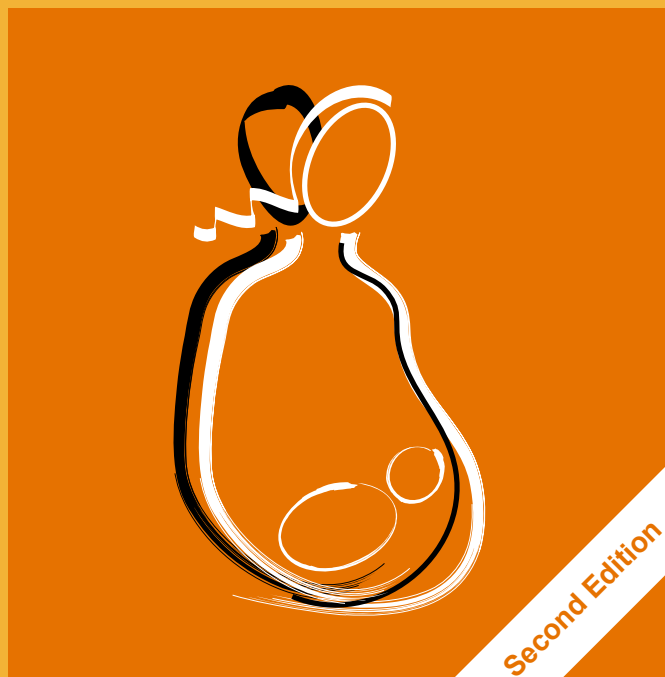


Managing Complications in Pregnancy and Childbirth:

A guide for midwives and doctors



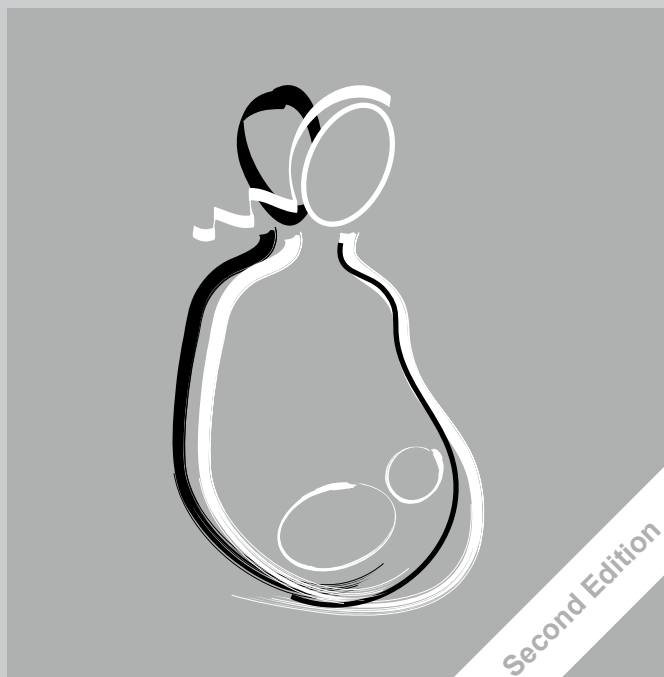
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Managing Complications in Pregnancy and Childbirth:

A guide for midwives and doctors



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Managing complications in pregnancy and childbirth: a guide for midwives and doctors – 2nd ed.

ISBN 978-92-4-156549-3

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Suggested citation. Managing complications in pregnancy and childbirth: a guide for midwives and doctors – 2nd ed. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at <http://apps.who.int/iris>.

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Printed in Malta

ACKNOWLEDGEMENTS

Managing Complications in Pregnancy and Childbirth represents a common understanding between WHO, UNFPA, and UNICEF of key elements of an approach to reducing maternal and perinatal mortality and morbidity. These agencies co-operate closely in efforts to reduce maternal and perinatal mortality and morbidity. The principles and policies of each agency are governed by the relevant decisions of each agency's governing body and each agency implements the interventions described in this document in accordance with these principles and policies and within the scope of its mandate.

Both editions of the guide have been reviewed and endorsed by the International Confederation of Midwives and the International Federation of Gynecology and Obstetrics.

WHO gratefully acknowledges the technical and editorial assistance provided by the USAID-funded Maternal and Child Survival Program (MCSP) and Jhpiego for the second edition of this guide. This edition is made possible by Jhpiego and the generous support of the American people through the United States Agency for International Development (USAID) under the terms of the Cooperative Agreement AID-OAA-A-14-00028.

Financial support for the first edition was provided by USAID's Bureau for Global Health through the Nutrition and Maternal Health Division, Office of Health and Nutrition, under the terms of Award No. HRN-A-00-98-00043-00, and through the Service Delivery Improvement Division, Office of Population and Reproductive Health, under the terms of Award No. HRN-A-00-98-00041-00. Financial support towards the preparation and production of the first edition of this manual was provided by the Governments of Australia, the Netherlands, Sweden, the United Kingdom of Great Britain and Northern Ireland, and the United States of America. Technical and editorial assistance was provided by staff of Jhpiego's Maternal and Neonatal Health Program and Training in Reproductive Health Project.

Image sources

Figure S-6. Intrauterine balloon tamponade: Chin, E. 2016. Uterine Balloon Tamponade to Treat Postpartum Hemorrhage. Jhpiego: Baltimore, MD.

Box S-3. Non-pneumatic anti-shock garment: Pathfinder International, Wall Chart: Applying the Non-pneumatic Anti Shock Garment (NASG), part of the *Clinical and Community Action to Address Postpartum Hemorrhage Toolkit*, 2010; and Pathfinder International, Wall Chart: Removing the Non-pneumatic Anti Shock Garment (NASG), part of the *Clinical and Community Action to Address Postpartum Hemorrhage Toolkit*, 2010.

Figure P-8. Locating the flexion point (F): A. Vacca, the flexion point (F). vaccaresearch.com. © 2015 Vacca Research Pty Ltd. Reprinted by permission of Vacca Research Pty Ltd.

Figure P-9. Locating the flexion point (F), 3 cm anterior to the posterior fontanelle, and calculating cup insertion distance: A. Vacca, direct occipito-anterior position and low OT, no asynclitism—digital distance 6–7 cm. vaccaresearch.com. © 2015 Vacca Research Pty Ltd. Reprinted by permission of Vacca Research Pty Ltd.

Figure P-10. Applying the cup: A. Vacca, (A) holding the cup, retracting the perineum; (B) inserting the cup through introitus; and (C) attaching the cup over the flexion point. vaccaresearch.com. © 2015 Vacca Research Pty Ltd. Reprinted by permission of Vacca Research Pty Ltd.

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The special contribution of George Povey, whose original work inspired the idea for this manual, is gratefully acknowledged.

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PREFACE TO THE SECOND EDITION

Since the first edition was published in 2000, *Managing Complications in Pregnancy and Childbirth* has been translated into several languages and today is used widely in training for and the provision of emergency obstetric care. The new edition brings the guidance in the manual into line with WHO's current recommendations for emergency obstetric and newborn care.

The updating process for the second edition involved WHO's Departments of Maternal, Newborn, Child and Adolescent Health and Reproductive Health and Research as well as MCSP, USAID's flagship maternal, newborn and child health program, led by Jhpiego. A core review group (see Acknowledgements) conducted a user survey to solicit feedback on use of the manual and suggestions to guide the revision. The core group then updated the following chapters with the current WHO recommendations:

- **Section 1: Clinical Principles:** Emotional and psychological support, Emergencies, General care principles, Antibiotic therapy, Operative care principles, Normal labour and childbirth, and Newborn care principles
- **Section 2: Symptoms:** Vaginal bleeding in early pregnancy; Vaginal bleeding after childbirth; Elevated blood pressure, headache, blurred vision, convulsions or loss of consciousness; Fever during pregnancy and labour; Fever after childbirth; Difficulty in breathing; Prelabour rupture of membranes; and Immediate newborn conditions or problems
- **Section 3: Procedures:** Induction and augmentation of labour, Manual removal of placenta, and Repair of vaginal and perineal tears

The updated chapters were reviewed at the first core group meeting in Washington, DC, in August 2015. The revised chapters were sent to an external panel of expert reviewers (see Acknowledgements). The external experts were selected on the basis of their clinical experience in emergency obstetric care in low- and middle-income countries. None of the external reviewers reported any conflict of interest.

The core group met again in Geneva in January 2016 to review comments from the external reviewers and to finalize the chapters. The finalized chapters were then sent to the WHO's Guidelines Review Committee for approval.

Minor revisions, including clarification of wording and corrections (e.g. grammatical and typographical), have been made throughout the manual. Some new figures were added to the manual and some figures have been slightly modified to make their meaning more clear.

It was beyond the scope of the second edition to address obstetric ultrasound. However, readers are referred to two recent WHO sources on obstetric ultrasound: Chapter 2 in the *Manual of Diagnostic Ultrasound*, Second Edition (WHO, 2013) and *WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience* (WHO, 2016). The latter recommends one routine ultrasound scan before 24 weeks of gestation.

PREFACE TO THE FIRST EDITION

In support of the Safe Motherhood Initiative, the WHO Making Pregnancy Safer Strategy focuses on the Health Sector's contribution to reducing maternal and newborn deaths.

The Integrated Management of Pregnancy and Childbirth (IMPAC) is the technical component of the aforementioned strategy and mainly addresses the following:

- Improving the skills of health workers through locally adapted guidelines and standards for the management of pregnancy and childbirth at different levels of the health care system;
- Interventions to improve the health care system's response to the needs of pregnant women and their newborns, and to improve the district level management of health services, including the provision of adequate staffing, logistics, supplies and equipment;
- Health education and promotion of activities that improve family and community attitudes and practices in relation to pregnancy and childbirth.

This manual, and a similar one on the management of preterm and sick newborns, is written for midwives and doctors working in district hospitals. This manual complements and is consistent with the Essential Care Practice Guide for Pregnancy and Childbirth which is prepared mainly for the primary health care level. Together these manuals will provide guidance for health workers who are responsible for the care of pregnant women and newborns at all levels of care.

The interventions described in these manuals are based on the latest available scientific evidence. Given that evidence-based medicine is the standard on which to base clinical practice, it is planned to update the manual as new information is acquired.

It is hoped that this manual will be used at the side of the patient, and be readily available whenever a midwife or doctor is confronted with an obstetric emergency.

While most pregnancies and births are uneventful, all pregnancies are at risk. Around 15% of all pregnant women will develop a potentially life-threatening complication that calls for skilled care, and some will require a major obstetrical intervention to survive. This manual is written for midwives and doctors at the district hospital who are responsible for the care of women with complications of pregnancy, childbirth or the immediate postpartum period, including immediate problems of the newborn.

In addition to providing care to women in facilities, midwives and doctors have a unique role and relationship with:

- the community of health care providers within the district health system, including auxiliary and multipurpose health workers;
- family members of patients;
- community leaders;
- populations with special needs (e.g. adolescents, women with HIV/AIDS).

Midwives and doctors:

- support activities for the improvement of all district health services;
- strive for efficient and reliable referral systems;
- monitor the quality of health care services;
- advocate for community participation in health-related matters.

A district hospital is defined as a facility that is capable of providing quality services, including caesarean birth and blood transfusion. Although many of the procedures in this manual require specialized equipment and the expertise of specially trained providers, it should be noted that many of the life-saving procedures described can also be performed at health centres.

A woman presenting with a life-threatening obstetric complication is in an emergency situation requiring immediate diagnosis and management. Therefore, the main text of this manual is arranged by **symptom** (e.g. vaginal bleeding in early pregnancy). Because this symptom-based approach is different than most medical texts, which are arranged by disease, an indexed list of diagnoses is provided.

The emphasis of the manual is on rapid assessment and decision making. The clinical action steps are based on clinical assessment, with limited reliance on laboratory or other tests that would be unavailable in many field situations, and most are possible in a variety of clinical settings (e.g. district hospital or health centre).

Section 1 outlines the **clinical principles** of managing complications in pregnancy and childbirth. It begins with a table that the health care worker can use to rapidly assess the woman's condition and initiate appropriate treatment. This section includes the general principles of emergency, general and operative care, including infection prevention, the use of blood and replacement fluids, antibiotics and anaesthesia and analgesia. In order to provide health care workers with the information needed to differentiate between normal processes and a complication, the section also includes a description of normal labour and childbirth, including use of the partograph and active management of the third stage. Guidance on the initial care of the normal newborn is also provided. Finally, this section also outlines the linkage between providers and their community and how to provide emotional support to the woman and her family.

Section 2 describes the **symptoms** by which women with complications of pregnancy and childbirth present. The symptoms reflect the major causes of mortality and morbidity. For each symptom there is a statement of general, initial management. Where relevant, diagnosis tables lead to identifying the diagnosis which is causing the symptom. Simplified management protocols for these specific diagnoses then follow. Where there are several choices of therapy, the most effective and inexpensive is chosen. Also in this section is information on management for immediate (within the first 24 hours) conditions or problems of the newborn.

Section 3 describes the **procedures** that may be necessary in the management of complications of pregnancy and childbirth. These procedures are not intended to be detailed “how-to” instructions but rather a summary of the main steps associated with each procedure. Because general operative care principles are summarized in Section 1, these are not repeated for each procedure, unless there is care required that is specific to the procedure (e.g. post-procedure care for ketamine anaesthesia). Clear guidance is provided on drugs and dosages, a wide variety of anaesthesia

options (e.g. safe caesarean under local anaesthesia) and safe, effective and lower-cost techniques (e.g. single layer closure of the uterus).

A list of **essential drugs** is included as an appendix to the manual. Finally, the manual's **index** is organized so that it can be used in an emergency situation to find relevant material quickly. The most critical information, including diagnosis, management and steps for a procedure, is listed first in bold. Other relevant entries follow in alphabetical order. Only the pages containing critical or relevant information are included, rather than every page that contains a word or phrase.

ABBREVIATIONS

ACT	artemisinin-based combination therapy
AIDS	acquired immunodeficiency syndrome
BP	blood pressure
BCG	bacillus Calmette-Guérin
CPAP	continuous positive airway pressure
D and E	dilatation and evacuation
HELLP	haemolysis, elevated liver enzymes and low platelets
HIV	human immunodeficiency virus
IM	intramuscular
IPTp	intermittent preventive treatment in pregnancy
IUD	intrauterine device
IV	intravenous
NASG	non-pneumatic anti-shock garment
PPH	postpartum haemorrhage
PPROM	preterm prelabour rupture of membranes
PROM	prelabour rupture of membranes
dL	decilitre
g	gram
kg	kilogram
L	litre
mcg	microgram
mg	milligram
mIU	milli-international units
mL	millilitre

LIST OF DIAGNOSES

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Maternal/Fetal

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Wound abscess, wound seroma or wound haematoma	S-135		
Wound cellulitis	S-135		

SECTION 1
CLINICAL PRINCIPLES

The survival of a woman experiencing an obstetric emergency is determined by the amount of time it takes for care to be delivered and by the level and quality of care provided. When a woman of childbearing age presents with a problem, rapidly assess her condition to determine the extent of her illness.

TABLE C-1. Rapid initial assessment^a

Assess	Danger Signs	Consider
Airway and breathing	<p>LOOK FOR:</p> <ul style="list-style-type: none"> • cyanosis (blueness) • respiratory distress <p>EXAMINE:</p> <ul style="list-style-type: none"> • skin: pallor • lungs: wheezing or rales 	<ul style="list-style-type: none"> • severe anaemia • heart failure • pneumonia • asthma <p>See Difficulty in breathing, page S-149</p>
Circulation (signs of shock)	<p>EXAMINE:</p> <ul style="list-style-type: none"> • skin: cool and clammy • pulse: fast (110 or more) and weak • blood pressure: low (systolic less than 90 mmHg) 	Shock, page S-1
Vaginal bleeding (early or late pregnancy or after childbirth)	<p>ASK IF:</p> <ul style="list-style-type: none"> • pregnant, length of gestation • recently given birth • placenta delivered <p>EXAMINE:</p> <ul style="list-style-type: none"> • vulva: amount of bleeding, placenta retained, obvious tears • uterus: atony • bladder: full <p>Do not do a vaginal exam at this stage.</p>	<ul style="list-style-type: none"> • abortion • ectopic pregnancy • molar pregnancy <p>See Vaginal bleeding in early pregnancy, page S-7</p> <ul style="list-style-type: none"> • abruptio placentae • ruptured uterus • placenta praevia <p>See Vaginal bleeding in later pregnancy and labour, page S-21</p> <ul style="list-style-type: none"> • atonic uterus • tears of cervix and vagina • retained placenta • inverted uterus <p>See Vaginal bleeding after childbirth, page S-29</p>

Assess	Danger Signs	Consider
Unconscious or convulsing	ASK IF: <ul style="list-style-type: none"> • pregnant, length of gestation EXAMINE: <ul style="list-style-type: none"> • blood pressure: high (diastolic 90 mmHg or more) • temperature: 38°C or more 	<ul style="list-style-type: none"> • eclampsia • malaria • epilepsy • tetanus See Elevated blood pressure, heading, blurred vision, convulsions or loss of consciousness, page S-49
Dangerous fever	ASK IF: <ul style="list-style-type: none"> • weak, lethargic • frequent, painful urination EXAMINE: <ul style="list-style-type: none"> • temperature: 38°C or more • unconscious • neck: stiffness • lungs: shallow breathing, consolidation • abdomen: severe tenderness • vulva: purulent discharge • breasts: tender 	<ul style="list-style-type: none"> • urinary tract infection • malaria See Fever during pregnancy and labour, page S-113 <ul style="list-style-type: none"> • endometritis • pelvic abscess • peritonitis • breast infection See Fever after childbirth, page S-127 <ul style="list-style-type: none"> • complications of abortion See Vaginal bleeding in early pregnancy, page S-7 <ul style="list-style-type: none"> • pneumonia See Difficulty in breathing, page S-149
Abdominal pain	ASK IF: <ul style="list-style-type: none"> • pregnant, length of gestation EXAMINE: <ul style="list-style-type: none"> • blood pressure: low (systolic less than 90 mmHg) • pulse: fast (110 or more) • temperature: 38°C or more • uterus: state of pregnancy 	<ul style="list-style-type: none"> • ovarian cyst • appendicitis • ectopic pregnancy See Abdominal pain in early pregnancy, page S-137 <ul style="list-style-type: none"> • possible term or preterm labour • amnionitis • abruptio placentae • ruptured uterus See Abdominal pain in later pregnancy and after childbirth, page S-141

^a This list does not include all of the problems a woman might face in pregnancy or the puerperal period. It identifies those problems that put the woman at greatest risk of maternal morbidity and mortality.

The woman also needs **prompt attention** if she has any of the following signs:

- blood-stained mucus discharge (show) with palpable contractions
- ruptured membranes
- pallor
- weakness
- fainting
- severe headaches
- blurred vision
- vomiting
- fever
- respiratory distress.

Send the woman to the front of the queue and treat promptly.

IMPLEMENTING A RAPID INITIAL ASSESSMENT SCHEME

Delayed activation of a rapid response to an obstetric emergency is associated with an increased risk of death. Rapid initiation of treatment requires immediate recognition of the specific problem and quick action. This can be done by:

- clearly identifying women presenting for care who warrant prompt or immediate attention from a health worker, including those waiting for routine consultations who should pass to the front of the queue;
- having norms and protocols (and knowing how to use them) to outline how to recognize a genuine emergency and react immediately, including the roles and responsibilities of all members of staff in the facility;
- training all staff—including clerks, guards, door keepers and switchboard operators—to react in an agreed upon fashion (e.g. “sound the alarm,” call for help) when a woman arrives at the facility with an obstetric emergency or pregnancy complication or when the facility is notified that a woman is being referred;

- ensuring that an emergency trolley with equipment, medications and supplies is accessible (keys are available) and ready to use at all times (see **page C-21**), that equipment is in working order (daily checks) and that staff are properly trained to use it;
- conducting clinical or emergency drills with staff to ensure their readiness at all levels;
- debriefing team members after an event in an effort to evaluate and improve their response; and
- agreeing on schemes by which women with emergencies can be exempted from payment, at least temporarily (e.g. local insurance schemes, health committee emergency funds).

Pregnancy is typically a time of joy and anticipation. It can also be a time of anxiety and concern. Listening and talking respectfully and sensitively with a woman and her family can help build the woman's trust and confidence in her health care providers.

Women who develop complications may have difficulty talking to the provider and explaining their problem. It is the responsibility of the entire health care team to speak with the woman respectfully and put her at ease. Focusing on the woman means that the health care provider and staff:

- respect the woman's dignity and right to privacy;
- respect the woman's right to information and informed consent;
- respect the woman's right to decline any treatment or procedures offered;
- respect the woman's choices and preferences, including companionship during maternity care, procedures and treatment;
- protect a woman's privacy rights and protections with respect to her health information, including how her health information is used and to whom her information is disclosed by health care providers;
- are sensitive and responsive to the woman's needs;
- are nonjudgmental about the decisions that the woman and her family make regarding the woman's care.

It is understandable to disagree with a woman's risky behaviour or a decision that has resulted in a delay in seeking care. It is not acceptable, however, to show disrespect for a woman or disregard for a medical condition that you believe is a result of her behaviour. Provide respectful corrective counselling after the complication has been dealt with, not before or during management of the problem.

RIGHTS OF WOMEN

Providers should be aware of the rights of women when receiving maternity care services:

- Every woman receiving care has the right to information about her health.
- Every woman has the right to discuss her concerns in an environment in which she feels confident.
- A woman should know in advance the type of procedure that is going to be performed.

- A woman (or her family, if necessary) should give informed consent before the provider performs any procedure.
- A woman (or her family, if necessary) has the right to decline any treatment or procedure offered.
- Procedures should be conducted in an environment (e.g. labour ward) in which the woman's right to privacy is respected.
- A woman has the right to determine how her health information is used and to whom her information is disclosed by health care providers.
- A woman should be made to feel as comfortable as possible when receiving care.
- A woman has the right to express her views about the services she receives.

When a provider talks to a woman about her pregnancy or a complication, s/he should use basic communication techniques. These techniques help the provider establish an honest, caring and trusting relationship with the woman. If a woman trusts her provider and feels that the provider has her best interests at heart, she will be more likely to return to the facility for childbirth or come early if there is a complication.

COMMUNICATION TECHNIQUES

Speak in a calm, quiet manner and assure the woman that the conversation is confidential. Be sensitive to any cultural or religious considerations and respect her views. In addition:

- Ask the woman whom she would like present. Facilitate the presence of only those she chooses to be present.
- Encourage the woman and her family to speak honestly and completely about events surrounding the complication.
- Listen to what the woman and her family have to say and encourage them to express their concerns; try not to interrupt.
- Respect the woman's sense of privacy and modesty by closing the door or drawing curtains around the examination table.
- Let the woman know that she is being listened to and understood.
- Use supportive nonverbal communication such as nodding and smiling.

- Answer the woman's questions directly and in a calm, reassuring manner.
- Explain what steps will be taken to manage the situation or complication.
- Ask the woman to repeat back to you the key points to ensure her understanding.

If a **woman must undergo a surgical procedure**, explain to her the nature of the procedure and its risks and help to reduce her anxiety. Women who are extremely anxious have a more difficult time during surgery and recovery.

For more information on providing emotional support during an emergency, see **page C-9**.

