three-way connector x 2 8. Alcohol swabs x 10 9. Cotton ball swabs x 1 pack 10. Sterile gloves x 4 11. Non-sterile gloves x 4 pairs 12. Alcohol swabs x 10 13. Yellow stopper x 2 14. Blood tubes i. EDTA tube (purple) x 2 ii. Lithium heparin tube (green) x 2 iii. Plain tube (red) x 1 iv. Plain tube with gel (yellow) x 1	1. IV Cannula (14 gauge and 16 gauge) x 5 each 2. Syringe 5/10/20/50cc x 4 each 3. Needles (green and blue) x 4 each 4. Water for injection x 10 5. Tegaderm x 10 6. Extension tubing x 3 7. Three-way connector x 2 8. Alcohol swab x 10 9. Cotton ball swabs x 1 pack 10. Sterile gloves x 4 11. Non-sterile gloves x 4 pairs 12. Alcohol swabs x 10 13. Yellow stopper x 2 14. Blood tubes i. EDTA tube (purple) x 2 ii. Lithium heparin tube (green) x 2 iii. Plain tube (red) x 1 iv. Plain tube with gel (yellow) x 1 v. Blue tube x 1 vi. Grey tube x 1 15. Pressure infusion bag x 1 16. Gelafundin 500cc x 3
For CBD insertion	
1. Foley's catheter x 2 2. Syringe 10cc x 1 3. Urine bag x 1 4. Cathejell x 1 5. Disposable galipot with cotton swabs	1. Foley's catheter x 2 2. Syringe 10cc x 1 3. Urine bag x 1 4. Cathejell x 1 5. Disposable galipot with cotton swabs

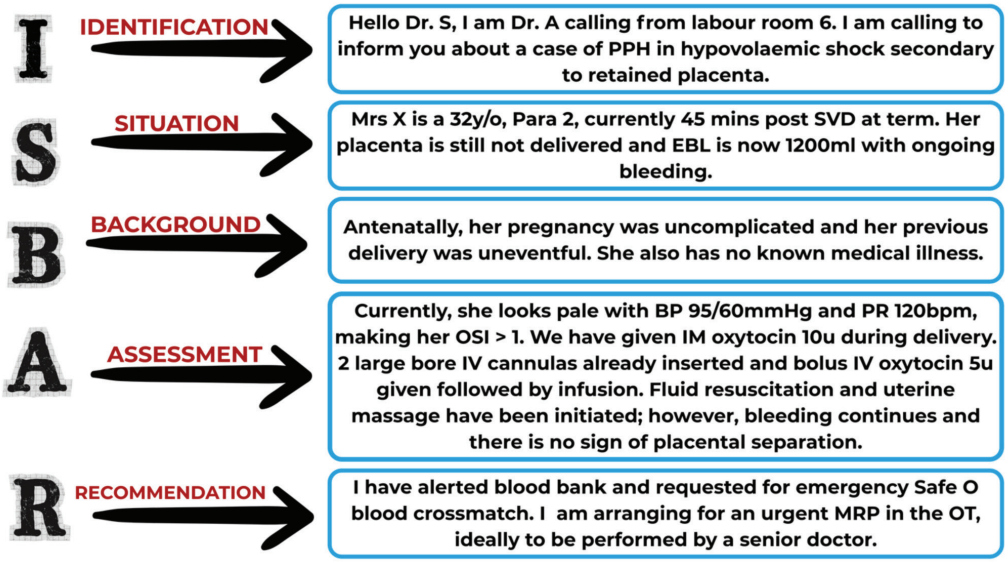
Basic Retrieval Kit (For nurses)	Advance Retrieval Kit (For doctors)
Medications	
1. Pitocin x 6 vials 2. Syntometrine x 2 vials 3. Carboprost x 3 vials 4. IV Tranexamic acid x 2 vials 5. IV Labetalol 25mg x 5 vials 6. IV Hydralazine 20mg x 2 vials 7. IV $MgSO_4$ x 5 vials 8. IV Calcium gluconate x 2 vials 9. T Nifedipine 10mg x 2 tabs 10. T Labetalol 100mg x 2 tabs 11. IV Dexamethasone x 2 vials 12. IV Dextrose 50 % x 2 vials	1. Pitocin x 6 vials 2. Syntometrine x 2 vials 3. Carboprost x 3 vials 4. IV Tranexamic acid x 2 vials 5. IV Labetalol 25mg x 5 vials 6. IV Hydralazine 20mg x 2 vials 7. IV $MgSO_4$ x 5 vials 8. IV Calcium gluconate x 2 vials 9. T Nifedipine 10mg x 2 tabs 10. T Labetalol 100mg x 2 tabs 11. IV Dexamethasone x 2 vials 12. IV Dextrose 50% x 2 vials 13. IV Noradrenaline x 2 vials 14. IV Adrenaline x 6 vials 15. IV Atropine x 3 vials
Miscellaneous	
1. Micropore x 1 2. Plastic bags x 4 3. Paper, Vital sign chart, PET chart, $MgSO_4$ chart 4. Laminated specialist phone numbers	1. Micropore x 1 2. Plastic bags x 4 3. Bakri balloon 4. Kiwi cup x 2 5. MRP long gloves 6. Paper, Vital sign chart, PET chart, $MgSO_4$ chart 7. Laminated specialist phone numbers 8. Laminated ACLS protocols
	For resuscitation: 1. Ambubag with oxygen reservoir for adult x 1 2. Ambubag with oxygen reservoir for baby x 1 3. Laryngoscope set (adult and baby) + Batteries x 1 4. Adult ETT size 6/6.5 x 2 each 5. Baby ETT size 2.5/3/3.5 x 2 each 6. Oxygen tubing x 2
	Sutures: 1. B-lynch suture x 2 2. PDS 3/0 x 2 3. Absorbable suture 1 x 4