EMOTIONAL AND PSYCHOLOGICAL SUPPORT IN OBSTETRIC AND NEWBORN EMERGENCIES

C-9

In every country and community in the world, pregnancy and childbirth are momentous events in the lives of women and families, and represent a time of intense vulnerability (White Ribbon Alliance, *Respectful Maternity Care: The Universal Rights of Childbearing Women*, 2012). The concept of safe motherhood is usually restricted to physical safety, but childbearing is also an important rite of passage, which may have deep personal and cultural significance for a woman and her family. The notion of safe motherhood must be expanded beyond the prevention of morbidity and mortality to encompass respect for women's basic human rights, including women's autonomy, dignity, feelings, and choices and preferences, including the choice of companionship, wherever possible.

GENERAL PRINCIPLES OF COMMUNICATION AND SUPPORT

Emergency situations are disturbing for all concerned, and they evoke a range of emotions that can have significant consequences. Because each emergency is unique, this chapter offers general guidance for responding to emotional and psychosocial needs in emergencies. Honest communication and genuine empathy are probably the most important keys to effective care in such situations. In addition, health care staff must try to understand and acknowledge the specific needs and cultural practices of individual women and their families, including the potentially differing needs of individual family members.

In general, women need opportunities to talk about their pregnancy and birth experience(s) and to be reassured that they will be well cared for during pregnancy, childbirth and the postpartum period. Good communication encompasses the following: an explanation of events; an explanation of findings and exploration of courses of action that will assist the woman in making informed decisions; an opportunity to discuss feelings such as loss, fear, anger and self-blame; social support; and a discussion of possible future childbearing.

EMOTIONAL AND PSYCHOLOGICAL REACTIONS

Multiple factors may influence women's psychological status before, during and after pregnancy. A woman's psychological status in turn influences her ability to care for herself and her baby and to follow health care recommendations. Therefore, to achieve optimal outcomes, it is as

important to provide emotional and psychological support as it is to provide medical care.

Common reactions to an obstetric/newborn emergency or death include:

- denial (feelings that “it can’t be true”);
- guilt regarding possible responsibility;
- anger (frequently directed toward health care staff but often masking anger that parents direct at themselves for “failure”);
- blame, fear, anxiety, sorrow, grief and a sense of failure;
- bargaining (particularly if the woman/baby hovers for a while between life and death);
- depression and loss of self-esteem, which may be long-lasting;
- isolation (feelings of being different or separate from others), which may be reinforced by caregivers who might avoid people who experience loss; and disorientation.

How each member of the family reacts to an emergency situation depends on:

- the woman’s support systems, including her relationship with her partner and the presence of family or supportive individuals;
- the social situation of the woman/couple and their cultural and religious practices, beliefs and expectations;
- the woman’s previous pregnancy outcomes, chronic medical problems and history of psychiatric problems, sexual and domestic abuse, or substance abuse;
- the personalities of the people involved and the quality and nature of social, practical and emotional support; and
- the nature, gravity and prognosis of the problem and the availability and quality of health care services.

Awareness and recognition of these factors can help maternal health care providers better support women and their families. Failure to recognize risk factors and/or psychological distress in pregnant and postpartum women can have devastating and tragic consequences for the woman and her child(ren) and family.

AT THE TIME OF THE EVENT

- Ensure the confidentiality and security of protected health information by disclosing information only to people authorized by the woman/parents.
- Both during and after the event, provide as much privacy as possible to the woman and her family.
- Assign a person to communicate with the woman/family while emergency care is being provided. Do not pass this responsibility on to junior staff.
- At the onset of the event, it is helpful to advise the woman and her family that:
 - in order to address the emergency, the providers need to quickly assess and treat the complication;
 - the providers will provide pertinent information while they are providing care;
 - after the emergency, the providers will be able to speak in more detail.
- Listen to those who are distressed. The woman/family will need to express their hurt and sorrow.
- Do not change the subject and move on to easier or less painful topics of conversation. Show empathy.
- Tell the woman/family as much as you can about what is happening. Often a simple explanation and understanding the situation and knowing what to expect can reduce their anxiety and prepare them for what happens next.
- Be honest. Do not hesitate to admit what you do not know. Maintaining trust matters more than appearing knowledgeable.
- If language is a barrier to communication, find a translator.

AFTER THE EVENT

- Give practical assistance, information and emotional support.
- Respect traditional beliefs and customs and accommodate the family's needs as much as possible.
- Offer counselling for the woman/family and allow for reflection on the event.

- Explain the problem to help reduce anxiety and guilt. Many women/families blame themselves for what has happened.
- Listen and express understanding and acceptance of the woman's feelings. Nonverbal communication may speak louder than words: A squeeze of the hand or a look of concern can say an enormous amount.
- Repeat information several times and give written information, if possible. People experiencing an emergency will not remember much of what is said to them.
- Remember to care for staff who themselves may experience guilt, grief, confusion and other emotions. Provide supportive services for health care providers as a way to relieve anxiety and distress. Health care providers may feel anger, guilt, sorrow, pain and frustration in the face of obstetric emergencies, which might lead them to avoid the woman/family. Showing emotion is not a weakness.

MATERNAL MORTALITY AND MORBIDITY

MATERNAL MORTALITY

The death of a woman in childbirth or from pregnancy-related events is a devastating experience for the woman's family, her partner and her surviving children. It is also devastating for all involved in her care. In addition to the principles listed above, remember the following:

AT THE TIME OF THE EVENT

- Provide psychological care as long as the woman is awake or even vaguely aware of what is or might be happening to her.
- If death is inevitable, provide emotional and spiritual comfort rather than focusing on the emergency (now futile) medical care.
- Provide dignity and respectful treatment at all times, even if the woman is unconscious or has already died.

AFTER THE EVENT

- Allow the woman's partner or family to be with her.
- Facilitate the family's arrangements for the funeral, if possible, and see that they have all the necessary documents.
- Explain what happened and answer any questions. Offer the opportunity for the family to return to ask additional questions.

Any maternal death in a health facility should be identified and communicated to the appropriate authorities within 24 hours and should trigger a review of the woman's medical record to determine the probable cause of death.

SEVERE MATERNAL MORBIDITY

Childbirth sometimes leaves a woman with severe physical or psychological damage.

AT THE TIME OF THE EVENT

- Include support people of the woman's choosing in the proceedings, if possible.
- Ensure that a staff member cares for the emotional and informational needs of the woman and her partner/support person.

AFTER THE EVENT

- Clearly explain the condition and its treatment so that it is understood by the woman and her companions.
- Arrange for treatment and/or referral, when indicated.
- Schedule a follow-up visit to check on progress and discuss available options.
- Provide supportive services for health care providers as a way to relieve anxiety and distress.

NEONATAL MORTALITY AND MORBIDITY

While general principles of emotional support for women experiencing obstetrical emergencies apply, when a baby dies or is born with an abnormality some specific factors should be considered. These include:

- appreciating the severity of the loss;
- offering understanding and support; and
- supporting the mother, father and/or family as they identify and express their feelings.

The grieving process may manifest in many different ways; there is no right way to grieve. No two people grieve or express their grief in the same way or for the same time period.

INTRAUTERINE DEATH, PRE-VIABLE BIRTH OR STILLBIRTH

Many factors influence a woman's reaction to the death of her baby. These include those mentioned above as well as:

- the woman's social support;
- the woman's previous obstetric and life history;
- the extent to which the baby was wanted;
- the events surrounding the birth and the cause of the loss, including whether or not the loss was expected or unexpected;
- previous experiences with the death or loss of a child.

AT THE TIME OF THE EVENT

- Avoid using sedation to help the woman cope. Sedation may delay acceptance of the death and may make reliving the experience later—part of the process of emotional healing—more difficult.
- Allow the parents to see the efforts made by the caregivers to revive their baby.
- Encourage the woman/couple to see and hold the baby to facilitate grieving.
- Prepare the parents for the possibly disturbing or unexpected appearance of the baby (red, wrinkled, peeling skin). If necessary, wrap the baby so that he or she looks as normal as possible at first glance.
- Avoid separating the woman and baby too soon (before the woman indicates that she is ready), as this can interfere with and delay the grieving process.

AFTER THE EVENT

- Allow the woman/family to continue to spend time with the baby. Parents of a stillborn still need to get to know their baby.

- People grieve in different ways, but for many, remembrance is important. Offer the woman/family small mementos such as a lock of hair, a cot label or a name tag.
- Where it is the custom to name babies at birth, encourage the woman/family to call the baby by the name they have chosen.
- Provide space and time for the woman and her partner to hold their baby, take pictures and talk about the baby's death.
- Where possible, room women who have suffered the loss of their baby separately from women who have given birth to healthy infants.
- Ensure access to supportive professional individuals and groups.
- Allow the woman/family to prepare the baby for the funeral if they wish.
- Encourage locally accepted burial practices and ensure that medical procedures (such as autopsies) do not preclude them.
- Where relevant, arrange a discussion with the woman and her partner to sensitively discuss the event and possible preventive measures for the future, without blaming the woman/family.
- Provide supportive services for health care providers as a way to relieve anxiety and distress.

DESTRUCTIVE OPERATIONS

Craniotomy or other destructive operations on a dead fetus may be distressing and call for additional psychosocial care.

AT THE TIME OF THE EVENT

- It is crucial that you explain to the mother and her family that the baby is dead and that the priority is to save the mother.
- Encourage the partner to provide support and comfort for the woman until she is anaesthetized or sedated.
- If the woman is awake or partially awake during the procedure, protect her from visual exposure to the procedure and to the baby.
- After the intervention, make arrangements for the baby to be seen and/or held by the woman/family if they wish, especially if the family is going to take care of the burial.

AFTER THE EVENT

- Allow unlimited visiting time for the woman's companion.
- Counsel the mother and her companion and reassure them that an alternative was not available.
- Where possible, room women who have suffered the loss of their baby separately from women who have given birth to healthy infants.
- Ensure access to supportive professional individuals and groups.
- Allow the woman/family to prepare the baby for the funeral if they wish.
- Encourage locally accepted burial practices and ensure that medical procedures (such as autopsies) do not preclude them.
- Where relevant, arrange a discussion with the woman and her partner to discuss the event, and sensitively discuss possible preventive measures for the future, without blaming the woman/family.
- Provide supportive services for health care providers as a way to relieve anxiety and distress.
- Arrange a follow-up visit several weeks after the event to answer any questions and to prepare the woman for subsequent pregnancy (or the inability/inadvisability of another pregnancy).
- Family planning should be provided, if appropriate (**Table S-6, page S-15**).

BIRTH OF A BABY WITH AN ABNORMALITY

The birth of a baby with a serious malformation may be a devastating experience for the parents and family. Reactions vary.

- Allow the woman to see and hold the baby. Some women accept their baby immediately, while others take longer.
- Disbelief, denial and sadness are normal reactions, especially if the abnormality is unpredicted. Feelings of unfairness, despair, depression, anxiety, anger, failure and apprehension are common.

AT THE TIME OF THE EVENT

- Give the baby to the parents after birth. It may be less traumatic for the parents if they can see the problem immediately.

- In cases of severe deformity, wrap the baby before giving her/him to the mother to hold so that she can see the normality of the baby first. Do not force the mother to examine the abnormality.
- Provide a bed or cot in the room so the companion can stay with the woman if she chooses.

AFTER THE EVENT

- Discuss the baby and the problem with the woman and her family together, if possible.
- Ensure that the woman and her partner have free access to their baby. Keep the baby with the mother at all times. The more the woman and her partner can do for the baby themselves, the more quickly they will accept the baby.
- Where relevant (e.g. abnormalities associated with drug use, alcohol consumption or smoking during pregnancy; advanced maternal age; untreated viral or bacterial infections), arrange a discussion with both the woman and her partner about possible preventive measures for the future, without blaming the woman/family.
- Ensure access to supportive professional individuals and groups.
- Provide supportive services for health care providers as a way to relieve anxiety and distress.

PSYCHOLOGICAL MORBIDITY

Postpartum emotional distress is fairly common after pregnancy and ranges from mild postpartum blues (affecting about 80% of women) to postpartum depression or psychosis. Postpartum psychosis can pose a threat to the life of the woman and the baby.

“Postpartum blues” refers to mild depressive symptoms (i.e. sadness, tearfulness, irritability and anxiety), insomnia and decreased concentration. The symptoms of postpartum blues develop within two to three days of giving birth and typically peak over the next few days and resolve within two weeks. Women with postpartum blues are at increased risk of developing postpartum minor depression or major depression.

POSTPARTUM DEPRESSION

Postpartum depression affects up to 34% of women. It typically occurs in the early postpartum weeks or months and may persist for a year or more. Depression is not necessarily one of the leading symptoms, although it is usually evident. Other symptoms include exhaustion, irritability, weepiness, low energy and motivational levels, feelings of helplessness and hopelessness, loss of libido, and appetite and sleep disturbances. Headache, asthma, backache, vaginal discharge and abdominal pain may be reported. Symptoms might also include obsessional thinking, fear of harming the baby or self, suicidal thoughts, and depersonalization.

The prognosis for postpartum depression is good with early diagnosis and treatment. More than two thirds of women recover within a year. Facilitating the presence of a companion of choice during pregnancy, labour, childbirth and the postpartum period may help prevent postpartum depression.

Women should routinely be screened for depression during postpartum visits:

- At each postnatal contact, women should be asked about their emotional well-being, what family and social support they have, and their usual coping strategies for dealing with day-to-day matters. All women and their families/partners should be encouraged to tell their health care professional about any changes in mood, emotional state or behaviour that are outside the woman's normal pattern.
- At 10–14 days after birth, all women should be asked about resolution of mild, transitory postpartum depression (“maternal blues”/“baby blues”). **If symptoms have not resolved**, the woman's psychological well-being should continue to be assessed for postnatal depression and, if symptoms persist, further evaluated.

Women who screen positive for postnatal depression should be linked to ongoing care, including further diagnostic evaluation and ongoing treatment as indicated. In addition, surveillance for maternal depression can be performed at pediatric visits in the first 12 months postpartum.

Risk factors for postpartum depression include:

- Previous postpartum depression;
- Active or previous mental illness;
- Being a member of a vulnerable population;
- Traumatic childbirth;

- Giving birth to a preterm or stillborn infant or experiencing the death of a newborn;
- Having an infant admitted to intensive care;
- History of being a neglected child.

Once established, postpartum depression requires psychological counselling and ongoing practical support. In general:

- Psychosocial interventions should be the first line of management of depression during pregnancy and breastfeeding. Antidepressant medication should be avoided as much as possible in this population.
- Listen to the woman and provide encouragement.
- Incorporate general principles of care: provide empathic, clear and sensitive communication with women and their families, and mobilize and provide social support.
- Assure the woman that the experience is fairly common; many other women experience the same thing and most women are able to recover.
- Provide psycho-education and avoid over-medicalization. To avoid stigma, use commonly understood terms such as *stress* and *burden* instead of *depressive disorder* or *illness*.
- Assist the woman in rethinking her image of motherhood, and assist the couple in thinking through their respective roles as new parents. They may need to adjust their expectations and activities.
- Provide adjunct treatments such as structured physical activity, relaxation and problem-solving, if available, and integrate these activities into the woman's daily routine.
- Facilitate social support for the woman throughout the intervention.
- Give attention to the woman's overall well-being, attending to her physical as well as psychological health and emphasizing the importance of the mother-infant relationship in this period.
- Provide practical help (with the baby and with home care).
- **If depression is severe**, women may benefit from treatment with an antidepressant medication. Be aware that medication can be passed through breastmilk and that decisions about treatment will need to take into consideration and address a woman's breastfeeding status. Where possible, consult a specialist.

Care can be home-based or can be offered through day care clinics, with links established for community-based care and other mental health services. Local support groups of women who have had similar experiences can be valuable for many women.

POSTPARTUM PSYCHOSIS

Postpartum psychosis typically occurs around the time of childbirth, most often within the first two weeks postpartum, and affects less than 1% of women. Severe postpartum depression may be associated with psychosis. Symptoms of postpartum psychosis include delusions, hallucinations, sleep disturbances, obsessive thoughts about the baby, severe depression, anxiety, despair, and suicidal or infanticidal impulses. Women who have bipolar disorder or schizoaffective disorder have a higher risk of developing postpartum psychosis. About half of women experiencing postpartum psychosis have a history of mental illness.

The prognosis for recovery is excellent, but about 50% of women will suffer a relapse with subsequent births. Postpartum psychosis is a mental health emergency and requires immediate attention to prevent the woman from harming herself or her baby. In general:

- Immediately seek comprehensive psychiatric and medical care.
- A woman with active psychosis should not care for her infant “as usual.” Arrangements should be made for supplemental care to ensure the safety of the newborn.
- Family members should remain with the woman at all times.
- Often, hospitalization is required for women with postpartum psychosis.
- Provide psychological support and arrange for practical help with the baby and with home care, including measures to ensure that the baby remains safe until the psychosis has resolved.
- Listen to the woman and provide support for her and her family, including linkages for further diagnostic evaluation and treatment, as indicated. This is important for avoiding tragic outcomes.
- Lessen stress.
- Avoid dealing with emotional issues when the woman is unstable.
- If **antipsychotic medications are used**, be aware that medication can be passed through breastmilk, so decisions about treatment must take into consideration and address a woman’s breastfeeding status.

Emergencies can happen suddenly, as with a convulsion, or they can develop as a result of a complication that was not detected or is not properly managed or monitored.

PREVENTING EMERGENCIES

Most emergencies can be prevented by:

- careful planning;
- empowering women and communities;
- following clinical guidelines;
- closely monitoring the woman; and
- responding immediately when problems are identified.

PREPARING FOR EMERGENCIES

To improve first response in case of an obstetric emergency, facilities should ensure the availability of:

- essential equipment, medications and supplies;
- skilled staff;
- a system for responding to emergencies; and
- regular drills.

An emergency trolley should be available and ready to use at all times. Providers must be prepared to respond quickly at all times to the most common obstetric and newborn emergencies. The emergency trolley should be checked daily and between shifts to make sure that the equipment is functional, that drugs have not expired and that everything that should be on the trolley is actually there. The person in charge of the unit should set up a schedule that is clearly posted and that indicates who is responsible for checking the trolley. The trolley should be restocked and any equipment should be appropriately treated immediately after responding to every emergency.

A facility's ability to manage emergencies should be assessed and reinforced by frequent emergency drills. A schedule should be set up so that units regularly practice the drill and become proficient at responding to emergencies. It is important to know what to do—and how to do it—in any particular emergency. It is also important to communicate when

responding to the emergency, to work as a team, and to carefully document what happened and what medical care was provided.

Everyone responding to an emergency should learn to talk out loud to each other while they are working, so that each provider knows what the other is doing and what they have found. Talking out loud can help coordinate efforts in response to the emergency, and can help avoid duplication of effort.

RESPONDING TO AN EMERGENCY

Responding to an emergency promptly and effectively requires that members of the clinical team know their roles and how the team should function. Team members should also know:

- clinical situations and their diagnoses and treatments;
- medicines, how they are used and administered and their side effects; and
- emergency equipment and how it functions.

The ability of a facility to deal with emergencies should be assessed and reinforced by frequent practice emergency drills.

When managing an emergency:

- Introduce yourself.
- Ask the woman her name; if she is unconscious, ask for the woman's name from her companion.
- Encourage the companion to stay with the woman.
- Explain all procedures; ask permission and keep the woman informed as much as you can about what you are doing. If the woman is unconscious, talk to her companion.
- Ensure and respect the woman's privacy during examination and discussion.
- Do not leave the woman unattended.
- Ensure that the emergency transport the woman used to get to the health facility is retained at the facility until a clear plan of management is in place.

INITIAL MANAGEMENT OF AN OBSTETRIC EMERGENCY

When a woman presents with an obstetric emergency:

- Stay calm. Think logically and focus on the needs of the woman.
- Take charge. Avoid confusion by choosing one person to be in charge.
- **SHOUT FOR HELP.** Have one person go for help and have another person gather emergency equipment and supplies (e.g. oxygen cylinder, emergency kit).
- If the **woman is unconscious**, assess the airway, breathing and circulation. Begin resuscitation of the woman, as needed (e.g. assist breathing, start intravenous infusion).
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further, because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.
- Position the woman lying down on her left side with her feet elevated. Loosen tight clothing.
- Talk to the woman and help her stay calm. Ask her or someone with her what happened, what symptoms she is experiencing and when they started.
- Perform a **rapid evaluation** of the woman's general condition, level of consciousness, presence of anxiety and/or confusion, blood loss, colour, and temperature of skin (**page C-1**).
- Put in one or two large-bore IV cannulae/needles.
- Get blood samples before infusing IV fluids.
- Infuse IV fluids. Adjust the flow rate based on the woman's condition and potential risks of fluid overload (e.g. pre-eclampsia).
- Perform a rapid targeted history and physical examination to make a differential diagnosis of the problem.
- Stabilize the woman.
- Consider catheterization if monitoring urinary output or a distended bladder.
- Document history, findings, actions and plan for continued management based on the cause of the emergency.

BASIC PRINCIPLES WHEN PROVIDING CARE

- Where feasible, ensure that the woman has a companion of her choice with her.
- Provide information to the woman—and any accompanying family members the woman would like to be involved in decision-making—about diagnostic tests to be performed, supportive care to be provided (e.g. IV infusion), the process of care, her diagnosis, treatment options and the estimated time for in-patient care if required.
- If the woman is unconscious, explain the procedure to her family.
- Obtain informed consent for any procedures, diagnostic or therapeutic, and care.

INFECTION PREVENTION AND CONTROL








- In the context of maternal and newborn health care, infection prevention and control has three primary objectives:
 - to prevent major infections when providing services;
 - to minimize the risk of transmitting serious diseases such as hepatitis B and HIV/AIDS to the women and to health care providers and staff, including cleaning and housekeeping personnel; and
 - to protect the environment by properly disposing of medical waste.
- The recommended infection prevention and control practices are based on the following principles:
 - Consider every person (woman or staff) as potentially infectious.
 - Handwashing is the most practical procedure for preventing cross-contamination.
 - Wear gloves before touching anything wet—broken skin, mucous membranes, blood or other body fluids (secretions or excretions).
 - Use barriers (e.g. protective goggles, face masks or aprons) if splashes and spills of any body fluids (secretions or excretions) are anticipated.
 - Use safe work practices such as not recapping or bending needles, proper instrument processing, and proper disposal of medical waste.






HANDWASHING

- Handwashing with water and soap removes visible dirt and organic material as well as bacterial contamination.
- Thoroughly rub together all surfaces of the hands lathered with plain or antimicrobial soap. Wash for 15–30 seconds and rinse with a stream of running or poured water.
- Wash hands:
 - before and after examining the woman (or having any direct contact);
 - after exposure to blood or any body fluids (secretions or excretions), even if gloves were worn;
 - before putting gloves on because hands may contaminate gloves;
 - after removing gloves because the gloves may have holes in them.
- To encourage handwashing, programme managers should make every effort to provide soap and a continuous supply of clean, potable water, from either the tap or a bucket, and single-use towels. Do not use shared towels to dry hands.
- To wash hands for surgical procedures, see **page C-67**.

FIGURE C-1. Hand hygiene technique with soap and water

Duration of the entire procedure: 40-60 seconds

0		Wet hands with water;
1		Apply enough soap to cover all hand surfaces;
2		Rub hands palm to palm;
3		Right palm over left dorsum with interlaced fingers and vice versa;
4		Palm to palm with fingers interlaced;
5		Backs of fingers to opposing palms with fingers interlocked;
6		Rotational rubbing of left thumb clasped in right palm and vice versa;

7		Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;
8		Rinse hands with water;
9		Dry hands thoroughly with a single use towel;
10		Use towel to turn off faucet;
11		Your hands are now safe.

HANDRUB WITH ALCOHOL-BASED SOLUTION








- If hands are not visibly dirty, use handrub with an alcohol-based solution for antimicrobial activity.
- Use plenty of handrub, enough to cover both hands, and rub all parts of the hands for 30 seconds or until hands are dry.

Wash hands with soap and water when visibly soiled.

Note: Remove rings, wrist watches and bracelets. Avoid wearing artificial nails because they increase the risk of hands remaining contaminated even after washing with soap and water and using alcohol-based handrub.

FIGURE C-2. Hand hygiene technique with alcohol-based handrub

Duration of the entire procedure: 20-30 seconds

1a		<p>Apply a palmful of the product in a cupped hand, covering all surfaces;</p>
1b		
2		<p>Rub hands palm to palm</p>
3		<p>Right palm over left dorsum with interlaced fingers and vice versa;</p>
4		<p>Palm to palm with fingers interlaced;</p>
5		<p>Backs of fingers to opposing palms with fingers interlocked;</p>
6		<p>Rotational rubbing of left thumb clasped in right palm and vice versa;</p>

7		Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;
8		Once dry, your hands are safe.

GLOVES AND GOWNS

- The use of gloves does not replace the need for hand hygiene by either handrubbing or handwashing.
- Wear gloves:
 - when there is a chance of touching blood, body fluids, secretions or excretions;
 - when performing a procedure (**Table C-2, page C-31**);
 - when handling soiled instruments, gloves or other items soiled with body fluids; and
 - when disposing of contaminated waste items (cotton, gauze or dressings).
- Wash hands before retrieving gloves from a box to prevent introducing skin commensals and pathogenic bacteria into glove boxes.
- When wearing gloves, change or remove them when moving from a contaminated body site to another body site (including a mucous membrane, non-intact skin or medical device within the same woman or the environment).
- Change gloves between caring for different individuals. A separate pair of gloves must be used for each woman to avoid cross-contamination.
- Immediately remove gloves after completing a procedure or caring for a woman. Do not walk around with contaminated gloves as this will contaminate the environment.

- Remove gloves by turning the first glove inside out as it is pulled over the hand. During the removal of the second glove, avoid touching the outer surface by slipping the fingers of the ungloved hand under the glove and pulling it inside out as it is pulled over the hand.
- Immediately dispose of the used gloves in a lined waste container. The reuse of gloves is not recommended. Disposable gloves are preferred.
- Immediately clean hands with handrub or soap and water after removing gloves.
- A clean, but not necessarily sterile, gown should be worn during all childbirth procedures:
 - If the gown has long sleeves, the gloves should be put on over the gown sleeve to avoid contamination of the gloves.
 - Ensure that gloved hands (sterile) are held above the level of the waist and do not come into contact with the gown.
- In addition to the gown, goggles and mask should be worn as a measure of protection.

TABLE C-2. Glove and gown requirements for common obstetric procedures^a

Procedure	Preferred Gloves	Alternative Gloves ^b	Gown
Blood drawing, starting IV infusion	Exam ^c	Sterile surgical ^d	None
Pelvic examination	Exam	Sterile surgical	None
Manual vacuum aspiration, dilatation and curettage, colpotomy, culdocentesis	Sterile surgical	None	None
Laparotomy and intra-abdominal procedures, artificial rupture of membranes, normal childbirth, instrumental birth, episiotomy, repair of cervical or perineal tears, craniotomy, craniocentesis, bimanual compression of uterus, manual removal of placenta, correcting uterine inversion	Sterile surgical	None	Clean, high-level disinfected or sterile

Procedure	Preferred Gloves	Alternative Gloves ^b	Gown
Handling and cleaning instruments	Utility ^c	Exam	None
Handling contaminated waste	Utility	Exam	None
Cleaning blood or body fluid spills	Utility	Exam	None

^a Gloves and gowns are not required to be worn to check blood pressure or temperature, or to give injections.

^b Alternative gloves are generally more expensive and require more preparation than preferred gloves.

^c Exam gloves are single-use, disposable latex gloves.

^d Surgical gloves are latex gloves that are sized to fit the hand.

^e Utility gloves are thick household gloves.

HANDLING SHARP INSTRUMENTS AND NEEDLES

OPERATING THEATRE AND LABOUR WARD

- Do not leave sharp instruments or needles (“sharps”) in places other than “safe zones” (**page C-70**).
- Alert other workers before passing sharps.

HYPODERMIC NEEDLES AND SYRINGES

- Use each needle and syringe only once.
- Promptly dispose of needles and syringes in a puncture-proof container.
- Do not disassemble a needle and syringe after use.
- Do not recap, bend or break needles prior to disposal.
- Make hypodermic needles unusable by burning them.

WASTE DISPOSAL

- The purpose of waste disposal is to:
 - minimize the spread of infections and reduce the risk of accidental injury to staff, clients and visitors;
 - protect those who handle waste from infection and accidental injury;
 - prevent the spread of infection to the local community; and
 - reduce the likelihood of contamination of the soil or ground water with chemicals or microorganisms.
- Health facilities generate four kinds of waste: noncontaminated waste, sharps, nonsharps contaminated waste and hazardous waste. Waste should be sorted, placed into separate waste containers and disposed of appropriately:
 - Noncontaminated waste (e.g. paper from offices, boxes) poses no infectious risk and can be disposed of according to local guidelines.
 - Proper handling of contaminated waste (blood- or body fluid–contaminated items) is required to minimize the spread of infection to hospital personnel and the community. Proper handling means:
 - wearing utility gloves;
 - transporting solid contaminated waste to the disposal site in covered containers;
 - disposing of all sharp items in puncture-proof containers;
 - carefully pouring liquid waste down a drain or flushable toilet (dedicated toilet that is not one used by clients or staff);
 - burning or burying contaminated solid waste; and
 - washing hands, utility gloves and containers after disposal of infectious waste.

STARTING AN IV INFUSION

- Explain what is involved in giving an IV infusion and its purpose to the woman and any accompanying family members the woman would like to have involved in decision-making. If the woman is unconscious, explain the procedure to her family.
- Obtain informed consent for starting an IV infusion.
- Start an IV infusion (two if the woman is in shock) using a large-bore (16-gauge or largest available) cannula or needle.
- Infuse IV fluids (normal saline or Ringer's lactate) at a rate appropriate for the woman's condition.
- **Note:** If the **woman is in shock**, avoid using plasma substitutes (e.g. dextran). There is no evidence that plasma substitutes are superior to normal saline in the resuscitation of a woman in shock, and dextran can be harmful in large doses.
- If a **peripheral vein cannot be cannulated**, perform a venous cutdown (**Fig. S-1, page S-4**).

BASIC PRINCIPLES FOR PROCEDURES

Before any simple (non-operative) procedure, the following steps are necessary:

- Where feasible, ensure that the woman has a companion of her choice during the procedure.
- Gather and prepare all supplies. A lack of needed supplies can disrupt a procedure.
- Explain the procedure and the need for it to the woman and any accompanying family members the woman would like to have involved in decision-making. If the woman is unconscious, explain the procedure to her family.
- Obtain informed consent for the procedure.
- Estimate the length of time for the procedure and provide pain medication accordingly (**page C-55**).

- Place the woman in a position appropriate for the procedure being performed. For example, when performing manual vacuum aspiration, use the lithotomy position; during cardiopulmonary resuscitation on a pregnant woman with gestational age of 20 weeks or more, perform left lateral tilt.
- Clean hands with soap and water (**page C-26**) or alcohol handrub (**page C-28**) and put on gloves appropriate for the procedure (**Table C-2, page C-31**).
- If the **vagina and cervix need to be prepared with an antiseptic** for the procedure (e.g. manual vacuum aspiration):
 - Wash the woman's lower abdomen and perineal area with soap and water, if necessary.
 - Gently insert a sterile speculum or retractor(s) into the vagina.
 - Apply antiseptic solution (e.g. iodophors, chlorhexidine) three times to the vagina and cervix using a sterile ring forceps and a cotton or gauze swab.
- If the **skin needs to be prepared with an antiseptic** for the procedure (e.g. for a caesarean birth):
 - Wash the area with soap and water, if necessary.
 - Apply antiseptic solution (e.g. iodophors, chlorhexidine) three times to the area using a sterile ring forceps and a cotton or gauze swab. If the **swab is held with a gloved hand**, do not contaminate the glove by touching unprepared skin.
 - Begin at the centre of the area and work outward in a circular motion away from the area.
 - At the edge of the sterile field, discard the swab.
 - Never go back to the middle of the prepared area with the same swab. Keep your arms and elbows high and surgical dress away from the surgical field.
- If the **procedure is conducted under local, paracervical or spinal anaesthesia**, keep the woman informed about progress during the procedure.
- After the procedure, inform the woman and accompanying family members of the woman's choice about:
 - how the procedure went;

- complications linked to the procedure (e.g. reaction to anaesthesia, too much bleeding, accidental injury);
 - any pertinent findings;
 - side effects to expect;
 - managing pain related to the procedure; and
 - estimated length of stay in the facility after the procedure.
- Provide instructions on post-procedure care and follow-up, including danger signs that indicate that the woman should return immediately to the facility for care.

CLINICAL USE OF BLOOD, BLOOD PRODUCTS, AND REPLACEMENT FLUIDS

C-37

Obstetric care sometimes requires blood transfusions. It is important to use blood, blood products and replacement fluids appropriately and to be aware of the principles designed to assist health workers in deciding when (and when not) to transfuse.

The appropriate use of blood products is defined as the transfusion of safe blood products to treat a condition leading to significant morbidity or mortality that cannot be prevented or managed effectively by other means.

Conditions that might require blood transfusion include:

- postpartum haemorrhage leading to shock;
- loss of a large volume of blood at operative birth; and
- severe anaemia, especially in later pregnancy or if accompanied by cardiac failure.

Note: For anaemia in early pregnancy, treat the cause of anaemia and provide haematinics.

District hospitals should be prepared for the urgent need for blood transfusion. It is mandatory for obstetric units to keep stored blood available, especially type O negative blood and fresh frozen plasma, as these can be life-saving.

UNNECESSARY USE OF BLOOD PRODUCTS

Used correctly, blood transfusions can save lives and improve health. Like any therapeutic intervention, however, transfusion can result in acute or delayed complications, and it carries the risk of transmission of infectious agents. It is also expensive and uses scarce resources.

- Transfusion is often unnecessary for the following reasons:
 - Conditions that might eventually require transfusion can often be prevented by early treatment or prevention programmes.
 - Transfusions of whole blood, red cells or plasma are often given to prepare a woman quickly for planned surgery or to allow earlier discharge from the hospital. Other treatments, such as the infusion of IV fluids, are often cheaper, safer and equally effective (**page C-34**).
- Unnecessary transfusion can:
 - expose the woman to unnecessary risks; and

- cause a shortage of blood products for women in real need. Blood is an expensive, scarce resource.

RISKS OF TRANSFUSION

Before prescribing blood or blood products for a woman, it is essential to consider the risks of transfusing against the risks of not transfusing.

WHOLE BLOOD OR RED CELL TRANSFUSION

- The transfusion of red blood cell products carries a risk of incompatible transfusion and serious haemolytic transfusion reactions.
- Blood products can transmit infectious agents—including HIV, hepatitis B, hepatitis C, syphilis, malaria and Chagas disease—to the recipient.
- Any blood product can become bacterially contaminated and very dangerous if it is manufactured or stored incorrectly.

PLASMA TRANSFUSION

- Plasma can transmit most of the infections present in whole blood.
- Plasma can also cause transfusion reactions.
- There are very few clear indications for plasma transfusion (e.g. coagulopathy) and the risks often outweigh any possible benefit.

BLOOD SAFETY

- The risks associated with transfusion can be reduced by:
 - effective blood donor selection, deferral and exclusion;
 - screening for transfusion-transmissible infections in the blood donor population (e.g. HIV/AIDS and hepatitis);
 - quality-assurance programmes;
 - high-quality blood grouping, compatibility testing, component separation, and storage and transportation of blood products; and
 - appropriate clinical use of blood and blood products.

SCREENING FOR INFECTIOUS AGENTS

- Every unit of donated blood should be screened for transfusion-transmissible infections using the most appropriate and effective tests, in accordance with both national policies and the prevalence of infectious agents in the potential blood donor population.
- All donated blood should be screened for the following:
 - HIV-1 and HIV-2
 - hepatitis B surface antigen
 - *Treponema pallidum* antibody (syphilis).
- Where possible, all donated blood should also be screened for:
 - hepatitis C;
 - Chagas disease, in countries where the seroprevalence is significant;
 - malaria, in areas with high prevalence of malaria and in low-prevalence countries when donors have travelled to malarial areas.
- No blood or blood product should be released for transfusion until all nationally required tests are shown to be negative.
- Perform compatibility tests on all blood components transfused, even if, in life-threatening emergencies, the tests are performed after the blood products have been issued.

Blood that has not been obtained from appropriately selected donors and that has not been screened for transfusion-transmissible infectious agents (e.g. HIV, hepatitis) in accordance with national requirements should not be issued for transfusion, other than in the most exceptional life-threatening situations.

PRINCIPLES OF CLINICAL TRANSFUSION

The fundamental principle of appropriate use of blood or blood product is that transfusion is only one element of managing urgent care for women. When there is sudden rapid loss of blood due to haemorrhage, surgery or complications of childbirth, the most urgent need is usually the rapid replacement of the fluid lost from circulation.

Transfusion of red cells might also be vital to restoring the oxygen-carrying capacity of the blood.

Minimize “wastage” of a woman’s blood (to reduce the need for transfusion) by:

- using replacement fluids for resuscitation;
- minimizing the blood taken for laboratory use;
- using the best anaesthetic and surgical techniques to minimize blood loss during surgery;
- salvaging and reinfusing surgical blood lost during procedures (autotransfusion), where appropriate (**page S-17**).

Principles to remember:

- Transfusion is only one element of managing a woman’s care.
- Decisions about prescribing a transfusion should be based on national guidelines on the clinical use of blood, taking the woman’s needs into account.
- Blood loss should be minimized to reduce a woman’s need for transfusion.
- A woman with acute blood loss should receive effective resuscitation (IV replacement fluids, oxygen, etc.) while the need for transfusion is being assessed.
- The woman’s haemoglobin value, although important, should not be the sole deciding factor in starting the transfusion. The decision to transfuse should be supported by the need to relieve clinical signs and symptoms and prevent significant morbidity and mortality.
- The clinician should be aware of the risks of transfusion-transmissible infection in blood products that are available.
- Transfusion should be prescribed only when the benefits to the woman are likely to outweigh the risks.
- A trained person should monitor the transfused woman and respond immediately if any adverse effects occur (**page C-41**).
- The clinician should record the reason for transfusion and investigate any adverse effects (**page C-43**).

PRESCRIBING BLOOD

Prescribing decisions should be based on national guidelines on the clinical use of blood, taking the woman's needs into account.

- Before prescribing blood or blood products for a woman, keep in mind the following:
 - expected improvement in the woman's clinical condition;
 - methods to minimize blood loss to reduce the woman's need for transfusion;
 - alternative treatments that could be given, including IV replacement fluids or oxygen, before making the decision to transfuse;
 - specific clinical or laboratory indications for transfusion;
 - risks of transmitting HIV, hepatitis, syphilis or other infectious agents through the blood products that are available;
 - benefits of transfusion versus risk for the particular woman;
 - other treatment options if blood is not available in time;
 - the need for a trained person to monitor the woman and immediately respond if a transfusion reaction occurs.

MONITORING THE TRANSFUSED WOMAN

For each unit of blood transfused, monitor the woman at the following stages:

- before starting the transfusion;
- at the onset of the transfusion;
- 15 minutes after starting the transfusion;
- at least every hour during the transfusion;
- at four-hour intervals after completing the transfusion.

Closely monitor the woman during the first 15 minutes of the transfusion and regularly thereafter to detect early symptoms and signs of adverse effects.

At each of these stages, record the following information on the woman's chart:

- general appearance
- temperature
- pulse
- blood pressure
- respiration
- fluid balance (oral and IV fluid intake, urinary output).

In addition, record:

- the time the transfusion is started;
- the time the transfusion is completed;
- the volume and type of all products transfused;
- the unique donation numbers of all products transfused; and
- any adverse effects.

RESPONDING TO A TRANSFUSION REACTION

Transfusion reactions may range from a minor skin rash to anaphylactic shock. Stop the transfusion and keep the IV line open with IV fluids (normal saline or Ringer's lactate) while making an initial assessment of the acute transfusion reaction and seeking advice. If the **reaction is minor**, give promethazine 10 mg by mouth and observe.

MANAGING ANAPHYLACTIC SHOCK FROM MISMATCHED BLOOD TRANSFUSION

- Manage as for shock (**page S-1**) and give:
 - adrenaline 1:1000 solution (0.1 mL in 10 mL normal saline or Ringer's lactate) IV slowly;
 - promethazine 10 mg IV; and
 - hydrocortisone 1 g IV every two hours as needed.
- If **bronchospasm occurs**, give aminophylline 250 mg in 10 mL normal saline or Ringer's lactate IV slowly.
- Combine resuscitation measures above until stabilized.

- Monitor renal, pulmonary and cardiovascular functions.
- Transfer to referral centre when stable.

DOCUMENTING A TRANSFUSION REACTION

- Immediately after the reaction occurs, take the following samples and send with a request form to the blood bank for laboratory investigations:
 - immediate post-transfusion blood samples:
 - one clotted;
 - one anticoagulated (EDTA/Sequestrene) taken from the vein opposite the infusion site;
 - the blood unit and giving set containing red cell and plasma residues from the transfused donor blood;
 - the first specimen of the woman's urine following the reaction.
- If **septic shock is suspected due to a contaminated blood unit**, take a blood culture in a special blood culture bottle.
- Complete a transfusion reaction report form.
- After the initial investigation of the transfusion reaction, send the following to the blood bank for laboratory investigations:
 - blood samples at 12 hours and 24 hours after the start of the reaction:
 - one clotted;
 - one anticoagulated (EDTA/Sequestrene) taken from the vein opposite the infusion site;
 - all urine for at least 24 hours after the start of the reaction.
- Immediately report all acute transfusion reactions, with the exception of mild skin rashes, to a medical officer and to the blood bank that supplied the blood.
- Record the following information on the woman's chart:
 - type of transfusion reaction;
 - length of time after the start of transfusion that the reaction occurred;

- volume and type of blood products transfused; and
- unique donation numbers of all products transfused.

REPLACEMENT FLUIDS: SIMPLE SUBSTITUTES FOR TRANSFUSION

Only normal saline (sodium chloride 0.9%) or balanced salt solutions that have a similar concentration of sodium to plasma are effective replacement fluids. These should be available in all hospitals where IV replacement fluids are used.

Replacement fluids are used to replace abnormal losses of blood, plasma or other extracellular fluids by increasing the volume of the vascular compartment. They are used principally in:

- management of women with established hypovolaemia (e.g. haemorrhagic shock);
- maintenance of normovolaemia in women with on-going fluid losses (e.g. surgical blood loss).

INTRAVENOUS REPLACEMENT THERAPY

Intravenous replacement fluids are the first-line treatment for hypovolaemia. Initial treatment with these fluids may be life-saving and can provide some time to control bleeding and obtain blood for transfusion if it becomes necessary.

CRYSTALLOID FLUIDS

- Crystalloid replacement fluids:
 - contain a similar concentration of sodium to plasma;
 - cannot enter cells because the cell membrane is impermeable to sodium; and
 - pass from the vascular compartment to the extracellular space compartment (normally only a quarter of the volume of crystalloid infused remains in the vascular compartment).
- To restore circulating blood volume (intravascular volume), infuse crystalloids in a volume at least three times the volume lost.

Dextrose (glucose) solutions are poor replacement fluids. Do not use them to treat hypovolaemia unless there is no other alternative.

COLLOID FLUIDS

- Colloid solutions are composed of a suspension of particles that are larger than crystalloids. Colloids tend to remain in the blood where they mimic plasma proteins to maintain or raise the colloid osmotic pressure of blood.
- Colloids are usually given in a volume equal to the blood volume lost. In many conditions where the capillary permeability is increased (e.g. trauma, sepsis), leakage out of the circulation will occur and additional infusions will be necessary to maintain blood volume.

Points to remember:

- There is no evidence that colloid solutions (albumin, dextrans, gelatins, hydroxyethyl starch solutions) have advantages over normal saline or balanced salt solutions for resuscitation.
- There is evidence that colloid solutions may have an adverse effect on survival.
- Colloid solutions are much more expensive than normal saline and balanced salt solutions.
- Human plasma should not be used as a replacement fluid. All forms of plasma carry a risk, similar to that of whole blood, of transmitting infection, such as HIV and hepatitis.
- Plain water should never be infused intravenously. It will cause haemolysis and will probably be fatal.

There is a very limited role for colloids in resuscitation.

SAFETY

Before giving any IV infusion:

- check that the seal of the infusion bottle or bag is not broken;
- check the expiry date;
- check that the solution is clear and free of visible particles.

MAINTENANCE FLUID THERAPY

Maintenance fluids are crystalloid solutions, such as dextrose or dextrose in normal saline, used to replace normal physiological losses through skin, lungs, faeces and urine. If it is anticipated that the woman will receive IV fluids for 48 hours or more, infuse a balanced electrolyte solution (e.g. potassium chloride 1.5 g in 1 L IV fluids) with dextrose. The volume of maintenance fluids required by a woman will vary, particularly if the woman has fever or if the ambient temperature or humidity is high, in which case losses will increase.

OTHER ROUTES OF FLUID ADMINISTRATION

There are other routes of fluid administration in addition to the IV route.

ORAL AND NASOGASTRIC ADMINISTRATION

- This route can often be used for women who are mildly hypovolaemic and for women who can receive oral fluids.
- Oral and nasogastric administration should not be used if:
 - the woman is severely hypovolaemic;
 - the woman is unconscious;
 - there are gastrointestinal lesions or reduced gut motility (e.g. obstruction);
 - surgery with general anaesthesia is imminent.

RECTAL ADMINISTRATION

- Rectal administration of fluids is not suitable for severely hypovolaemic women.
- Advantages of rectal administration include the following:
 - It allows the ready absorption of fluids.
 - Absorption ceases and fluids are ejected when hydration is complete.
 - It is administered through a plastic or rubber enema tube inserted into the rectum and connected to a bag or bottle of fluid.
 - The fluid rate can be controlled by using an IV set, if necessary.

- The fluids do not have to be sterile. A safe and effective solution for rectal rehydration is 1 L of clean drinking water to which a teaspoon of table salt is added.

SUBCUTANEOUS ADMINISTRATION

- Subcutaneous administration can occasionally be used when other routes of administration are unavailable, but this method is unsuitable for severely hypovolaemic women.
- Sterile fluids are administered through a cannula or needle inserted into the subcutaneous tissue (the abdominal wall is a preferred site).

Solutions containing dextrose can cause tissue to die and should not be given subcutaneously.

This chapter briefly discusses the use of prophylactic antibiotics before an obstetrical procedure, therapeutic use of antibiotics for suspected or established severe pelvic infection, and management of antibiotic allergies.