*Source: SGH Labour Ward Manual, 2020

Appendix 15:

Communication Technique - ISBAR





Appendix 16:

Examples of Multiple Choice Question (MCQ)

Choose one best answer

1. A 32 year old woman of 39 weeks gestation attends the antenatal day unit feeling very unwell with sudden onset of epigastric pain associated with nausea and vomiting. Her temperature is 36.5° C. Examination: she is found to have right upper quadrant tenderness. Her blood results show mild anaemia, low platelets, elevated liver enzymes and haemolysis. What is the most likely diagnosis?

   A. Acute fatty liver of pregnancy
   B. Cholecystitis
   C. HELLP syndrome
   D. Acute hepatitis
   E. Abruptio placenta

2. A 27 year-old lady has an uncomplicated pregnancy so far. She came to the hospital 2 hours ago after her water broke. The midwife is looking at her now. She has regular contractions. Per vaginal examination revealed 2 cm dilated cervix. Vital signs are normal. What stage of labour is she in?

   A. Latent stage
   B. First stage
   C. Second stage
   D. Third stage
   E. False labour

3. A 19 year-old primigravida comes in emergency at 32 weeks gestation. She is complaining of blurring of vision, gross oedema. On examination, her blood pressure is 170/115 mmHg. What is the most likely diagnosis?

   A. Severe hypertension
   B. Renal disease
   C. Eclampsia
   D. Pre-eclampsia
   E. Acute heart failure

4. A 25 year-old Para 2 comes to the emergency, after home delivery with heavy bleeding per vagina. After evaluation and emergency resuscitation, she is diagnosed as a case of uterine atony. What is the appropriate medicine in the management of this case?

   A. Oxytocin
   B. Salbutamol
   C. Magnesium sulphate
   D. Hydralazine
   E. Beta blockers

5. An 18 year-old Para 1 presents in the outpatient department 10 days after delivery with tender hot painful swelling in right breast. She also complains of fever with rigors. What will be the most likely management?

   A. Analgesics
   B. Lactation inhibition
   C. Antibiotics
   D. Incision and drainage
   E. Regular expressed breast milk

6. The most common side effect of tocolytic agents is:

   A. Vaginal bleeding
   B. Abdominal pain
   C. Nausea, vomiting
   D. Oliguria
   E. Palpitation

7. Based on the sepsis bundle hour-1 protocol, which is incorrect?

   A. Measure serum lactate
   B. Obtain blood cultures
   C. Administer broad spectrum antibiotics
   D. Administer 30 ml/kg IV crystalloid
   E. Initiate dialysis for renal support

8. What statement is true about shoulder dystocia?

   A. Is a common complication.
   B. It is associated with maternal obesity.
   C. Turtle neck sign is not present.
   D. Rubin manoeuvre can be done to hyper-flex the arms.
   E. McRobert manoeuvre can solve about 90 % of all cases.