- Prophylactic antibiotics are given to help prevent infection.
- **If a woman is suspected to have or is diagnosed as having an infection**, therapeutic antibiotics are indicated.

Recommendations for antibiotic treatment and prevention of specific conditions are discussed in the chapters on shock (**S-1**), operative care principles (**C-65**), normal labour and childbirth (**C-77**), vaginal bleeding in early pregnancy (**S-7**), vaginal bleeding after childbirth (**S-29**), fever during pregnancy and labour (**S-113**) and after childbirth (**S-127**), unsatisfactory progress of labour (**S-71**), difficulty in breathing (**S-149**), abdominal pain in early pregnancy (**S-137**), abdominal pain in later pregnancy and after childbirth (**S-141**), loss of fetal movements (**S-155**), prelabour rupture of membranes (**S-159**), induction and augmentation of labour (**P-17**), breech birth (**P-45**), caesarean birth (**P-53**), episiotomy (**P-85**), manual removal of placenta (**P-91**), repair of vaginal and perineal tears (**P-97**), correcting uterine inversion (**P-111**), repair of ruptured uterus (**P-115**), uterine and utero-ovarian artery ligation (**P-119**), postpartum hysterectomy (**P-123**), and salpingectomy for ectopic pregnancy (**P-131**).

Infection during pregnancy and the postpartum period can be caused by a combination of organisms, including aerobic and anaerobic cocci and bacilli. Antibiotics should be started based on specific indications, including:

- prevention of infection in the setting of established risk factors (e.g. vaginal colonization with Group B streptococcus);
- prophylaxis for medical procedures; and
- treatment of confirmed or suspected infection based on the clinical presentation of the woman.

Whenever possible, cultures and antibiotic sensitivities should be obtained (e.g. urine, vaginal discharge, pus) before initiating antibiotic treatment for a suspected infection so that treatment can be adjusted based on culture results or if there is no clinical response with treatment. However, prompt treatment of severe infections based on clinical presentation should not be delayed if a facility does not have the capacity to process cultures or to collect cultures in a timely manner.

If bacteraemia (presence of bacteria in the blood) or septicaemia (presence and multiplication of bacteria in the blood) is suspected, a blood culture should be done whenever feasible. Uterine infection can follow an abortion or

childbirth and is a major cause of maternal death. Broad spectrum antibiotics often are required to treat these infections. In cases of unsafe abortion and non-institutional births, antitetanus prophylaxis should also be provided as part of comprehensive management.

PROVIDING PROPHYLACTIC ANTIBIOTICS

Performing certain obstetrical procedures (e.g. caesarean birth, manual removal of placenta) increases a woman's risk of infectious morbidity. This risk can be reduced by:

- following recommended infection prevention and control practices (**page C-25**); and
- providing prophylactic antibiotics at the time of the procedure.

Whenever possible, give prophylactic intravenous antibiotics 15–60 minutes before the start of a procedure to achieve adequate blood levels of the antibiotic at the time of the procedure. One dose of prophylactic antibiotics is sufficient and is no less effective than three doses or 24 hours of antibiotics for preventing infection after an obstetrical procedure. If the **procedure lasts longer than six hours** or **blood loss is 1500 mL or more**, give a second dose of prophylactic antibiotics to maintain adequate blood levels during the procedure.

Obstetrical procedures for which antibiotic prophylaxis is recommended for the woman include the following:

- elective and emergency caesarean (**note**: prophylaxis to be given before starting the skin incision whenever possible) (**P-53**);
- suturing of third and fourth degree genital tears (**P-104**);
- manual removal of the placenta (**P-91**); and
- placement of uterine balloon tamponade (**S-35**).

PROVIDING THERAPEUTIC ANTIBIOTICS

- For initial treatment of **serious infections of the pelvic organs (e.g. uterus, fallopian tubes, ovaries) or upper urinary tract**, give a combination of antibiotics:
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.

Note: If the **infection is not severe**, amoxicillin 500 mg by mouth every eight hours may be used instead of ampicillin.

- If the **clinical response is poor after 48 hours**, ensure that adequate dosages of antibiotics are being given and re-evaluate the woman for other sources of infection. Consider altering the treatment according to reported microbial sensitivity if cultures have been checked, and consider adding an additional agent to cover anaerobes if one was not included in the initial antibiotic combination.
- If **culture facilities are not available**, re-examine for pus collection, especially in the pelvis, and for non-infectious causes of pain and fever, such as deep vein and pelvic vein thrombosis.
 - Consider the possibility of infection due to organisms resistant to the above combination of antibiotics.
 - If **staphylococcal infection is suspected**, add:
 - cloxacillin 1 g IV every four hours;
 - OR vancomycin 1 g IV every 12 hours infused over one hour.
 - If **clostridial infection or Group A haemolytic streptococci is suspected**, add penicillin 2 million units IV every four hours.
 - If **neither of the above are possibilities**, add ceftriaxone 2 g IV every 24 hours.
 - **Note:** To avoid phlebitis, change the infusion site every three days or at the first sign of inflammation.
 - If the **infection does not clear**, re-evaluate for the source of infection.

For the treatment of postpartum endometritis, a combination of clindamycin and gentamycin is recommended, continuing until the woman is fever-free for 48 hours (see **S-130**). Discontinue antibiotics once the woman has been fever-free for 48 hours. There is no need to continue with oral antibiotics, as this has not been proven to have additional benefit. Women with bloodstream infections (bacteraemia), however, require antibiotics for at least seven days.

ALLERGIES

Allergies can range from very mild skin rashes to life-threatening systemic anaphylactic reactions requiring immediate management to prevent death. Because of the potentially life-threatening risk of an allergic reaction to an antibiotic (or any medication), it is very important to rule out any previously known allergy to antibiotic or other medications before administering any medication.

If an antibiotic to which a woman has developed an allergy is needed for a significant infection for which no other options exist, then it is reasonable to decide whether or not to use the antibiotic based on the severity of the prior reported allergic reaction. In general, antibiotics that have been associated with a significant prior allergic reaction (e.g. anaphylaxis) should not be given unless under the close supervision of a trained physician. However, if the reported antibiotic allergic reaction was mild (e.g. rash) and did not involve systemic symptoms, then it is reasonable, if other options do not exist, to give a carefully supervised trial of the antibiotic. In general, there is up to a 10% chance that a woman with a prior allergic reaction to penicillin may have an allergic reaction to a cephalosporin.

ANAPHYLAXIS

Anaphylaxis is a severe systemic allergic reaction that depends on rapid and timely management.

- Symptoms of anaphylaxis can include:
 - a sense of tingling
 - flushing
 - swelling of the face, lips and tongue
 - difficulty breathing due to swelling of the throat and airway
 - shortness of breath
 - abdominal cramps
 - palpitations
 - syncope
- Administer adrenaline 0.3–0.5 mg IM immediately, and repeat every 10 to 15 minutes, as needed.

- Monitor vital signs (blood pressure, pulse, respiration rate, oxygen saturation) and admit for observation.
- Try to identify the cause of the anaphylactic reaction (e.g. specific medication, food) and immediately discontinue the triggering factor.
- After an anaphylactic reaction a woman should be monitored closely for at least 24–48 hours because there is a risk of a second rebound reaction. Rebound (biphasic) reactions almost always occur within the first 72 hours after an anaphylactic event. Consider beginning prednisolone 40–60 mg by mouth for three days to reduce the severity of a possible rebound reaction.
- Record the drug allergy in the woman's case notes, and counsel her to:
 - write down the name of the medication;
 - inform all future providers that she has an allergy to this medication; and
 - always avoid this medication in the future.

MILD ALLERGIC REACTIONS

Mild allergic reactions usually involve itching and swelling and other cutaneous manifestations such as a new rash.

- Give antihistamines (e.g. loratadine 10 mg by mouth once daily) for mild cases.
- For more severe cases, add prednisolone 40–60 mg by mouth per day for five to seven days. If prednisolone is needed for longer than seven days to control symptoms, then taper down the prednisolone gradually over several days while observing symptoms (e.g. 30, 20, 10 and 5 mg).

Pain relief may be required during labour and is required during and after operative procedures. Analgesic drugs and methods of support during labour, local anaesthesia, general principles for using anaesthesia and analgesia, and postoperative analgesia are discussed in this chapter.

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ANALGESIC DRUGS DURING LABOUR

- The perception of pain during labour depends greatly on a woman's emotional state. Supportive care during labour provides reassurance and decreases the perception of pain (**page C-86**).
- If a **woman is distressed by pain**, encourage her to walk around or assume any comfortable position. Encourage her companion to massage her back or sponge her face between contractions. Encourage the use of breathing techniques and allow the woman to take a warm bath or shower if she chooses. For most women, this is enough to cope with the pain of labour. If necessary, offer the woman:
 - morphine 0.1 mg/kg body weight IM every four hours as needed, informing her of the advantages and disadvantages (see below) and obtaining consent;
 - promethazine 25 mg IM or IV if vomiting occurs.

<p>Barbiturates and sedatives should not be used to relieve anxiety in labour.</p>

DANGER

If **morphine is given to the woman within four hours before she gives birth**, the baby may suffer from respiratory depression. Naloxone is the antidote.

Note: Do not administer naloxone to newborns whose mothers are suspected of having recently abused narcotic drugs.

- If there are **signs of respiratory depression** in the newborn, begin resuscitation immediately:
 - After vital signs have been established, give naloxone 0.1 mg/kg body weight IV to the newborn.
 - If the **infant has adequate peripheral circulation after successful resuscitation**, naloxone can be given IM. Repeated doses may be required to prevent recurrent respiratory depression.

- If there are **no signs of respiratory depression** in the newborn, but **morphine was given within four hours before birth**, observe the baby expectantly for signs of respiratory depression and treat as above if they occur.

PREMEDICATION WITH PROMETHAZINE AND DIAZEPAM

Premedication is required for procedures that last longer than 30 minutes. The dose must be adjusted to the weight and condition of the woman and to the condition of the fetus (when present). Inform the woman of the advantages and disadvantages, and obtain consent.

- Offer morphine 0.1 mg/kg body weight IM, informing the woman of the advantages and disadvantages (**page C-55**) and obtaining consent.
- Give diazepam in increments of 1 mg IV and wait at least two minutes before giving another increment. A safe and sufficient level of sedation has been achieved when the woman's upper eyelid droops and just covers the edge of the pupil.
 - Monitor the respiratory rate every minute. If the **respiratory rate falls below 10 breaths per minute**, stop administration of all sedative or analgesic drugs.
 - Monitor the fetal heart rate at least every 15 minutes. If the **fetal heart rate falls below 100 beats per minute**, stop administration of all sedative or analgesic drugs.

LOCAL ANAESTHESIA

Local anaesthesia (lidocaine with or without adrenaline) is used to infiltrate tissue and block the sensory nerves.

- Because a woman under local anaesthesia remains awake and alert during the procedure, it is especially important to ensure:
 - counselling to increase cooperation and minimize her fears;
 - good communication throughout the procedure as well as physical reassurance from the provider, if necessary;
 - time and patience, as local anaesthetics do not take effect immediately.

- The following conditions are required for the safe use of local anaesthesia:
 - All members of the operating team must be knowledgeable and experienced in the use of local anaesthetics.
 - Emergency drugs and equipment (suction, oxygen, resuscitation equipment) should be readily available and in usable condition, and all members of the operating team trained in their use.

LIDOCAINE

Lidocaine preparations are usually 2% or 1% and require dilution before use (**Box C-1**). For most obstetric procedures, the preparation is diluted to 0.5%, which gives the maximum effect with the least toxicity.

BOX C-1. Preparation of lidocaine 0.5% solution

Combine:

- lidocaine 2%, one part; and
- normal saline or sterile distilled water, three parts (do not use glucose solution as it increases the risk of infection).

Or combine:

- lidocaine 1%, one part; and
- normal saline or sterile distilled water, one part.

ADRENALINE

Adrenaline causes local vasoconstriction. Its use with lidocaine has the following advantages:

- less blood loss;
- longer effect of anaesthetic (usually one to two hours); and
- less risk of toxicity because of slower absorption into the general circulation.

If the **procedure requires a small surface to be anaesthetized or requires less than 40 mL of lidocaine**, adrenaline is not necessary. For larger surfaces, however, especially when more than 40 mL is needed, adrenaline is required to reduce the absorption rate and thereby reduce toxicity.

The best concentration of adrenaline is 1:200 000 (5 mcg/mL). This gives a maximum local effect with the least risk of toxicity from the adrenaline itself (**Table C-3**).

Note: It is critical to measure adrenaline carefully and accurately using a syringe such as a bacillus Calmette-Guérin (BCG) or insulin syringe. Mixtures must be prepared observing strict infection prevention practices (**page C-25**).

TABLE C-3. Formulas for preparing 0.5% lidocaine solutions containing 1:200 000 adrenaline

Desired Amount of Local Anaesthetic Needed	Normal Saline/ Lidocaine 2%	Normal Saline/ Lidocaine 1%	Adrenaline 1:1000
20 mL	15 mL/5 mL	10 mL/10 mL	0.1 mL
40 mL	30 mL/10 mL	20 mL/20 mL	0.2 mL
100 mL	75 mL/25 mL	50 mL/50 mL	0.5 mL
200 mL	150 mL/50 mL	100 mL/100 mL	1.0 mL

COMPLICATIONS

PREVENTION OF COMPLICATIONS

All local anaesthetic drugs are potentially toxic. Major complications from local anaesthesia, however, are extremely rare (**Table C-5, page C-59**).

The best way to avoid complications is to prevent them:

- Avoid using concentrations of lidocaine stronger than 0.5%.
- If **more than 40 mL of the anaesthetic solution is to be used**, add adrenaline to delay dispersion. Procedures that might require more than 40 mL of 0.5% lidocaine are caesarean and repair of extensive perineal tears.
- Use the lowest effective dose.
- Observe the maximum safe dose (**Table C-4, page C-59**). For an adult, this is 4 mg/kg body weight of lidocaine without adrenaline and 7 mg/kg body weight of lidocaine with adrenaline. The anaesthetic effect should last for at least two hours. Doses can be repeated if needed after two hours.

TABLE C-4. Maximum safe doses of local anaesthetic drugs

Drug	Maximum Dose (mg/kg of body weight)	Maximum Dose for 60 kg Adult (mg)
Lidocaine	4	240
Lidocaine + adrenaline 1:200 000 (5 mcg/mL)	7	420

- Inject slowly.
- Avoid accidental injection into a vessel. There are three ways of doing this:
 - Moving needle technique (preferred for tissue infiltration): The needle is constantly in motion while injecting; this makes it impossible for a substantial amount of solution to enter a vessel.
 - Plunger withdrawal technique (preferred for nerve block when considerable amounts are injected into one site): The syringe plunger is withdrawn before injecting; if blood appears, the needle is repositioned and attempted again.
 - Syringe withdrawal technique: The needle is inserted and the anaesthetic is injected as the syringe is being withdrawn.

To avoid lidocaine toxicity:

- Use a dilute solution.
- Add adrenaline when more than 40 mL will be used.
- Use the lowest effective dose.
- Observe the maximum dose.
- Avoid IV injection.

DIAGNOSIS OF LIDOCAINE ALLERGY AND TOXICITY

TABLE C-5. Symptoms and signs of lidocaine allergy and toxicity

Allergy	Mild Toxicity	Severe Toxicity	Life-Threatening Toxicity (very rare)
<ul style="list-style-type: none"> • Shock • Redness of skin • Skin rash/hives • Bronchospasm • Vomiting • Serum sickness 	<ul style="list-style-type: none"> • Numbness of lips and tongue • Metallic taste in mouth • Dizziness/light-headedness • Ringing in ears • Blurred vision 	<ul style="list-style-type: none"> • Sleepiness • Disorientation • Muscle twitching and shivering • Slurred speech 	<ul style="list-style-type: none"> • Tonic-clonic convulsions • Respiratory depression or arrest • Cardiac depression or arrest

MANAGEMENT OF LIDOCAINE ALLERGY

- Give adrenaline 1:1000, 0.5 mL IM, and repeat every 10 minutes if necessary.
- In acute situations, give hydrocortisone 100 mg IV every hour.
- To prevent recurrence, give diphenhydramine 50 mg IM or IV slowly, then 50 mg by mouth every six hours.
- Treat bronchospasm with aminophylline 250 mg in normal saline 10 mL IV slowly.
- Laryngeal oedema may require immediate tracheostomy.
- For shock, begin standard shock management (**page S-1**).
- Severe or recurrent signs may require corticosteroids (e.g. hydrocortisone IV 2 mg/kg body weight every four hours until condition improves). In chronic situations give prednisone 5 mg or prednisolone 10 mg by mouth every six hours until the condition improves.

MANAGEMENT OF LIDOCAINE TOXICITY

Symptoms and signs of toxicity (**Table C-5, page C-59**) should alert the practitioner to immediately stop injecting and prepare to treat severe and life-threatening side effects. If **symptoms and signs of mild toxicity are observed**, wait a few minutes to see if the symptoms subside, check vital signs, talk to the woman and then continue the procedure, if possible.

CONVULSIONS

- Turn the woman to her left side, insert an airway and aspirate secretions.
- Give oxygen at 6–8 L per minute by mask or nasal cannulae.
- Give diazepam 1–5 mg IV in 1-mg increments. Repeat if convulsions recur.
- **Note:** The use of diazepam to treat convulsions may cause respiratory depression.

RESPIRATORY ARREST

- If the **woman is not breathing**, assist ventilation using an Ambu bag and mask or via endotracheal tube; give oxygen at 4–6 L per minute.

CARDIAC ARREST

- Hyperventilate with oxygen.
- Perform cardiac massage.
- If the **woman has not yet given birth**, immediately perform a caesarean (**page P-53**) using general anaesthesia.
- Give adrenaline 1:10 000, 0.5 mL IV.

ADRENALINE TOXICITY

- Systemic adrenaline toxicity results from inadvertent or excessive amounts of IV administration and results in:
 - restlessness
 - sweating
 - hypertension
 - cerebral haemorrhage
 - rapid heart rate
 - ventricular fibrillation.
- Local adrenaline toxicity occurs when the concentration is excessive, and results in ischaemia at the infiltration site with poor healing.

GENERAL PRINCIPLES FOR ANAESTHESIA AND ANALGESIA

- The keys to pain management and comfort are:
 - supportive attention from staff before, during and after a procedure (helps reduce anxiety and lessen pain);
 - a provider who is comfortable working with women who are awake and who is trained to use instruments gently; and
 - the selection of an appropriate type and level of pain medication.

- Tips for performing procedures on women who are awake include the following:
 - Explain each step of the procedure before performing it.
 - Use adequate premedication in cases expected to last longer than 30 minutes.
 - Give analgesics or sedatives at an appropriate time before the procedure (30 minutes before for IM and 60 minutes before for oral medication) so that maximum relief will be provided during the procedure.
 - Use dilute solutions in adequate amounts.
 - Check the level of anaesthesia by pinching the area with forceps. If **the woman feels the pinch**, wait two minutes and then retest.
 - Wait a few seconds after performing each step or task to allow the woman to prepare for the next one.
 - Move slowly, without jerky or quick motions.
 - Handle tissue gently and avoid undue retraction, pulling or pressure.
 - Use instruments with confidence.
 - Avoid saying things like “this won’t hurt” if, in fact, it will hurt; or “I’m almost finished” if you are not almost finished.
 - Talk with the woman throughout the procedure.
- The need for supplemental analgesic or sedative medications (by mouth, IM or IV) depends on:
 - the emotional state of the woman;
 - the procedure to be performed (**Table C-6, page C-63**);
 - the anticipated length of the procedure; and
 - the skill of the provider and the assistance of the staff.

TABLE C-6. Analgesia and anaesthesia options

Procedure	Analgesia/Anaesthesia Options^a
Breech birth	<ul style="list-style-type: none"> • General methods of labour support (page C-85) • Pudendal block (page P-3)
Caesarean	<ul style="list-style-type: none"> • Spinal anaesthesia (page P-11) • Local anaesthesia (page P-7) • Ketamine (page P-13) • General anaesthesia
Cervical tears (extensive)	<ul style="list-style-type: none"> • Morphine and diazepam (pages C-55, C-56) • Ketamine (page P-13)
Colpotomy/ Culdocentesis	<ul style="list-style-type: none"> • Local anaesthesia (page C-56)
Craniotomy/ Craniocentesis	<ul style="list-style-type: none"> • Emotional support and encouragement (page C-9) • Diazepam (page C-56) • Pudendal block (page P-3)
Dilatation and curettage	<ul style="list-style-type: none"> • Paracervical block (page P-1) • Morphine (page C-55)
Episiotomy	<ul style="list-style-type: none"> • Local anaesthesia (page C-56) • Pudendal block (page P-3)
Forceps birth	<ul style="list-style-type: none"> • Emotional support and encouragement (page C-9) • Pudendal block (page P-3)
Labour and childbirth	<ul style="list-style-type: none"> • General methods of labour support (page C-85) • Morphine and promethazine (pages C-55, C-56)
Laparotomy	<ul style="list-style-type: none"> • General anaesthesia • Spinal anaesthesia (page P-11)
Manual removal of placenta	<ul style="list-style-type: none"> • Morphine and diazepam (pages C-55, C-56) • Ketamine (page P-13)
Manual vacuum aspiration	<ul style="list-style-type: none"> • Paracervical block (page P-1) • Morphine (page C-55)
Perineal tears (first and second degree)	<ul style="list-style-type: none"> • Local anaesthesia (page C-56) • Pudendal block (page P-3)
Perineal tears (third and fourth degree)	<ul style="list-style-type: none"> • Pudendal block (page P-3) • Ketamine (page P-13) • Local anaesthesia, morphine and diazepam (pages C-55, C-56) • Spinal anaesthesia (page P-11)
Uterine inversion (correction of)	<ul style="list-style-type: none"> • Morphine and diazepam (pages C-55, C-56) • General anaesthesia
Vacuum-assisted birth	<ul style="list-style-type: none"> • Emotional support and encouragement (page C-9) • Pudendal block (page P-3)

^a The preferred analgesia/anaesthesia option is listed in bold.

POSTOPERATIVE ANALGESIA

Adequate postoperative pain control is important. A woman who is in severe pain does not recover well.

Note: Avoid over-sedation as this will limit mobility, which is important during the postoperative period.

Good postoperative pain control regimens include:

- non-narcotic mild analgesics, such as paracetamol 500 mg by mouth as needed;
- narcotics such as morphine 0.1 mg/kg body weight IM every four hours as needed, informing the woman of the advantages and disadvantages (**page C-55**) and obtaining consent;
- combinations of lower doses of narcotics with paracetamol.

Note: If the **woman is vomiting**, narcotics may be combined with anti-emetics such as promethazine 25 mg IM or IV every four hours as needed.

The woman is the primary focus of the physician/midwife and nurse during any procedure. The surgical or scrub nurse has her attention focused on the procedure and the needs of the physician/midwife performing the procedure.

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PREOPERATIVE CARE PRINCIPLES

PREPARING THE OPERATING THEATRE

Ensure that:

- the operating theatre is clean (it should be cleaned after every procedure);
- necessary supplies and anaesthesia equipment are available, including medications and an oxygen cylinder;
- emergency equipment, medication and supplies for both adult and newborn resuscitation are available, in working order and not past the expiry date;
- there is an adequate supply of theatre dress for the anticipated members of the surgical team;
- clean/sterile linens are available; and
- sterile surgical instruments and supplies (e.g. gloves, gauze, instruments) are available and not beyond expiry date.

PREPARING A WOMAN FOR A SURGICAL PROCEDURE

- Explain the procedure to be performed and its purpose to the woman and any accompanying family members the woman would like to be involved in decision-making. If the woman is unconscious, explain the procedure to her family.
- Obtain informed consent for the procedure.
- Ensure that all members of the operating, anaesthesia and newborn (if indicated) teams have been mobilized and the level of urgency of the surgery has been communicated.
- Ensure that the indication for the procedure is documented.
- Assist the woman and her family in preparing emotionally and psychologically for the procedure (**page C-9**).

- Review the woman's medical history:
 - Check for any possible allergies.
 - Ensure that the woman has received the complete antitetanus regimen, and give one dose of tetanus vaccine, if necessary.
- Review any potential anaesthetic risks (difficult airway), anticipated difficulty with the procedure, anticipated duration of the procedure and blood loss, and any specific concerns.
- Send a blood sample for haemoglobin (or haematocrit), type and screen, and order blood for possible transfusion. Do not delay transfusion if needed.
- Administer premedication appropriate for the anaesthesia used (**page C-56**).
- Give an antacid (sodium citrate 0.3% 30 mL or magnesium trisilicate 300 mg) to reduce stomach acid in case there is aspiration.
- Ensure prophylactic intravenous antibiotics have been ordered and given at least 15–60 minutes before surgery.

For caesarean birth, prophylactic antibiotics should be given prior to skin incision, rather than intra-operatively after umbilical cord clamping.

- Wash the area around the proposed incision site with soap and water, if necessary.
- Do not shave the woman's pubic hair as this increases the risk of wound infection. The hair may be trimmed, if necessary.
- Monitor and record vital signs (blood pressure, pulse, respiratory rate, temperature, oxygen saturation, and fetal heart rate, if applicable).
- Confirm that the indication for the procedure is still valid just before the start of the procedure, as this might have changed, rendering the need for the procedure obsolete (e.g. an emergency caesarean birth for fetal distress may have to be abandoned if the baby is found to have died before the procedure is started).

- Catheterize the bladder if necessary and monitor urine output.
- Ensure that all relevant information is passed on to other members of the team (doctor/midwife, nurse, anaesthetist, assistant and others).

INTRA-OPERATIVE CARE PRINCIPLES

POSITION

Place the woman in a position appropriate for the procedure to allow:

- the optimum exposure of the operative site;
- access for the anaesthetist;
- access for the nurse to take vital signs and monitor IV drugs and infusions;
- the safety of the woman, preventing injuries and maintaining circulation; and
- maintenance of the woman's dignity and modesty.

Note: If the **woman has not given birth**, tilt the operating table to the left or place a pillow or folded linen under her right lower back to decrease supine hypotension syndrome.

SURGICAL HANDSCRUB

- Remove all jewellery.
- Hold hands above the level of the elbow, wet hands thoroughly and apply soap (preferably an iodophore such as betadine).
- Begin at the fingertips and lather and wash, using a circular motion:
 - Wash between all fingers.
 - Move from the fingertips to the elbows of one hand and then repeat with the second hand.
 - Wash for three to five minutes.
- Rinse each arm separately, fingertips first, holding hands above the level of the elbows.

- Dry hands with a sterile towel, wiping from the fingertips to the elbows, or allow hands to air dry.
- Ensure that scrubbed hands do not come into contact with objects (e.g. equipment, protective gown) that are not sterile. If the **hands touch a contaminated surface**, repeat surgical handscrub.

PREPARING THE INCISION SITE

- Prepare the skin with an antiseptic (e.g. iodophors):
 - Apply antiseptic solution three times to the incision site using a sterile ring forceps and a cotton or gauze swab. If the **swab is held with a gloved hand**, do not contaminate the glove by touching unprepared skin.
 - Begin at the proposed incision site and work outward in a circular motion away from the incision site.
 - At the edge of the sterile field, discard the swab.
- Never go back to the middle of the prepared area with the same swab. Keep your arms and elbows high, and keep surgical dress away from the surgical field.
- Drape the woman immediately after the area is prepared to avoid contamination:
 - If the drape has a window, place the window directly over the incision site first.
 - Unfold the drape away from the incision site to avoid contamination.

MONITORING

Monitor the woman's condition regularly throughout the procedure.

- Monitor vital signs (blood pressure, pulse, and respiratory rate), level of consciousness and blood loss.
- Record the findings on a monitoring sheet to allow quick recognition if the woman's condition deteriorates.
- Maintain adequate hydration throughout surgery.

MANAGING PAIN

Maintain adequate pain management throughout the procedure (**page C-55**). Women who are comfortable during a procedure are less likely to move and cause injury to themselves. Pain management can include:

- emotional support and encouragement
- local anaesthesia
- regional anaesthesia (e.g. spinal)
- general anaesthesia.

ANTIBIOTICS

- Give prophylactic antibiotics before starting the procedure (**page C-50**).

MAKING THE INCISION

- When choosing the incision type, carefully consider the woman's past surgical history, the indication for surgery, and potential technical difficulties and complications. For example, for an obstructed labour case with Bandl's ring formation, a sub-umbilical midline incision may be preferable to a Pfannenstiel's incision.
- Make the incision only as large as necessary for the procedure.
- Make the incision with great care and proceed one layer at a time.

HANDLING TISSUE

- Handle tissue gently.
- When using clamps, close the clamp only one ratchet (click), when possible. This will minimize discomfort and reduce the amount of dead tissue that remains behind at the end of the procedure, thus decreasing the risk of infection.

HAEMOSTASIS

Haemostasis is the process in which blood is maintained in a fluid state and confined to the vascular system.

- Ensure haemostasis throughout the procedure to help maintain adequate visualization and to optimize outcomes.
- Women with obstetrical complications often have anaemia. Therefore, keep blood loss to a minimum.

INSTRUMENTS AND SHARPS

- Start and finish the procedure with a count of instruments, sharps and sponges:
 - Perform the count every time a body cavity (e.g. uterus) is closed;
 - Document in the woman's record that the surgical counts were correct.
- Use instruments, especially sharps, carefully to reduce the risk of injury (**page C-32**). Use "safe zones" when handling and passing instruments and sharps:
 - Use a pan such as a kidney basin to carry and pass sharp items, and pass suture needles on a needle holder.
 - Alternatively, pass the instrument with the handle, rather than the sharp end, pointing toward the receiver.

DRAINAGE

- Always leave an abdominal drain in place if:
 - bleeding persists after hysterectomy;
 - a clotting disorder is suspected;
 - infection is present or suspected; or
 - a bladder or ureteral injury is suspected or has been identified and repaired.
- A closed drainage system can be used, or a corrugated rubber drain can be placed through the abdominal wall or pouch of Douglas.
- Remove the drain once the infection has cleared or when no pus or blood-stained fluid has drained for 48 hours.

SUTURE

- Select the appropriate type and size of suture for the tissue (**Table C-7**). Sizes are reported by the number of “0”s:
 - A smaller suture has a greater number of “0”s (e.g. a 000 [3-0] suture is smaller than a 00 [2-0] suture); a suture labelled as “1” is larger in diameter than a “0” suture.
 - A suture that is too small will be weak and may break easily; a suture that is too large in diameter will tear through tissue.
- Refer to the section describing specific procedures for the recommended size and type of suture.

TABLE C-7. Recommended suture types

Suture Type	Tissue	Recommended Number of Knots
Plain catgut	Fallopian tube	3 ^a
Chromic catgut	Muscle	3 ^a
Polyglycolic	Muscle, fascia, skin	4
Nylon	Skin	6
Silk	Skin, bowel	3 ^a

^a These are natural sutures. Do not use more than three knots because this will abrade the suture and weaken the knot.

DRESSING

At the conclusion of surgery, cover the surgical wound with a sterile dressing (**page C-73**).

POSTOPERATIVE CARE PRINCIPLES

INITIAL CARE

- Place the woman in the recovery position:
 - Position the woman on her side with her head slightly extended to ensure a clear airway.
 - Place her upper arm in front of her body for easy access to check blood pressure.

- Place legs so that they are flexed, with the upper leg slightly more flexed than the lower to maintain balance.
- Assess the woman's condition immediately after the procedure:
 - Check vital signs (blood pressure, pulse, respiratory rate, temperature) and oxygen saturation every 15 minutes during the first hour, then every 30 minutes for the next hour.
 - Evaluate for airway obstruction, hypoxia, haemorrhage (internal and external), hypertension and/or hypotension, postoperative pain, hypothermia/shivering, vomiting and aspiration, and residual narcosis.
 - Assess the woman's level of consciousness every 15 minutes until she is alert.

Note: Ensure that the woman has constant supervision until conscious.

- Ensure that there is a clear airway and adequate ventilation.
- Transfuse if necessary (**page C-37**).
- If **vital signs become unstable** or if the **haematocrit continues to fall despite transfusion**, quickly return to the operating theatre because bleeding might be the cause.

GASTROINTESTINAL FUNCTION

Gastrointestinal function typically returns rapidly for obstetrical patients. For most uncomplicated procedures, bowel function should be normal within 12 hours of surgery.

- If the **surgical procedure was uncomplicated**, give the woman a liquid diet and advance to a regular diet as tolerated.
- If there were **signs of infection**, or if the **caesarean was for obstructed labour or uterine rupture**, wait until bowel sounds are heard before giving liquids.
- If the **woman is receiving IV fluids**, continue the fluids until she is taking liquids well.
- If you **anticipate that the woman will receive IV fluids for 48 hours or more**, infuse a balanced electrolyte solution (e.g. potassium chloride 1.5 g in 1 L IV fluids).

- If the **woman receives IV fluids for more than 48 hours**, monitor electrolytes every 48 hours. Prolonged infusion of IV fluids can alter electrolyte balance.
 - Whenever a woman is receiving IV fluids, monitor her intake and output closely.
- Ensure that the woman is eating a regular diet before discharge from the hospital.

DRESSING AND WOUND CARE

The dressing is a protective barrier against infection while a healing process known as “re-epithelialization” occurs. Keep the dressing on the wound for the first day after surgery to protect against infection while re-epithelialization occurs. Thereafter, a dressing is not necessary.

- **If blood or fluid is leaking through the initial dressing**, do not change the dressing:
 - Reinforce the dressing.
 - Monitor the amount of blood/fluid lost by outlining the blood stain on the dressing with a pen.
 - **If bleeding increases or the blood stain covers half the dressing or more**, remove the dressing and inspect the wound. Replace with another sterile dressing.
- If the **dressing comes loose**, reinforce with more tape rather than removing the dressing. This will help maintain the sterility of the dressing and reduce the risk of wound infection.
- Change the dressing using sterile technique.
- The wound should be clean and dry, without evidence of infection or seroma, before the woman’s discharge from the hospital.

ANALGESIA

Adequate postoperative pain control is important (**page C-55**). A woman who is in severe pain does not recover well.

Note: Avoid over-sedation as this will limit mobility, which is important during the postoperative period.

BLADDER CARE

A urinary catheter may be required for some procedures. Early catheter removal reduces the risk of infection and encourages the woman to walk.

- If the **urine is clear**, remove the catheter eight hours after surgery or after the first postoperative night.
- If the **urine is not clear**, leave the catheter in place until the urine is clear.
- Wait 48 hours after surgery before removing the catheter if there was:
 - uterine rupture
 - prolonged or obstructed labour
 - massive perineal oedema
 - puerperal sepsis with pelvic peritonitis.

Note: Ensure that the urine is clear before removing the catheter.

- If the **bladder was injured** (from either uterine rupture or during caesarean or laparotomy):
 - Leave the catheter in place for a minimum of seven days and until the urine is clear.
 - If the **woman is not currently receiving antibiotics**, give nitrofurantoin 100 mg by mouth once daily until the catheter is removed, for prophylaxis against cystitis.
 - If **there is a suspicion of a bladder injury** (e.g. the woman has had prolonged obstructed labour), consider leaving the catheter in for seven days.

ANTIBIOTICS

- If there were **signs of infection or the woman currently has a fever**, continue antibiotics until the woman is fever-free for 48 hours (**page C-49**).

SUTURE REMOVAL

Major support for abdominal incisions comes from the closure of the fascial layer. Remove skin sutures five days after surgery.

FEVER

- A fever (temperature of 38°C or more) that occurs postoperatively should be evaluated (**page S-127**).
- Ensure that the woman is fever-free for a minimum of 24 hours before discharge from the hospital.

AMBULATION

Ambulation enhances circulation, encourages deep breathing and stimulates the return of normal gastrointestinal function. Encourage foot and leg exercises and mobilize as soon as possible, usually within 24 hours.

Encourage the woman to mobilize as soon as appropriate after giving birth, taking gentle exercise and making time to rest during the postnatal period.

SAFE SURGERY CHECKLIST

The World Health Organization (WHO) has undertaken a number of global and regional initiatives to address surgical safety, including the development of the *WHO Surgical Safety Checklist* (WHO, 2009). Countries are encouraged to adapt the checklist to their practice settings and circumstances using the checklist's accompanying implementation manual.

Every woman has a right to the highest attainable standard of health, the right to dignified, respectful health care throughout pregnancy and childbirth, and the right to be free from violence and discrimination. Abuse, neglect or disrespect during childbirth is a violation of a woman's fundamental human rights, as described in internationally adopted human rights standards and principles.

DIAGNOSIS AND CONFIRMATION OF LABOUR

- Suspect or anticipate labour if a woman has:
 - intermittent abdominal pain after 22 weeks of gestation;
 - abdominal pain/contractions often associated with blood-stained mucus discharge (show); and/or
 - watery vaginal discharge or a sudden gush of water.
- Confirm the onset of labour if there is:
 - cervical effacement—the progressive shortening and thinning of the cervix during labour; and
 - cervical dilatation—the increase in diameter of the cervical opening, measured in centimetres (**Fig. C-4, page C-81**).

DIAGNOSIS OF STAGE AND PHASE OF LABOUR

- Diagnose the stage of labour based on cervical dilatation (**Table C-8, page C-78**).
- Diagnose the phase of labour (**Table C-8, page C-78**) based on:
 - cervical dilatation during the first stage of labour; and
 - the woman's urge to push during the second stage of labour.

An incorrect diagnosis of labour can lead to unnecessary anxiety and interventions.

TABLE C-8. Diagnosis of stage and phase of labour based on cervical dilatation

Symptoms and Signs	Stage	Phase
<ul style="list-style-type: none"> • Cervix not dilated 	False labour/ not in labour	
<ul style="list-style-type: none"> • Cervix dilated less than 4 cm 	First	Latent
<ul style="list-style-type: none"> • Cervix dilated 4 cm up to 10 cm • Rate of dilatation typically 1 cm per hour or more • Fetal descent begins 	First	Active
<ul style="list-style-type: none"> • Cervix fully dilated (10 cm) • Fetal descent continues • No urge to push 	Second	Early (nonexpulsive)
<ul style="list-style-type: none"> • Cervix fully dilated (10 cm) • Presenting part of fetus reaches pelvic floor • Woman has the urge to push 	Second	Late (expulsive)

The third stage of labour begins with the birth of the baby and ends with the expulsion of the placenta.

INITIAL ASSESSMENT OF A WOMAN IN LABOUR

RAPID ASSESSMENT

- Ask the woman if she has had any danger signs (vaginal bleeding, gush of fluid or any problems such as fever, difficulty breathing, cough, leg pain, etc.) or has any concerns.
- Perform a rapid initial assessment (**page C-1**) of the woman (airway, breathing, circulation, vaginal bleeding, level of consciousness, convulsions, temperature higher than 38°C, abdominal pain).
- Assess fetal condition:
 - Listen to the fetal heart rate immediately after a contraction.
 - Count the fetal heart rate for a full minute.
 - If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-109**).

- Respond immediately to any abnormalities in vital signs or other problems identified during the rapid initial assessment.

HISTORY

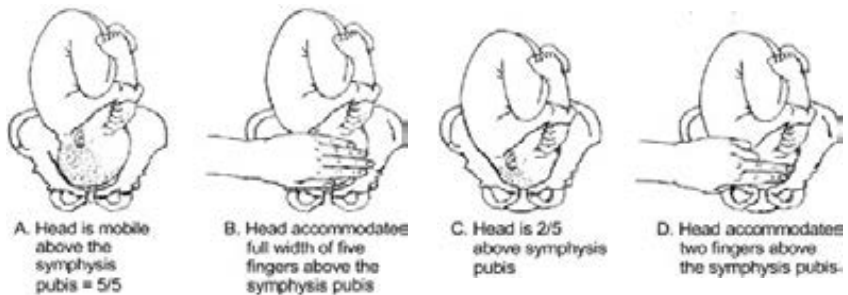
- Ask the woman about the history of this labour: approximate time contractions began and membranes ruptured.
- Ask the woman about or check her record for:
 - past obstetric, medical and surgical history, especially abdominal or pelvic surgeries or past caesarean(s);
 - problems during the current pregnancy (e.g. high blood pressure, pre-eclampsia, anaemia, malaria, sexually transmitted infections) and management;
 - haemoglobin;
 - tetanus vaccination status; and
 - syphilis, HIV and tuberculosis status.
- Check the woman's record. If she has no record:
 - Ask her when the birth is expected.
 - Determine the gestational age. If preterm (before 37 weeks of pregnancy are completed), manage as preterm labour (**page S-144**).

ABDOMINAL PALPATION

- Check the woman's abdomen for:
 - a caesarean scar;
 - a horizontal ridge across lower abdomen (if present, ask the woman to empty her bladder and observe her again).
- Assess uterine contractions:
 - Observe the woman's response to contractions:
 - Is she coping well or is she distressed?
 - Is she pushing or grunting? If so, manage as second stage of labour (**page C-97**).

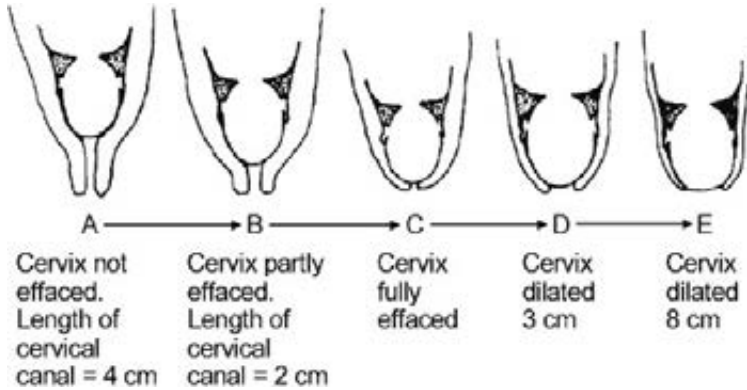
- Assess the number of uterine contractions in 10 minutes and their duration in seconds.
- Assess fetal lie—longitudinal or transverse—and fetal presentation.
 - Fetal lie other than longitudinal and presentations in labour other than cephalic are considered malpositions or malpresentations (**page S-83**).
- Assess **descent** in terms of fifths of fetal head palpable above the symphysis pubis (**Fig. C-3 A–D**):
 - A head that is entirely above the symphysis pubis is five fifths (5/5) palpable (**Fig. C-3 A–B**).
 - A head that is entirely below the symphysis pubis is zero fifths (0/5) palpable.

FIGURE C-3. Abdominal palpation for descent of the fetal head



VAGINAL EXAMINATION (page C-90)

- Assess cervical dilatation and effacement:

FIGURE C-4. Effacement and dilatation of the cervix

- Note the status of membranes. If the **membranes have ruptured**, note the colour of the draining amniotic fluid:
 - The presence of thick meconium indicates the need for close monitoring and possible intervention for management of fetal distress (**page S-109**).

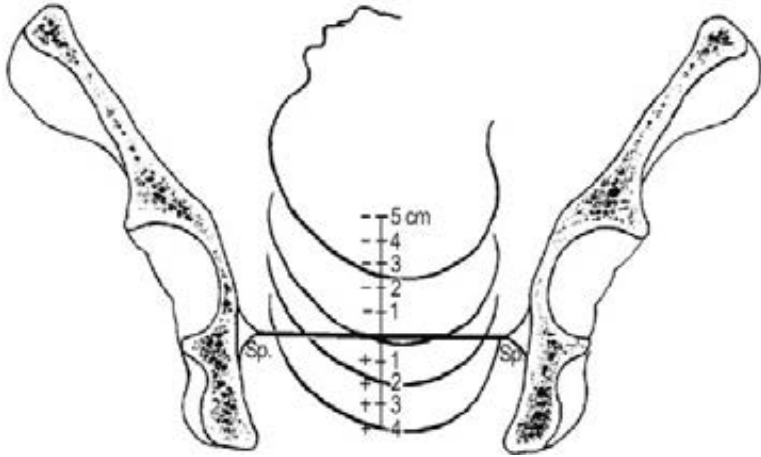
Routine antibiotics are **not recommended** in cases of meconium-stained amniotic fluid in the absence of other indications. Personnel experienced in neonatal resuscitation should attend the birth of infants if thick meconium liquor is noted, as meconium aspiration is clinically more significant in cases of thick meconium.

- The presence of foul-smelling watery discharge indicates the need to manage as amnionitis (**page S-163**).

Antibiotics should be administered when characteristics of the liquor suggest infection (**page S-182**).

- An absence of fluid draining after rupture of the membranes is an indication of reduced volume of amniotic fluid, which may be associated with fetal distress.
- If necessary, a vaginal examination may be used to assess **descent** by relating the level of the fetal presenting part to the ischial spines of the maternal pelvis (**Fig. C-5, page C-82**).

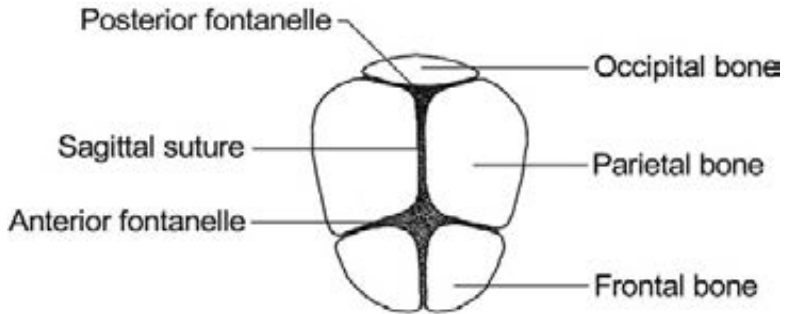
FIGURE C-5. Assessing descent of the fetal head by vaginal examination; 0 station is at the level of the ischial spine (Sp)



Note: When there is a **significant degree of caput or moulding**, assessment by abdominal palpation using fifths of head palpable is more useful than assessment by vaginal exam.

- Determine **presenting part** during vaginal examination:
 - The most common presenting part is the vertex of the fetal head. If the **vertex is not the presenting part**, manage as a malpresentation (**Table S-16, page S-88**).
 - If the **vertex is the presenting part**, use landmarks on the fetal skull to determine the position of the fetal head in relation to the maternal pelvis (**Fig. C-6**).

FIGURE C-6. Landmarks of the fetal skull



- Determine the **position of the fetal head** during vaginal examination:
 - The fetal head normally engages in the maternal pelvis in an **occiput transverse position**, with the fetal occiput transverse in the maternal pelvis (**Fig. C-7**).