9. What is the core philosophy behind the WHO EMOTIVE bundle as compared to traditional PPH management?

   A. It encourages the sequential approach where you wait for one treatment to fail before starting the next.
   B. It prioritises surgical intervention over medical management.
   C. It advocates for a "bundle" approach where multiple interventions are performed simultaneously to save time.
   D. It focuses on only pharmacological intervention without physical manoeuvre.
   E. It is intended only for use in high-resource tertiary hospitals.

10. Cord prolapse - which of the following is true?

    A. Occurs when the cord is felt through intact membranes.
    B. Occurs in 1 in 5000 deliveries.
    C. Risk factors include preterm labour, breech presentation and twins.
    D. More than half occur at artificial amniotomy.
    E. It is a common cause of intrapartum stillbirth.

11. Uterine rupture and inversion - which of the following is true?

    A. Constant lower abdominal pain in labour is common and unlikely to be related to uterine rupture.
    B. Rupture of a LSCS scar has a lower perinatal and maternal mortality than primary ruptures or those from a classical caesarean.
    C. Rupture of a LSCS scar most commonly occurs before labour.
    D. Uterine inversion usually follows traction on the placenta and occurs in 1 in 20 000 deliveries.
    E. The uterus should be replaced as soon as possible.

12. In maternal collapse, the uterus will be displaced to which direction to alleviate aortocaval compression?

    A. Left
    B. Right
    C. Up
    D. Down
    E. Do not displace the uterus

13. A lady G2P1 at 38 weeks of gestation collapsed in the delivery suit. Her pulse is not palpable, as the first one who encounters the situation, what should you do?

    A. Call for help
    B. Prepare for caesarean section
    C. Start performing CPR while calling for help
    D. Put patient on oxygen
    E. Check the foetal heart rate

14. What is the normal range of obstetric shock index?

    A. 0.0 - 0.1
    B. 0.2 - 0.4
    C. 0.5 - 0.8
    D. 1.2 - 1.5
    E. 1.5 - 2.0

15. Which of the following findings indicates progression from sepsis to septic shock in a postpartum woman?

    A. Fever > 39 degree despite antibiotics
    B. Foul smelling discharge with abdominal pain
    C. Increasing C-reactive protein level
    D. Worsening leucocytosis (WBC > 30,000)
    E. Persistent hypotension despite IV fluids

16. A G2P1 woman at 34 weeks of gestation is admitted with chorioamnionitis and intrauterine infection. Despite broad-spectrum antibiotics and fluids, she develops worsening hypotension and foetal tachycardia (HR 190 bpm). What is the next best step?

    A. Continue antibiotics and monitor
    B. Perform an urgent Caesarean delivery
    C. Perform tepid sponging to bring down the temperature
    D. Administer corticosteroids and delay delivery
    E. Give iv vasopressors and wait for improvement

17. A 38 year old woman with a history of preeclampsia delivers vaginally. Soon after, she develops heavy bleeding. Her blood pressure is 160/100 mmHg. Which medication is contraindicated in this patient?

    A. Prostaglandin
    B. Oxytocin
    C. Misoprostol
    D. Syntometrine
    E. Carboprost

18. A 30 year old woman has persistent PPH despite oxytocin and uterine massage. A Bakri balloon is placed but fails to stop the bleeding. The specialist on call decides to perform a uterine-sparing procedure before considering hysterectomy. Which of the following is the most appropriate next step?

    A. B-Lynch suture
    B. Uterine artery embolization
    C. Hysterotomy
    D. Internal iliac artery ligation
    E. Pack the uterus with abdominal packing

19. During resuscitation, all of these must be applied, except:

    A. Leader should delegate appropriate tasks to correct team member
    B. The leader must be the consultant on call
    C. Everyone should be aware of protocols & guidelines
    D. Closed loop communication is essential

20. Debriefing post adverse events, which of the following is correct?

    A. Create conducive safe environment to encourage honest reflections
    B. Focus on the weakness that lead to the adverse event
    C. Should be arrange after few weeks of event to let the situation cool-off
    D. To determine the person at fault so that action can be taken to make sure the adverse event will not happen again in the future
    E. Find out the pitfall and ask for an explanation letter



Ministry of Health Malaysia

Medical Development Division, Ministry of Health Malaysia
Level 4, Block E1, Complex E, Precinct 1
Federal Government Administrative Centre
62590, Putrajaya, Malaysia
Tel: 603 8883 1229

www.moh.gov.my

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