FIGURE C-7. Occiput transverse positions

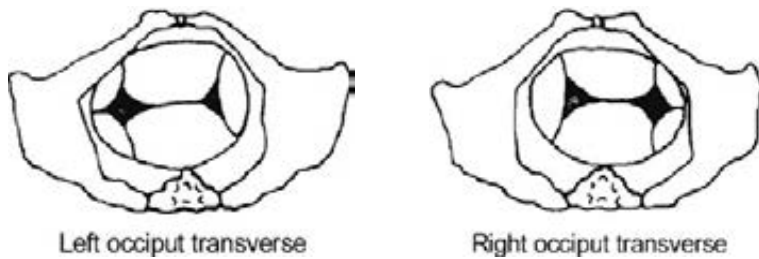
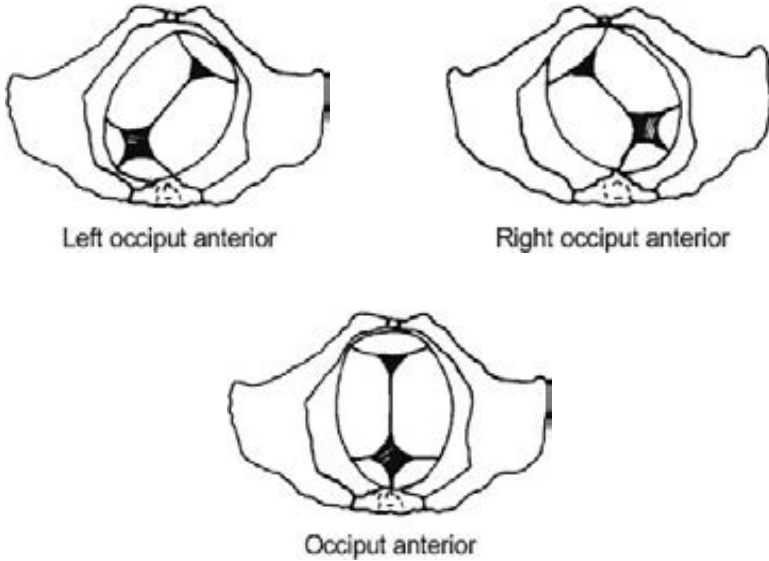
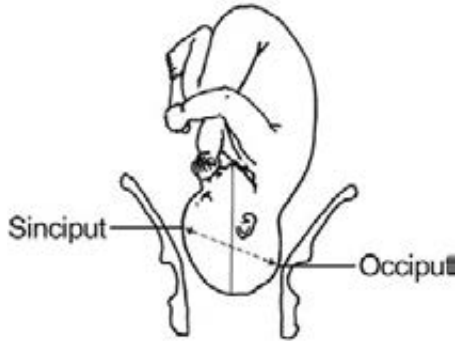


FIGURE C-8. Occiput anterior positions

- With descent, the fetal head rotates so that the fetal occiput is anterior in the maternal pelvis (**occiput anterior position; Fig. C-8**). Failure of an occiput transverse position to rotate to an occiput anterior position should be managed as an occiput posterior position (**page S-91**).
- An additional feature of a normal presentation is a **well-flexed vertex (Fig. C-9, page C-85)**, with the occiput lower in the vagina than the sinciput.

FIGURE C-9. Well-flexed vertex

NOTE: If there are positions or presentations in labour other than occiput anterior with a well-flexed vertex, manage as malpositions or malpresentations (**page S-85**).

CARE DURING LABOUR AND CHILDBIRTH

- Review findings from the woman's history, physical examination and assessment, and make plans to care for the woman based on her individual needs and the stage and phase of labour. Communicate with the woman and her companion about the plan:
 - Administer intrapartum antibiotic (ampicillin or penicillin G) to all women with documented Group B streptococcus colonization, except where there are contraindications.
 - Provide counselling and testing for HIV and syphilis if this was not done during the third trimester of pregnancy.
 - As needed, provide prophylactic treatments and ongoing management of obstetric or medical problems per protocols.
 - Plan to assess the progress of maternal condition, fetal condition and labour based on the phase and stage of labour, and any identified problems (**page C-88-89**).
 - Provide supportive care (**page C-86**).

- If the woman is in the latent phase of the first stage of labour and able to be receptive to health education counselling, provide information regarding infant feeding and postpartum family planning.

SUPPORTIVE CARE

- Ensure that the woman has a companion of her choice and, where possible, the same health care provider throughout labour and childbirth:
 - Encourage the woman to have support from a person of her choice throughout labour and childbirth. Supportive companionship can enable a woman to face fear and pain, while reducing loneliness and distress, and can promote positive physiologic birth outcomes.
 - Where possible, encourage companions to take an active role in her care.
 - Encourage the companion to give support to the woman during labour and childbirth (e.g. by rubbing her back, wiping her brow with a wet cloth, helping her move about).
 - Arrange seating for the companion next to the woman.
 - During the second stage, position the companion at the top of the bed to allow the companion to focus on caring for the woman's emotional needs.
- Ensure good communication and support by staff:
 - Explain all procedures, seek permission and discuss findings with the woman.
 - Provide a supportive, encouraging atmosphere for birth that is respectful of the woman's wishes.
 - Ensure privacy and confidentiality.
- Maintain cleanliness of the woman and her environment:
 - Encourage the woman to wash herself or bathe or shower at the onset of labour.
 - Wash the vulval and perineal areas before each examination.
 - Wash your hands with soap before and after each examination.

- Ensure the cleanliness of the labouring and birthing area(s).
- Clean up all spills immediately.
- Ensure mobility:
 - Encourage the woman to move about freely, especially to be in an upright position.
 - Support the woman's choice of position during labour and birth (**Fig. C-10**).

FIGURE C-10. Some positions that a woman may adopt during labour



- Encourage the woman to empty her bladder regularly. Note: Do not routinely catheterize women in labour.
- Encourage the woman to eat and drink as she wishes. If the **woman has visible severe wasting or tires during labour**, make sure she is fed. Nutritious liquid drinks are important, even in late labour.
- Teach the woman breathing techniques for labour and childbirth. Encourage the woman to breathe out more slowly than usual and relax with each expiration.
- Help the woman in labour who is anxious, fearful or in pain:
 - Give her praise, encouragement and reassurance.
 - Give her information on the process and progress of her labour.
 - Listen to the woman and be sensitive to her feelings.
 - Encourage her birth companion to provide the same support.
- If the woman is distressed by pain:
 - Suggest changes of position (**Fig. C-10**).

- Encourage mobility.
- Encourage her companion to massage her back or hold her hand, sponge her face between contractions and place a cool cloth at the back of her neck.
- Encourage the woman to use the breathing techniques.
- Encourage the woman to take a warm bath or shower.
- If necessary, offer morphine 0.1 mg/kg body weight IM, informing the woman of the advantages and disadvantages and obtaining consent.
- **Avoid** the following practices:
 - Do not routinely shave the perineal/pubic area prior to a vaginal birth.
 - Do not routinely cleanse the vagina with an antiseptic (e.g. chlorhexidine) during labour for the purpose of preventing infectious morbidities, even in women with documented Group B streptococcus colonization.
 - Do not routinely give an enema to women in labour.

ASSESSMENT OF MATERNAL CONDITION

- Monitor the woman's condition:
 - During the **latent phase** of the first stage of labour: Check maternal mood and behaviour (distressed, anxious) at least once every hour; check blood pressure, pulse and temperature at least once every four hours.
 - During the **active phase** of first stage of labour: Check maternal mood and behaviour (distressed, anxious) at least once every 30 minutes; check blood pressure at least once every four hours, temperature at least once every two hours and pulse once every 30 minutes.
 - During **second stage**: Check maternal mood and behaviour (distressed, anxious) at least once every five minutes.
- Evaluate the woman for emergency signs and for signs of distress, and respond appropriately:
 - If the **woman's pulse is increasing**, she may be dehydrated or in pain or she may be developing a fever.

- Ensure adequate hydration via oral or IV routes.
- Provide adequate analgesia (**page C-55**).
- If the **woman's temperature is higher than 38°C**, manage the cause of the fever (**page S-113**) and monitor temperature at least every two hours.
- If the **woman's blood pressure decreases**, suspect occult or frank haemorrhage.
- If **acetone is present in the woman's urine**, suspect poor nutrition or dehydration and encourage her to eat or drink; otherwise, give dextrose IV.

ASSESSMENT OF FETAL CONDITION

- Count the fetal heart rate for a full minute at least once every hour during the latent phase, once every 30 minutes during the active phase and every five minutes during the second stage.
 - If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-109**).

ASSESSMENT OF PROGRESS OF LABOUR

- Once diagnosed, progress of labour is assessed by:
 - measuring changes in cervical effacement and dilatation (**Fig. C-4, page C-81**) during the latent phase;
 - measuring the rate of cervical dilatation and fetal descent (**Fig. C-4, page C-81, and Fig. C-5, page C-82**) during the active phase; and
 - assessing further fetal descent during the second stage.
- If **unsatisfactory progress of labour or prolonged labour is suspected**, manage the cause of slow progress (**page S-73**).

Progress of the first stage of labour should be plotted on a partograph once the woman enters the active phase of labour. A sample partograph is shown in **Fig. C-12, page C-94**. Alternatively, plot a simple graph of cervical dilatation (centimetres) on the vertical axis against time (hours) on the horizontal axis.

UTERINE CONTRACTIONS

- Count the number of contractions in a 10-minute time period and their duration in seconds at least once every hour during the latent phase and once every 30 minutes during the active phase.
 - Contractions are considered to be efficient if they result in progressive dilatation of the cervix.
 - In general, contractions are considered to be efficient during the active phase if there are three or more contractions in 10 minutes, each lasting more than 40 seconds.
 - The uterus should relax between contractions.

VAGINAL EXAMINATIONS

During the first stage of labour and after rupture of the membranes, vaginal examinations should be carried out once every four hours, unless there is a clinical indication to perform them more frequently. Plot the findings on a partograph if the woman is in the active phase of labour.

Multiple vaginal examinations increase a woman's risk of infection, especially in the presence of other infection risk factors (e.g. prolonged rupture of membranes and/or labor.) Do not perform vaginal exams more frequently than every four hours unless there is a clear indication. Always maintain hygienic technique when performing vaginal exams (see **page C-26**).

- Inform the woman adequately about the necessity of the vaginal examination, what to expect and information to be gained by performing the exam; address the woman's fears and anxieties, and give her the opportunity to ask questions.
- The woman should not be assisted in the removal of her clothing unless it has been clarified that assistance is required.
- Obtain the woman's informed consent and permission before conducting the examination.
- Do not force the woman's legs apart. Talk her gently through the exam and wait until she is ready for you to begin.
- If available, use a lubricant when performing a vaginal examination; if a lubricant is not available, wet the glove with clean water.

- Assist the woman in assuming the position of her choice, and maintain eye contact during the examination to decrease any feelings of vulnerability.
- After the examination, provide information on your findings and how they affect the plan of care.
- At each vaginal examination, record the following:
 - status of membranes;
 - colour of amniotic fluid (liquor), if membranes are ruptured;
 - cervical dilatation and effacement; and
 - descent (can also be assessed abdominally).
- If the **cervix is not dilated on first examination**, it might not be possible to diagnose labour.
 - If **contractions persist**, re-examine the woman for cervical changes after four hours. At this stage, if there is **effacement and dilatation**, the woman is in labour; if there is **no change**, the diagnosis is false labour.
 - In the second stage of labour, perform vaginal examinations once every hour.

USING THE PARTOGRAPH

The WHO partograph has been modified to make it simpler and easier to use. The latent phase has been removed, and plotting on the partograph begins in the active phase when the cervix is 4 cm dilated. A sample partograph is included (**Fig. C-12, page C-94**). Note that the partograph should be enlarged to full size before use. Record the following on the partograph:

Client information: Record the woman's name, gravida, para, hospital number, date and time of admission, and time of ruptured membranes or time elapsed since rupture of membranes (if rupture occurred before charting on the partograph began).

Fetal heart rate: Record every half hour.

Amniotic fluid: Record the colour of the amniotic fluid and the status of membranes at every vaginal examination:

- I: membranes intact

- R: membranes ruptured
- C: membranes ruptured, clear fluid
- M: meconium-stained fluid
- B: blood-stained fluid.

Moulding:

1. sutures apposed
2. sutures overlapped but reducible
3. sutures overlapped and not reducible.

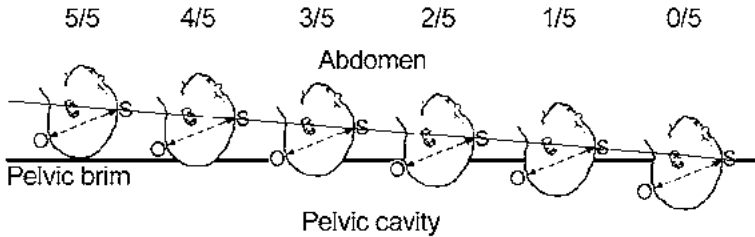
Cervical dilatation: Assess at every vaginal examination and mark a cross (X) on the partograph. Begin plotting on the partograph at 4 cm.

Alert line: A line starts at 4 cm of cervical dilatation to the point of expected full dilatation at the rate of 1 cm per hour.

Action line: Parallel and four hours to the right of the alert line.

Descent assessed by abdominal palpation: Refers to the part of the head (divided into five parts) palpable above the symphysis pubis; record as a circle (O) at every abdominal examination. At 0/5, the sinciput (S) is at the level of the symphysis pubis.

FIGURE C-11. Descent assessed by abdominal palpation






Completely above	Sinciput high, Occiput easily felt	Sinciput easily felt, Occiput felt	Sinciput felt, Occiput just felt	Sinciput felt, Occiput not felt	None of head palpable
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Hours: Record the time elapsed since onset of active phase of labour (observed or extrapolated).

Time: Record actual time.

Contractions: Chart every half hour; count the number of contractions in a 10-minute time period and their duration in seconds:

- Less than 20 seconds: 
- Between 20 and 40 seconds: 
- More than 40 seconds: 

Oxytocin: Record the amount of oxytocin per volume IV fluids in drops per minute every 30 minutes when used.

Drugs given: Record any additional drugs given.

Pulse: Record every 30 minutes and mark with a dot (●).

Blood pressure: Record every four hours and mark with arrows.

Temperature: Record every two hours.

Protein, acetone and volume: Record when urine is passed.

FIGURE C-12. The modified WHO Partograph

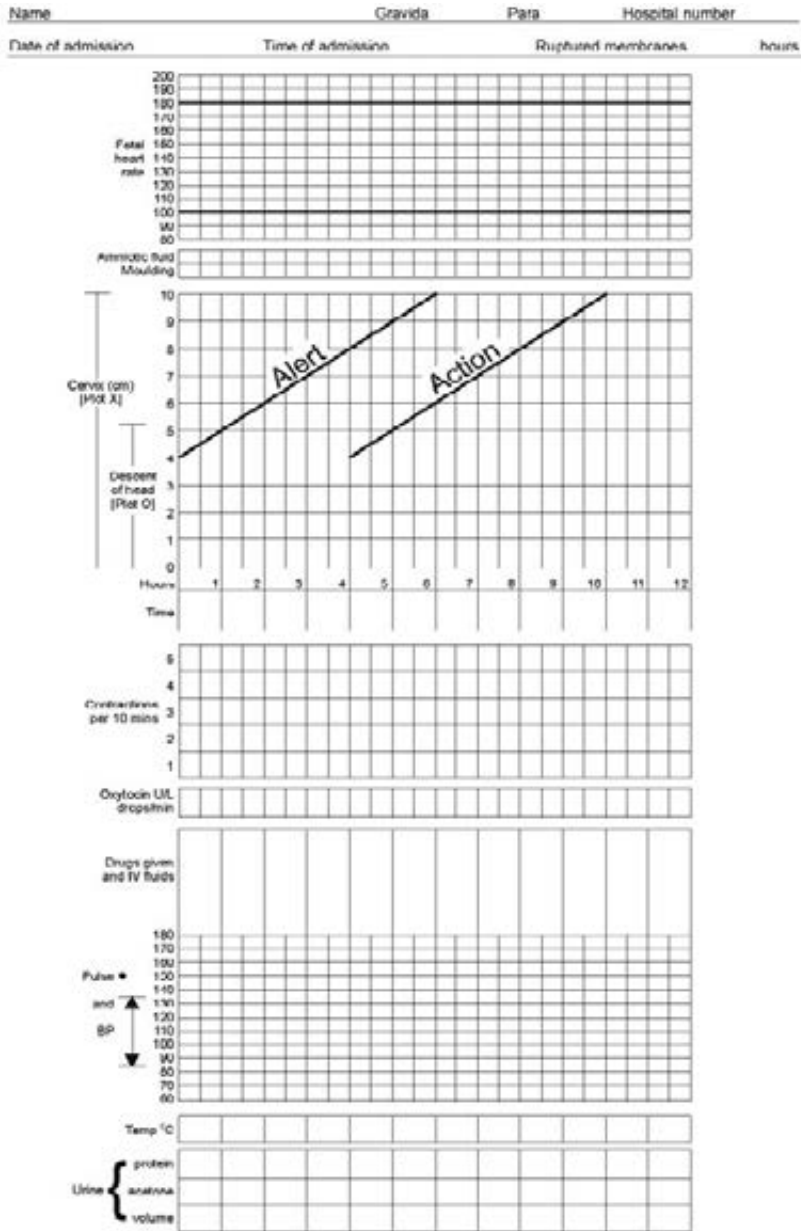


Fig. C-13, page C-96, is a sample partograph for normal labour:

- A multigravida was admitted in the latent phase of labour at 5:00 with the following circumstances:
 - fetal head 4/5 palpable;
 - cervix dilated 2 cm;
 - three contractions in 10 minutes, each lasting 20 seconds; and
 - normal maternal and fetal condition.

Note: Because the woman was in the latent phase of labour, this information was not plotted on the partograph.

- At 9:00:
 - the fetal head was 3/5 palpable;
 - the cervix dilated 5 cm; and
 - four contractions were counted in 10 minutes, each lasting 35 seconds.

Note: The woman was in the active phase of labour and this information was plotted on the partograph. Cervical dilatation was plotted on the alert line.

- At 11:00:
 - the fetal head was 2/5 palpable; and
 - four contractions were counted in 10 minutes, each lasting 45 seconds.
- At 13:00:
 - the fetal head was 0/5 palpable;
 - cervical dilatation progressed at a rate of more than 1 cm per hour and the cervix was fully dilated; and
 - five contractions were counted in 10 minutes, each lasting 45 seconds.
- Spontaneous vaginal birth occurred at 13:20.

PROGRESS OF FIRST STAGE OF LABOUR

- The following findings are suggestive of **satisfactory progress** in the first stage of labour:
 - regular contractions of progressively increasing frequency and duration;
 - rate of cervical dilatation at least 1 cm per hour during the active phase of labour (cervical dilatation on or to the left of the alert line); and
 - cervix well applied to the presenting part.
- The following findings are suggestive of **unsatisfactory progress** in the first stage of labour:
 - woman still in latent phase after eight hours of regular contractions;
 - OR irregular and infrequent contractions (two contractions or fewer in 10 minutes, each lasting less than 40 seconds) once active phase begins;
 - OR rate of cervical dilatation slower than 1 cm per hour during the active phase of labour (cervical dilatation to the right of alert line);
 - OR cervix poorly applied to the presenting part;
 - OR secondary arrest of cervical dilatation and descent of presenting part in the presence of adequate frequency and strength of contractions.

Unsatisfactory progress in labour can lead to prolonged labour and must be recognized and addressed promptly to reduce the risk of ruptured uterus and other complications (**Table S-15, page S-74**).

PROGRESS OF SECOND STAGE OF LABOUR

- Findings suggestive of **satisfactory progress** in the second stage of labour are:
 - steady descent of fetus through birth canal; and
 - onset of expulsive (pushing) phase.
- Findings suggestive of **unsatisfactory progress** in the second stage of labour are:

- lack of descent of fetus through the birth canal;
- failure of expulsive effort to develop during the late (expulsive) phase.

NORMAL CHILDBIRTH

Prepare for birth by preparing all equipment and supplies and, if feasible, calling for an assistant.

- Ensure that the birthing room is warm (25°C), with no draughts.
- Never leave the woman alone.
- Ensure that the woman's bladder is empty (only catheterize the woman if the bladder is full and she is unable to void).
- Assist the woman into a position of her choice, as upright as possible to facilitate physiologic birth, and ensure her comfort in this position.
- Offer her emotional and physical support.
- Once the cervix is fully dilated and the woman is in the expulsive phase of the second stage (woman has the urge to push), encourage her to assume the position she prefers (**Fig. C-14, page C-99**).

FIGURE C-14. Some positions that a woman may adopt during childbirth



General methods of supportive care during labour are most useful in helping the woman tolerate labour pains.

- Support the woman to push as she wishes with contractions. **Do not** urge her to push, particularly if the fetus remains at the pelvic midpoint.
- Continue to monitor the woman's condition (mood and behaviour), the condition of the fetus (fetal heart rate) and progress of labour (frequency, intensity and duration of contractions; perineum thinning and bulging; visible descent of the fetal head during contractions).
- If, after 30 minutes of spontaneous expulsive efforts, the perineum does not begin to thin and stretch with contractions, do a vaginal examination to confirm full dilatation of the cervix.

Note: Episiotomy is **not** recommended as a routine procedure. There is no evidence that routine episiotomy decreases perineal damage, future vaginal prolapse or urinary incontinence. In fact, routine episiotomy is associated with an increase of third and fourth degree tears and subsequent anal sphincter muscle dysfunction.

BIRTH OF THE HEAD

- Ask the woman to pant or give only small pushes with contractions as the baby's head is born.
- To control the birth of the head, place the fingers of one hand against the baby's head to keep it flexed (bent).
- Continue to gently support the perineum as the baby's head is born.
- Once the baby's head is born, ask the woman not to push.

Note: Routine intrapartum nasal or oral suction should **not** be done, even in babies born through liquor with meconium.

- Feel around the baby's neck for the umbilical cord:
 - If the **cord is around the neck but it is loose**, slip it over the baby's head.
 - If the **cord is tight around the neck**, doubly clamp and cut it before unwinding it from around the neck.

COMPLETION OF THE BIRTH

- Allow the baby's head to turn spontaneously.
- After the head turns, place a hand on each side of the baby's head. Tell the woman to push gently with the next contraction.
- Reduce tears by supporting the birth of one shoulder at a time. Move the baby's head posteriorly to facilitate birth of the anterior shoulder.

Note: If there is **difficulty delivering the shoulders**, or if the infant's head retracts against the perineum as it is born, suspect shoulder dystocia (**page S-99**).

- Lift the baby's head anteriorly to deliver the shoulder that is posterior.
- Support the rest of the baby's body with one hand as it slides out.
- Place the baby on the mother's abdomen.
- Thoroughly dry the baby and wipe the eyes. Remove the wet cloth.

Note: For neonates born through meconium-stained amniotic fluid who start breathing on their own, suctioning of the mouth or nose or tracheal suctioning should not be performed.

- Note the time of birth.
- Keep the baby warm; position skin-to-skin with the mother and cover the baby's head and body.

- Assess the baby's breathing:

Note: Most babies begin crying or breathing spontaneously within 30 seconds of birth:

- If the **baby is crying or breathing** (chest rising at least 30 times per minute), leave the baby with the mother.
- If the **baby does not start breathing**, stimulate the baby by rubbing the back two or three times.
- If, after drying and brief stimulation, the baby is still not crying or breathing, **call for help**, clamp and cut the umbilical cord and move the newborn to a flat surface to initiate resuscitation, including initiating positive-pressure ventilation within one minute after birth (**page S-167**).

Anticipate the need for resuscitation and have a plan to get assistance for every baby, but especially if the mother has a history of eclampsia, bleeding, prolonged or obstructed labour, preterm birth, or infection.

- If the **baby is breathing normally**, clamp and cut the umbilical cord one to three minutes after the birth of the baby, while initiating simultaneous essential newborn care.

Note: Only clamp the cord early (within one minute) if the newborn needs to be moved immediately for resuscitation.

- Ensure that the baby is kept warm and in skin-to-skin contact on the mother's chest. Keep the baby covered with a soft, dry cloth or blanket, and ensure that the baby's head is covered to prevent heat loss.
- If the **mother is not well**, request the support of an assistant so that both mother and baby can be appropriately monitored and cared for.
- Palpate the woman's abdomen to rule out the presence of an additional baby(s), and proceed with active management of the third stage of labour.

ACTIVE MANAGEMENT OF THE THIRD STAGE OF LABOUR

Active management of the third stage (active delivery of the placenta) helps prevent postpartum haemorrhage. It includes administration of a uterotonic medication within one minute after the birth of the baby. It may also include:

- controlled cord traction; and
- verification of uterine tone and, if the uterus is not well contracted, uterine massage.

The most important intervention to reduce postpartum hemorrhage is the immediate postpartum administration of a uterotonic within one minute of birth. Controlled cord traction is optional and should only be performed by a skilled provider.

IMMEDIATE POSTPARTUM UTEROTONIC

- Immediately after the birth of the baby, palpate the abdomen to rule out the presence of an additional baby(s).
- In the absence of an additional baby(s), **give oxytocin 10 units IM.**

Make sure there is no additional baby(s) before giving an injectable uterotonic medication IM or giving large doses of misoprostol orally.

Note: Oxytocin is preferred because it is effective two to three minutes after injection, has minimal side effects and can be used in all women.

- **If oxytocin is not available**, give:
 - oral misoprostol 600 mcg;
 - OR ergometrine (0.2 mg IM) or methylergometrine;
 - OR the fixed drug combination of oxytocin and ergometrine (1 mL = 5 IU oxytocin + 0.5 mg ergometrine).

Do not give ergometrine to women with pre-eclampsia, eclampsia or high blood pressure because it increases the risk of convulsions and cerebrovascular accidents.

CONTROLLED CORD TRACTION

The placenta may be allowed to deliver physiologically or can be delivered via controlled cord traction by a skilled provider. Controlled cord traction is contraindicated in settings without a skilled birth attendant.

- After cutting the cord, clamp the cord close to the perineum using sponge forceps. Hold the clamped cord and the end of the forceps with one hand.
- Place the other hand just above the woman's pubic bone and stabilize the uterus by applying counter-traction during controlled cord traction. This helps prevent inversion of the uterus.

Never apply cord traction (pull) without applying counter-traction (push) above the pubic bone with the other hand.

- Keep slight tension on the cord and await a strong uterine contraction (two to three minutes).
- When the **uterus becomes rounded (globular) or the cord lengthens**, very gently pull downward on the cord to deliver the placenta. Do not wait for a gush of blood before applying traction on the cord. Continue to apply counter-traction to the uterus with the other hand.
- If the **placenta does not descend** (i.e. there are no signs of placental separation) during 30 to 40 seconds of controlled cord traction, do not continue to pull on the cord. Instead:
 - Gently hold the cord and wait until the uterus is well contracted again. If necessary, use a sponge forceps to clamp the cord closer to the perineum as it lengthens.
 - With the next contraction, repeat controlled cord traction with counter-traction.
- As the placenta delivers, the thin membranes can tear off. Hold the placenta in two hands and gently turn it several times in a clockwise fashion until the membranes are twisted.
- Slowly pull to complete the delivery.

- If the **membranes tear**, gently examine the upper vagina and cervix while wearing sterile gloves. Use a sponge forceps to remove any pieces of membrane that are present.
- Examine the placenta carefully to be sure none of it is missing. If a **portion of the maternal surface is missing or if there are torn membranes with vessels**, suspect retained placental fragments (**page S-44**).
- **If uterine inversion occurs**, reposition the uterus (**page P-109**).
- If the **cord is pulled off**, manual removal of the placenta may be necessary (**page P-91**).
- Dispose of the placenta in a correct, safe and culturally appropriate manner.

VERIFICATION OF UTERINE TONE

- Immediately assess uterine tone. If **the uterus is soft**, massage the fundus of the uterus through the woman's abdomen until the uterus is contracted.

Note: Sustained uterine **massage** is not recommended as an intervention to prevent postpartum haemorrhage in women who have received a prophylactic uterotonic.

- Ensure that the uterus does not become relaxed (soft) after you stop uterine massage.
- Teach the woman how to assess uterine tone and massage her own uterus should it become soft.
- Estimate and record blood loss.

EXAMINATION FOR TEARS

- Examine the woman carefully and repair any tears to the cervix (**page P-95**) or vagina (**page P-97**), or repair the episiotomy (**page P-87**).

POSTPARTUM INTRAUTERINE DEVICE

- If a woman is medically eligible, has been appropriately counselled and has chosen postpartum insertion of an intrauterine device (IUD), either copper or levonorgestrel, proceed to postplacental insertion of the IUD just after expulsion and verification of an intact placenta.

CARE OF THE WOMAN AND NEWBORN DURING THE FIRST TWO HOURS AFTER CHILDBIRTH/BIRTH

- Keep the woman and her newborn in the birthing room for at least one hour after delivery of the placenta.

Avoid separating the woman from her baby whenever possible. Do not leave them unattended at any time.

- Conduct an examination of the woman and newborn before transferring them to the postpartum ward.
- Ensure that the room is warm (25°C).
- **Do not** discharge the woman and her newborn from the facility earlier than 24 hours after the birth.

CARE OF THE WOMAN

- Clean the woman and the area beneath her. Put a sanitary pad or folded clean cloth under her buttocks to collect blood. Help her change clothes if necessary.
- Monitor the woman's condition every 15 minutes for the first two hours and respond immediately if there are abnormal findings:
 - Assess uterine **tone** for early identification of uterine atony. Massage the uterus if atonic. Ensure that the uterus does not become relaxed (soft) after you stop uterine massage.
 - Measure blood pressure and pulse.

- Measure and record blood loss.

Note: If bleeding is excessive, investigate the cause(s) for the bleeding (uterine atony, vaginal/cervical laceration, retained placenta) and treat appropriately (see **Vaginal bleeding after childbirth, page S-29**).

- For emergency signs, assess the woman using rapid assessment and manage per protocols.
- Encourage the woman to empty her bladder and ensure that she has passed urine.
- Encourage the woman to eat, drink and rest.
- Advise the woman on postpartum care, nutrition and hygiene.
- Ask the woman's companion to watch her and call for help if bleeding or pain increases, or if the woman feels dizzy or has severe headaches, visual disturbance or epigastric distress.
- Check the woman's record and give any treatment or prophylaxis that is due.

Do **not** give routine prophylactic antibiotic treatment in the absence of clinical signs of infection or recommended treatment criteria.

Routine antibiotic prophylaxis is **not** recommended for:

- women with uncomplicated vaginal birth
- women undergoing operative vaginal birth
- women with episiotomy
- women with first or second degree lacerations.

Routine antibiotic prophylaxis **is** recommended for:

- repair of third and fourth degree tears
- premature prelabour rupture of membranes
- caesarean birth
- manual removal of placenta or placement of uterine balloon tamponade.

- Counsel the woman on healthy timing and spacing of pregnancy, the lactational amenorrhoea method, return to fertility, and resumption of sexual relations.
- Counsel the woman on family planning methods that she can initiate immediately after birth:
 - lactational amenorrhoea method;

- copper or levonorgestrel IUD (up to 48 hours after childbirth and then four weeks or more after childbirth);
- tubal ligation (up to one week after childbirth and then six weeks or more after childbirth);
- progestin-only implants;
- progestin-only oral contraceptive pills;
- condoms;
- vasectomy;
- DepoProvera (only for women who are not breastfeeding).

CARE OF THE NEWBORN NOT REQUIRING RESUSCITATION

- When providing newborn care, ensure strict adherence to infection prevention and control principles (page **C-113**).
- Place the baby naked between the mother's breasts. Cover with a clean, dry drape or cloth, and cover the baby's head. Skin-to-skin contact should continue for at least one hour.
 - Only interrupt skin-to-skin contact for essential care.
 - Prevent hypothermia in the newborn when the baby is not in skin-to-skin contact with the mother.
- All newborns, including low birth weight babies who are able to breastfeed, should be put to the breast as soon as possible after birth when they are clinically stable and the mother and baby are ready.
- Encourage the mother to initiate breastfeeding within one hour after birth:
 - Encourage early and exclusive breastfeeding when the baby appears ready (begins "rooting").
 - To encourage early breastfeeding, position the baby near the mother's breasts, where the baby can latch when ready to feed.
 - Do not force the baby to the breast.
- Monitor the baby's condition every 15 minutes for the first two hours after birth and respond immediately if there are abnormal findings:
 - Check the baby's breathing and colour:

- If the **baby becomes cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute), give oxygen by nasal catheter or prongs (**page S-173**).
- Estimate the baby's body temperature by feeling the baby's skin (foot or forehead):
 - If the **baby's feet feel cold**, check the baby's axillary temperature;
 - If the **baby's temperature is less than 36.5°C**, rewarm the baby (**page S-178**).
- Check the cord for bleeding.
- If the **cord is bleeding**, retie the cord more tightly.
- For emergency signs, assess the baby using rapid assessment and respond immediately (**page S-165**).
- Wipe off any meconium or blood from the baby's skin. **Do not** remove vernix.
- Bathing should be delayed until 24 hours after birth (and should not be given less than six hours after birth).
- Assess breastfeeding:
 - Let the infant breastfeed on demand, if able to suck.
 - If **problems with breastfeeding are present**, observe breastfeeding, looking for signs of poor attachment.
 - Teach mothers how to recognize and manage common problems that may prevent successful breastfeeding.
- Ask the mother/parents to watch the baby and call for help if **the baby is having breathing difficulties, the baby's temperature is too low or high, there is bleeding from the cord, or there are convulsions**.
- Provide the following care:
 - Apply antimicrobial drops (1% silver nitrate solution or 2.5% povidone-iodine solution) or ointment (1% tetracycline ointment) to both of the baby's eyes once, according to national guidelines.

Note: Povidone-iodine should not be confused with tincture of iodine, which could cause blindness if used.

- Provide cord care. Keep the umbilical cord clean and dry. Nothing should be placed on the cord unless recommended by the health authority (for example, chlorhexidine).
- Weigh the baby and initiate special care for babies weighing less than 2500 g (**page C-112**).
- Give vitamin K by IM injection (1 mg/0.5 mL for term babies; 0.4 mg/kg for a maximum dose of 1 mg for preterm babies).
- Check the mother's record and give antibiotic prophylaxis to infants who have been exposed to risk factors for infection (i.e. preterm prelabour rupture of membranes; membranes ruptured more than 18 hours before birth; mother had fever higher than 38°C before birth or during labour; amniotic fluid was foul smelling or purulent; or mother has documented colonization with Group B streptococcus) (**page S-182**).
- Check the mother's record and give any prophylaxis that is due if the newborn has been exposed to syphilis (**page S-183**), tuberculosis (**page S-184**) or HIV (**page S-185**).
- Give oral polio, hepatitis B, BCG and other vaccinations, depending on national guidelines.

SAFE CHILDBIRTH CHECKLIST

Of the more than 130 million births occurring each year, an estimated 303 000 result in the mother's death, 2.6 million in stillbirth and another 2.7 million in a newborn death within the first 28 days of birth.

In response to unacceptably high rates of maternal and perinatal deaths occurring during labour and childbirth, the WHO developed the *WHO Safe Childbirth Checklist* (WHO, 2015) to support the delivery of essential maternal and perinatal care practices. The checklist addresses the major causes of maternal death (haemorrhage, infection, obstructed labour and hypertensive disorders), intrapartum-related stillbirths (inadequate intrapartum care) and neonatal deaths (birth asphyxia, infection and complications related to prematurity). It was developed following a rigorous methodology and tested for usability in 10 countries across Africa and Asia.

The *WHO Safe Childbirth Checklist Implementation Guide* (WHO, 2015) for health facilities has been developed to help birth attendants and health care leaders successfully launch and sustain use of the safe childbirth checklist.

When a baby is born to a mother being treated for complications, management of the newborn is based on:

- whether the baby has a condition or problem requiring rapid treatment;
- whether the mother's condition permits her to care for her newborn completely, partially or not at all; and
- whether the mother's complication might have an impact on the newborn's health.

NEWBORN BABIES WITH URGENT PROBLEMS

- If the **newborn has an acute problem that requires treatment**, all health care providers who might come in contact with the newborn in the first 24 hours of life must recognize and give at least initial care for the problem (**page S-165**). Problems or conditions of the newborn requiring urgent interventions include:
 - gasping or not breathing;
 - breathing with difficulty (less than 30 or more than 60 breaths per minute, severe indrawing of the chest, or grunting);
 - central cyanosis (blueness);
 - pallor;
 - oozing or bleeding from cord;
 - drowsiness or unconsciousness;
 - movement only when stimulated or no movement at all;
 - not feeding well, inability to suck;
 - hypothermia (axillary temperature less than 36.5°C);
 - hyperthermia (axillary temperature greater than 37.5°C);
 - convulsions; and
 - severe jaundice (appears on the face during the first day of life or extends to the palms and soles at any time).

NEWBORN BABIES REQUIRING ADDITIONAL CARE

- The following babies require special care:
 - preterm babies (less than 37 complete weeks' gestation);
 - very low birth weight babies (less than 1500 g);
 - low birth weight babies (1500–2500 g); and
 - babies with obvious birth defects (e.g. cleft palate, ambiguous genitalia, spina bifida).
- If the **newborn has a malformation or other problem that does not require urgent care**:
 - Provide routine initial newborn care (**page C-107**).
 - Transfer the baby to the appropriate service to care for sick newborns as quickly as possible (**page C-114**).
- Asymptomatic (without symptoms) babies with the following circumstances are classified as at risk of infection and require early treatment (**page S-182**):
 - membranes ruptured more than 18 hours before birth;
 - mother is being treated with antibiotics for infection;
 - mother has fever greater than 38°C;
 - mother has confirmed maternal colonization with Group B streptococcus without adequate antibiotic therapy during labour;
 - mother is infected with HIV (**page S-185**) and/or syphilis (**page S-183**) and/or hepatitis B;
 - mother started tuberculosis treatment less than two months before birth (**page S-184**).

Infants exposed to infection should be referred to the appropriate service for the care of newborns.

NEWBORN BABIES WITHOUT PROBLEMS

- If the **newborn has no apparent problems**, provide routine initial newborn care and support early and exclusive breastfeeding (**page C-107**).

- If the **mother's condition permits**, keep the baby in skin-to-skin contact with the mother for at least the first hour after birth.

NOTE: Babies with birth weight less than 2000 g who are clinically stable should be given kangaroo mother care early in the first week of life.

- If the **mother's condition does not permit her to maintain skin-to-skin contact** with the baby after childbirth:
 - Wrap the baby in a soft, dry cloth, cover with a blanket and ensure that the baby's head is covered to prevent heat loss;
 - Observe the baby at least every 15 minutes for the first two hours after birth.
- If the **mother's condition requires prolonged separation** from the baby, transfer the baby to the appropriate service for the care of newborns (page C-114).

STANDARD INFECTION PREVENTION AND CONTROL PRACTICES WHEN CARING FOR A NEWBORN

- Avoid unnecessary separation of the newborn from the mother.
- Observe strict procedures for handwashing or alcohol handrubs for all staff and for families before and after handling infants.
- Provide appropriate umbilical cord care.
- Provide appropriate eye care.
- Promote exclusive breastfeeding.
- Use kangaroo mother care and avoid the use of incubators for preterm infants. If an incubator is used, do not use water (where *Pseudomonas* will easily colonize) for humidification, and ensure that the incubator is thoroughly cleaned with an antiseptic.
- Observe strict sterility for all procedures.
- Observe clean injection practices.

TRANSFERRING NEWBORN BABIES

- Explain to the mother and/or her companion why the baby is being transferred (**page C-5**).
- Keep the baby warm. Wrap the baby in a soft, dry cloth; cover with a blanket and ensure that the baby's head is covered to prevent heat loss. Babies with birth weight less than 2000 g should be transferred in skin-to-skin contact with the mother.
- Transfer the baby with the mother and a health care provider, if possible. If the **baby requires special treatment such as oxygen**, transfer the baby in an incubator or bassinet.
- Initiate breastfeeding as soon as the baby is ready to suckle or as soon as the mother's condition permits.
- If **breastfeeding has to be delayed** due to maternal or newborn problems, teach the mother to express breastmilk as soon as possible and ensure that this milk is given to the newborn with a spoon.
- Ensure that the service caring for the newborn receives the records of labour and childbirth and of any treatments given to the mother and newborn.

CREATING AN IMPROVED HEALTH CARE ENVIRONMENT

The district hospital should strive to create a welcoming environment for women, community members and health care providers from peripheral health units. It should support the efforts of other providers and work with them to correct deficiencies.

When dealing with other health care providers, doctors and midwives at the district hospital should:

- encourage and thank providers who refer patients, especially in the presence of women and their families;
- offer clinical guidance and corrective suggestions in private, so as to maintain the provider's credibility in the community;
- involve the provider (to an appropriate extent) in the continued care of the woman after discharge.

When dealing with community members, doctors and midwives at the district hospital should:

- promote patient, family and community involvement in strategic planning and improvement activities;
- invite members of the community to be part of the district hospital or health development committee;
- identify key persons in the community and invite them to the facility to learn about its function, as well as its constraints and limitations;
- create opportunities for the community to view the district hospital as a wellness facility (e.g. through vaccination campaigns and screening programmes).

MEETING THE NEEDS OF WOMEN

To enhance its appeal to women and the community, the district hospital should examine its own service delivery practices. The facility should create a culturally sensitive and comfortable environment that:

- respects women's modesty and privacy;
- welcomes family members; and
- provides a comfortable place for women and/or newborns (e.g. birthing bed in lowest possible position; warm and clean room).

With careful planning, the facility can create this environment without interfering with its ability to respond to complications or emergencies

IMPROVING REFERRAL PATTERNS

Health systems need to have formal tools and systems to facilitate referral and counter-referral and ensure continuity of care. Each woman who is referred to the district hospital should be given a standard referral slip containing the following information:

- general patient information (name, age, address);
- obstetrical history (parity, gestational age, complications in the antenatal period);
- relevant past obstetrical complications (e.g. previous caesarean, postpartum haemorrhage);
- relevant medical and surgical history;
- the specific problem for which she was referred; and
- treatments applied thus far and the results of those treatments.

Include the outcome of the referral on the referral slip. **Send the referral slip back to the referring facility** (counter-referral) with the woman or the person who brought her. Both the district hospital and the referring facility should keep a record of all referrals as a quality assurance mechanism:

- Referring facilities can assess the success and appropriateness of their referrals;
- The district hospital can review the records for patterns indicating that a health care provider or facility needs additional technical support or training.

PROVIDING TRAINING AND SUPPORTIVE SUPERVISION

District hospitals should offer high-quality, **participatory** clinical training for peripheral providers. Participatory training is skill-focused and more effective than classroom-based training because it:

- improves the relationship between health care providers at the district hospital and auxiliary and multipurpose workers from peripheral units;
- increases the familiarity of the peripheral providers with the clinical care provided at the district hospital; and

- promotes team building and facilitates supervision of health workers once they return to their community to implement the skills they have learned.

SECTION 2
SYMPTOMS

SHOCK

S-1

Shock is characterized by failure of the circulatory system to maintain adequate perfusion of the vital organs. Shock is a **life-threatening condition** that requires **immediate and intensive treatment**.

Suspect or anticipate shock if one or more of the following is present:

- bleeding in early pregnancy (e.g. abortion, ectopic or molar pregnancy);
- bleeding in late pregnancy or labour (e.g. placenta praevia, abruptio placentae, ruptured uterus);
- bleeding after childbirth (e.g. ruptured uterus, uterine atony, tears of the genital tract, retained placenta or placental fragments);
- infection (e.g. unsafe or septic abortion, amnionitis, endometritis, acute pyelonephritis);
- trauma (e.g. injury to uterus or bowel during abortion, ruptured uterus, tears of genital tract).

SYMPTOMS AND SIGNS f

Diagnose shock if the following symptoms and signs are present:

- fast, weak pulse (110 beats per minute or more);
- low blood pressure (systolic less than 90 mmHg).

Other symptoms and signs of shock include:

- pallor (especially of inner eyelid, palms or around mouth);
- sweatiness or cold, clammy skin;
- rapid breathing (rate of 30 breaths per minute or more);
- anxiousness, confusion or unconsciousness;
- scanty urine output (less than 30 mL per hour).

IMMEDIATE MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- **SHOUT FOR HELP.** Urgently mobilize all available personnel.
- Monitor vital signs (pulse, blood pressure, respiration, temperature).
- If the **woman is unconscious**, turn her onto her side to minimize the risk of aspiration if she vomits, and to ensure that an airway is open.
- Keep the woman warm but do not overheat her, as this will increase peripheral circulation and reduce blood supply to the vital centres.
- Elevate the legs to increase return of blood to the heart (if possible, raise the foot end of the bed).

SPECIFIC MANAGEMENT

- Start an IV infusion (two if possible) using a large-bore (16-gauge or largest available) cannula or needle.
- Collect blood for estimation of haemoglobin, immediate cross-match and bedside clotting test (**page S-3**), just before infusion of fluids:
 - Rapidly infuse IV fluids (normal saline or Ringer's lactate) initially at the rate of 1 L in 15–20 minutes.

Note: Avoid using plasma substitutes (e.g. dextran). There is no evidence that plasma substitutes are superior to normal saline in the resuscitation of a shocked woman, and dextran can be harmful in large doses.

- Give at least 2 L of these fluids in the first hour. This is over and above fluid replacement for ongoing losses.

Note: A more rapid rate of infusion is required in the management of shock resulting from bleeding. Aim to replace two to three times the estimated fluid loss.

Do not give fluids by mouth to a woman in shock.

- If a **peripheral vein cannot be cannulated**, perform a venous cutdown (**Fig. S-1. Page S-4**).
- Continue to monitor vital signs (every 15 minutes) and blood loss.
- Catheterize the bladder and monitor fluid intake and urine output.

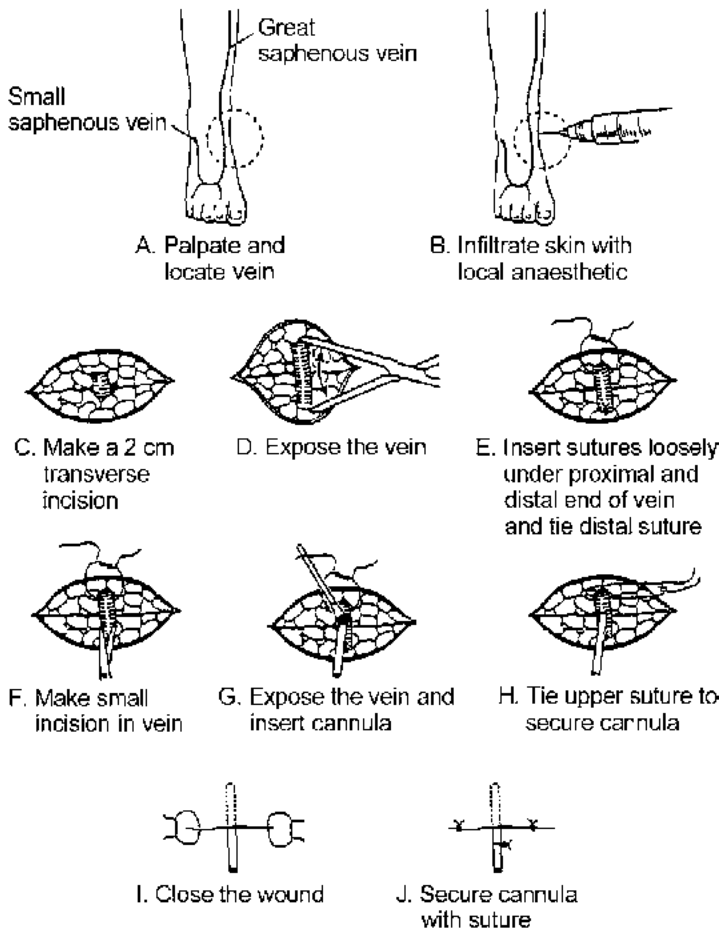
- Give oxygen at 6–8 L per minute by mask or nasal cannulae.

If available, apply a non-pneumatic anti-shock garment (NASG) as a temporizing measure until appropriate care is available (**page S-39**).

BEDSIDE CLOTTING TEST

Assess clotting status using this **bedside clotting test**:

- Take 2 mL of venous blood into a small, dry, clean, plain glass test tube (approximately 10 mm x 75 mm).
- Hold the tube in a closed fist to keep it warm ($\pm 37^\circ$).
- After four minutes, tip the tube slowly to see if a clot is forming. Then tip it again every minute until the blood clots and the tube can be turned upside down.
- Failure of a clot to form after seven minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-24**).

FIGURE S-1. Venous cutdown

DETERMINING AND MANAGING THE CAUSE OF SHOCK

Determine the cause of shock after the woman is stabilized.

- If **heavy bleeding is suspected** as the cause of shock:
 - Take steps simultaneously to stop bleeding (e.g. uterotonic drugs, uterine massage, bimanual compression, uterine balloon tamponade, aortic compression, preparations for surgical intervention).

- Transfuse as soon as possible to replace blood loss (**page C-37**).
 - Determine the cause of bleeding and manage accordingly:
 - If **bleeding occurs during first 22 weeks of pregnancy**, suspect abortion or ectopic or molar pregnancy (**page S-17**);
 - If **bleeding occurs after 22 weeks or during labour but before childbirth**, suspect placenta praevia (**page S-25**), abruptio placentae (**page S-23**) or ruptured uterus (**page S-24**);
 - If **bleeding occurs after childbirth**, suspect ruptured uterus, uterine atony, tears of genital tract, retained placenta or placental fragments (**page S-29**).
 - Reassess the woman's condition for signs of improvement (**page S-6**).
 - If **infection is suspected** as the cause of shock:
 - Collect appropriate samples (blood, urine, pus) for microbial culture, if facilities are available, before starting antibiotics.
 - Give the woman a combination of antibiotics to cover aerobic and anaerobic infections and continue until she is fever-free for 48 hours (**page C-50**):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
- Do not give antibiotics by mouth to a woman in shock.**
- Reassess the woman's condition for signs of improvement (**page S-5**).
 - If **trauma is suspected** as the cause of shock, prepare for surgical intervention.

REASSESSMENT

- Reassess the woman's response to fluids within 30 minutes to determine if her condition is improving. Signs of improvement include:
 - stabilizing pulse (rate of 90 per minute or less);

- increasing blood pressure (systolic 100 mmHg or more);
- improving mental status (less confusion or anxiety);
- increasing urine output (30 mL per hour or more).
- If the **woman's condition improves**:
 - Adjust the rate of infusion of IV fluids to 1 L in six hours.
 - Continue management for the underlying cause of shock (**page S-4**).
- If the **woman's condition fails to improve or stabilize**, provide further management (see below).

FURTHER MANAGEMENT

- Continue to infuse IV fluids, adjusting the rate of infusion to 1 L in six hours, and maintain oxygen at 6–8 L per minute.
- Closely monitor the woman's condition.
- Perform laboratory tests, including repeat haemoglobin determination, blood grouping and Rh typing. **If facilities are available**, check serum electrolytes, serum creatinine and blood pH.

PROBLEM

- Vaginal bleeding occurs during the first 22 weeks of pregnancy.

IMMEDIATE MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- Perform a **rapid evaluation** of the woman's general condition, vital signs (pulse, blood pressure, respiration), level of consciousness, presence of anxiety and/or confusion, blood loss, and colour and temperature of skin (**page C-1**).
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.

If the **woman is in shock**, consider ruptured ectopic pregnancy (**Table S-7, page S-16**).

- Depending on gestational age, check the fetal heart rate and ask about fetal movements:
 - If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-109**).
 - If **fetal heart cannot be heard**, ask several other persons to listen or use a Doppler stethoscope, if available. If **fetal heart cannot be heard, suspect fetal death** (**page S-156**).
- Start an IV infusion and infuse IV fluids (**page C-34**).

Note: Send a blood sample for haemoglobin or haematocrit and type and screen before infusing IV fluids.

DIAGNOSIS

- **Consider ectopic pregnancy** in any woman with anaemia, pelvic inflammatory disease, threatened abortion or unusual complaints about abdominal pain.

Note: If **ectopic pregnancy is suspected**, perform bimanual examination gently because an early ectopic pregnancy is easily ruptured.

- When available, perform ultrasound with quantitative assessment of beta-human chorionic gonadotropin as the essential diagnostic test.
- **Consider abortion** in any woman of reproductive age who has a missed period (delayed menstrual bleeding with more than one month having passed since her last menstrual period) and has one or more of the following: bleeding, cramping, partial expulsion of products of conception, dilated cervix or smaller uterus than expected.
- If **abortion is a possible diagnosis**, identify and treat any complications immediately (**Table S-2, page S-9**).

TABLE S-1. Diagnosis of vaginal bleeding in early pregnancy

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • Light bleeding^a • Closed cervix • Uterus corresponds to dates 	<ul style="list-style-type: none"> • Cramping/lower abdominal pain • Uterus softer than normal 	Threatened abortion, page S-11
<ul style="list-style-type: none"> • Light bleeding^a • Abdominal pain • Closed cervix • Uterus slightly larger than normal • Uterus softer than normal 	<ul style="list-style-type: none"> • Fainting • Tender adnexal mass • Amenorrhoea • Cervical motion tenderness 	Ectopic pregnancy, page S-15
<ul style="list-style-type: none"> • Light bleeding^a • Closed cervix • Uterus smaller than dates • Uterus softer than normal 	<ul style="list-style-type: none"> • Light cramping/lower abdominal pain • History of expulsion of products of conception 	Complete abortion, page S-13

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • Heavy bleeding^b • Dilated cervix • Uterus corresponds to dates 	<ul style="list-style-type: none"> • Cramping/lower abdominal pain • Tender uterus • No expulsion of products of conception 	Inevitable abortion, page S-12
<ul style="list-style-type: none"> • Heavy bleeding^b • Dilated cervix • Uterus smaller than dates 	<ul style="list-style-type: none"> • Cramping/lower abdominal pain • Partial expulsion of products of conception 	Incomplete abortion, page S-12
<ul style="list-style-type: none"> • Heavy bleeding^b • Dilated cervix • Uterus larger than dates • Uterus softer than normal • Partial expulsion of products of conception, which resemble grapes 	<ul style="list-style-type: none"> • Nausea/vomiting • Spontaneous abortion • Cramping/lower abdominal pain • Ovarian cysts (easily ruptured) • Early onset pre-eclampsia • No evidence of a fetus 	Molar pregnancy, page S-17

^a Light bleeding: takes five minutes or longer for a clean pad or cloth to be soaked

^b Heavy bleeding: takes less than five minutes for a clean pad or cloth to be soaked and/or large blood clots are expelled.

TABLE S-2. Diagnosis and management of complications of abortion

Symptoms and Signs	Complication	Management
<ul style="list-style-type: none"> • Lower abdominal pain • Rebound tenderness • Tender uterus • Prolonged bleeding • Malaise • Fever • Foul-smelling vaginal discharge • Purulent cervical discharge • Cervical motion tenderness 	Infection/sepsis	Begin antibiotics ^a as soon as possible before attempting manual vacuum aspiration (page P-75).

Symptoms and Signs	Complication	Management
<ul style="list-style-type: none"> • Cramping/abdominal pain • Rebound tenderness • Abdominal distension • Rigid (tense and hard) abdomen • Shoulder pain • Nausea/vomiting • Fever 	Uterine, vaginal or bowel injuries	Perform a laparotomy to repair the injury and perform manual vacuum aspiration (page P-75) simultaneously. Seek further assistance if required.

^a Clindamycin 600 mg IV every six to eight hours and gentamicin 5 mg/kg body weight IV every 24 hours. If clindamycin is not available, give ampicillin 2 g IV every six hours and gentamicin 5 mg/kg body weight IV every 24 hours.

BOX S-1. Types of abortion

Spontaneous abortion is defined as the loss of a pregnancy before fetal viability (22 weeks of gestation). The stages of spontaneous abortion may include:

- threatened abortion (pregnancy may continue);
- inevitable abortion (pregnancy will not continue and will proceed to incomplete/complete abortion);
- incomplete abortion (products of conception are partially expelled);
- complete abortion (products of conception are completely expelled).

Induced abortion is defined as a process by which pregnancy is terminated before fetal viability.

Unsafe abortion is defined as a procedure performed either by persons lacking necessary skills or in an environment lacking minimal medical standards, or both.

Septic abortion is defined as abortion complicated by infection. Sepsis may result from infection if organisms rise from the lower genital tract following either spontaneous or unsafe abortion. Sepsis is more likely to occur if there are retained products of conception and evacuation has been delayed. Sepsis is a frequent complication of unsafe abortion involving instrumentation.

SPECIFIC MANAGEMENT

If unsafe abortion is suspected, examine for signs of infection or uterine, vaginal or bowel injury (Table S-2, page S-9), and thoroughly irrigate the vagina to remove any herbs, local medications or caustic substances.

THREATENED ABORTION

- Medical treatment is usually not necessary.
- Advise the woman to avoid strenuous activity and sexual intercourse, but bed rest is not necessary.
- If **bleeding stops**, follow up in an antenatal clinic. Reassess if bleeding recurs.
- If **bleeding persists**, assess for fetal viability (pregnancy test/ultrasound) or ectopic pregnancy (ultrasound). Persistent bleeding, particularly in the presence of a uterus that is larger than expected, may indicate twins or molar pregnancy.

TABLE S-3. Management options for threatened abortion by gestational age

Surgical Management		Medical Management		Expectant Management
Less than 12–14 weeks	More than 12–14 weeks	Less than 12–14 weeks	More than 12–14 weeks	Any gestational age less than 24 weeks
Not applicable (NA)	NA	NA	NA	Medical treatment usually not necessary (page S-12)

Do not give medications such as hormones (e.g. estrogens or progestins) or tocolytic agents (e.g. salbutamol or indomethacin), as they will not prevent abortion.

INEVITABLE AND INCOMPLETE ABORTION

BOX S-2. Managing inevitable and incomplete abortion

- In cases of inevitable and incomplete abortion, surgical evacuation and medical or expectant management are all reasonable management options. To determine the best course of action, one must take the following into consideration:
 - the urgency of the particular case (i.e. haemodynamic stability);
 - the skill set of the available providers and staff;
 - the health facility setting and available materials, supplies and medications; and
 - the woman's preference, after complete counselling on options.
- **Evacuation: If evacuation is appropriate and the woman prefers surgical management**, examine the woman to determine if products of conception are visible in the os or the vagina and remove them with sponge or ring forceps. **If products are not visible**, proceed with manual vacuum aspiration if gestational age is less than 12–14 weeks (**page P-75**). Proceed with dilatation and evacuation (D and E) (**page S-18**) if gestational age is more than 12–14 weeks and the majority of the products remain in the uterus.
- **Medical Management:** If medical management is determined to be appropriate (i.e. the woman is haemodynamically stable and ectopic pregnancy is not suspected), and it is the woman's preference, proceed with a medical protocol.
 - **See Table S-4 (page S-13)** for medical management protocols. Optimal doses for misoprostol in the setting of incomplete abortion have not been determined. However, a reasonable protocol can be found in the management table.
 - If **misoprostol is not available**, oxytocin is an option for medical management after 16 weeks.
 - If **expulsion of products of conception is not achieved**, proceed to surgical evacuation.
 - Ensure follow-up of the woman after treatment (**page S-14**).
- **Expectant Management:** Expectant management is a reasonable option if the woman is haemodynamically stable and prefers to avoid surgical or medical intervention.
 - Await spontaneous expulsion of products of conception.
 - **If spontaneous expulsion does not occur in a reasonable timeframe**, depending on the woman's tolerance for the discomfort and wait and her haemodynamic status, proceed to either medical management or evacuation of the uterus via manual vacuum aspiration (**page P-75**) or D and E (**page S-18**).

TABLE S-4. Management options for inevitable and incomplete abortion by gestational age

Surgical Management		Medical Management		Expectant Management
Less than 12–14 weeks	More than 12–14 weeks	Less than 12–14 weeks	More than 12–14 weeks	Any gestational age less than 24 weeks
Inevitable abortion				
Manual vacuum aspiration (page P-75)	D and E (page S-18)	Misoprostol 800 mcg by vagina or sublingual every 3–12 hours; maximum three doses	Misoprostol 400 mcg by vagina or sublingual every three hours, maximum five doses OR Oxytocin 40 units in 1 L IV fluids at 40 drops per minute	Reasonable if woman is haemodynamically stable
Incomplete abortion				
Manual vacuum aspiration (page P-75)	D and E (page S-18)	Misoprostol 400 mcg sublingual or 600 mcg by mouth for one dose	Misoprostol 200 mcg by vagina every four hours until expulsion, maximum 800 mcg OR Oxytocin 40 units in 1L IV fluids at 40 drops per minute	Reasonable if woman is haemodynamically stable

COMPLETE ABORTION

- Evacuation of the uterus is usually not necessary.
- Observe for heavy bleeding. If **heavy bleeding ensues**, proceed to manual vacuum aspiration to ensure that there are no remaining products, and administer 800 mcg of misoprostol for management of post-abortal haemorrhage.
- Ensure follow-up of the woman after treatment (see below).

TABLE S-5. Management options for complete abortion by gestational age

Surgical Management		Medical Management		Expectant Management
Less than 12–14 weeks	More than 12–14 weeks	Less than 12–14 weeks	More than 12–14 weeks	Any gestational age less than 24 weeks
Manual vacuum aspiration (page P-75) in case of heavy bleeding ^a	NA	NA	NA	NA

^a Heavy bleeding: takes less than five minutes for a clean pad or cloth to be soaked

OTHER KEY COMPONENTS OF CARE FOR WOMEN WHO HAVE HAD AN ABORTION

Before discharge, tell a woman who has had a spontaneous abortion that spontaneous abortion is common and occurs in at least 15% (one in every seven) of clinically recognized pregnancies. Reassure her that the chances for a subsequent successful pregnancy are good unless there has been sepsis or a cause of the abortion is identified that may have an adverse effect on future pregnancies (this is rare).

Some women may want to become pregnant soon after having an abortion. They should be encouraged to delay the next pregnancy until they have completely recovered.

Abortion care should always include comprehensive contraceptive counselling with initiation of the method of choice as soon as desired after the abortion.

Before the desired method is initiated, women should be assessed for medical eligibility (see **WHO, *Medical Eligibility Criteria for Contraceptive Use*, 5th ed., 2015**).

TABLE S-6. Family planning methods

Type of Contraceptive	Advise to Start
Hormonal (pills, ring, injections, implants)	<ul style="list-style-type: none"> • Immediately • No additional contraceptive protection is needed
Condom	<ul style="list-style-type: none"> • Immediately
Diaphragm, cap	<ul style="list-style-type: none"> • Unsuitable until six weeks after second-trimester abortion
Intrauterine device	<ul style="list-style-type: none"> • Immediately • If infection is present or suspected, delay insertion until cleared • If haemoglobin is less than 7 g/dL, delay until anaemia improves • Provide an interim method (e.g. condom)
Voluntary tubal ligation	<ul style="list-style-type: none"> • Immediately • If infection is present or suspected, delay surgery until cleared • If haemoglobin is less than 7 g/dL, delay until anaemia improves • Provide an interim method (e.g. condom)

Identify any other reproductive health services that a woman might need. For example, some women may need:

- a tetanus prophylaxis or tetanus booster;
- treatment for sexually transmitted infections; or
- cervical cancer screening.

ECTOPIC PREGNANCY

An ectopic pregnancy is one in which implantation occurs outside the uterine cavity. The fallopian tube is the most common site of ectopic implantation (greater than 90%).

Symptoms and signs are extremely variable, depending on whether or not the pregnancy has ruptured (**Table S-7, page S-16**). Culdocentesis (cul-de-sac puncture, **page P-81**) is an important tool for the diagnosis of ruptured ectopic pregnancy, but it is less useful than a serum pregnancy test combined with ultrasonography. If **nonclotting blood is obtained**, begin immediate management.

TABLE S-7. Symptoms and signs of unruptured and ruptured ectopic pregnancy

Unruptured Ectopic Pregnancy	Ruptured Ectopic Pregnancy
<ul style="list-style-type: none"> • Symptoms of early pregnancy (irregular spotting or bleeding, nausea, swelling of breasts, bluish discolouration of vagina and cervix, softening of cervix, slight uterine enlargement, increased urinary frequency) • Abdominal and pelvic pain 	<ul style="list-style-type: none"> • Collapse and weakness • Fast, weak pulse (110 beats per minute or more) • Hypotension • Hypovolaemia • Acute abdominal and pelvic pain • Abdominal distension^a • Rebound tenderness • Pallor

^a A distended abdomen with shifting dullness may indicate free blood.

DIFFERENTIAL DIAGNOSIS

The most common differential diagnosis for ectopic pregnancy is threatened abortion. Others are acute or chronic pelvic inflammatory disease, ovarian cysts (torsion or rupture), and acute appendicitis.

If available, ultrasound can help to distinguish a threatened abortion or twisted ovarian cyst from an ectopic pregnancy.

IMMEDIATE MANAGEMENT

- Cross-match blood and arrange for immediate laparotomy. **Do not wait for blood before performing surgery.**
- At surgery, inspect both ovaries and fallopian tubes:
 - If there is **extensive damage to the tube**, perform salpingectomy (the bleeding tube and the products of conception are removed together). This is the treatment of choice in most cases (**page P-131**).
 - Rarely, if there is **little tubal damage**, perform salpingostomy (the products of conception can be removed and the tube conserved). Because the risk of another ectopic pregnancy is high, this should be done only when the conservation of fertility is very important to the woman (**page P-131**).

Autotransfusion

If **significant haemorrhage occurs**, autotransfusion can be used if the **blood is unquestionably fresh and free of infection** (in later stages of pregnancy, blood is contaminated [e.g. with amniotic fluid] and should not be used for autotransfusion). The blood can be collected before surgery or after the abdomen is opened:

- When the woman is on the operating table before surgery and the abdomen is distended with blood, it is sometimes possible to insert a needle through the abdominal wall and collect the blood in a donor set.
- Alternatively, open the abdomen:
 - Scoop the blood into a basin and strain through gauze to remove clots.
 - Clean the top portion of a blood donor bag with antiseptic solution and open it with a sterile blade.
 - Pour the woman's blood into the bag and reinfuse it through a filtered set in the usual way.
 - If a **donor bag with anticoagulant is not available**, add sodium citrate 10 mL to each 90 mL of blood.

SUBSEQUENT MANAGEMENT

- Before discharge, provide counselling and advice on prognosis for fertility. Given the increased risk of a future ectopic pregnancy, family planning counselling and provision of a family planning method, if desired, is especially important (**Table S-6, page S-15**).
- Correct anaemia with ferrous sulfate or ferrous fumarate 60 mg by mouth daily for three months.
- Schedule a follow-up visit at four weeks.

MOLAR PREGNANCY

Molar pregnancy is characterized by an abnormal proliferation of chorionic villi.

IMMEDIATE MANAGEMENT

- If the **diagnosis of molar pregnancy is certain**, cross-match blood if possible and arrange for evacuation of the uterus:

- **If cervical dilatation is needed**, use a paracervical block (**page P-1**).
- Use vacuum aspiration (**page P-75**). Manual vacuum aspiration is safer and associated with less blood loss than sharp metal curettage. The risk of perforation using the metal curette is high.
- Have three syringes prepared and ready for use during the evacuation. The uterine contents are copious and it is important to evacuate them rapidly.
- Infuse oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at a rate of 60 drops per minute to prevent haemorrhage once evacuation is under way.

SUBSEQUENT MANAGEMENT

- Recommend a hormonal family planning method for at least one year to prevent pregnancy (**Table S-6, page S-15**). Voluntary tubal ligation may be offered if the woman has completed her family.
- Follow up every eight weeks for at least one year with urine pregnancy tests because of the risk of persistent trophoblastic disease or choriocarcinoma. Assess the woman for irregular bleeding through a history and physical examination. If the **urine pregnancy test is not negative after eight weeks** or if it **becomes positive again** within the first year, urgently refer the woman to a tertiary care centre for further follow-up and management of choriocarcinoma.

DILATATION AND EVACUATION PROCEDURE

After 14 weeks, a manual vacuum aspiration procedure and cannula might not be sufficient to evacuate the remaining intrauterine contents. In this case, it is necessary to use a heavy forceps to complete the evacuation.

- Follow the manual vacuum aspiration procedure steps through placement of the tenaculum or vulsellum forceps.
- Leave the tenaculum or vulsellum forceps in place on the anterior lip of the cervix, or replace the forceps with a ring or sponge forceps if the tenaculum appears to be tearing the cervix.
- Use graduated dilators to further dilate the cervix if the forceps do not pass easily through the cervix (**page P-71**).
- Take care not to tear the cervix.

- Evacuate the remaining contents of the uterus using a ring/sponge or other heavy forceps. This may require multiple passes with the forceps.

Note: The uterus is very soft in pregnancy and can easily be injured during the procedure. It is important that the operator understands the depth of the uterus and that the uterus will contract and the depth will decrease as the contents are removed.

- When all of the remaining fetal parts and placenta are removed, pass the manual vacuum aspiration cannula once more to ensure a gritty sensation throughout the uterus.
- Evaluate all of the removed contents to ensure that all fetal parts are identified. Send the contents to histopathology if available and applicable.
- Remove the tenaculum and ensure haemostasis at the puncture sites.
- Assess the cervix for bleeding and tears.
- If **no tears are identified and bleeding is minimal**, remove the speculum and perform a bimanual exam to check the uterus for size and firmness.
- Follow recommended post-procedure care (**page P-73**).

Anti-D Immunoglobulin

In settings where the prevalence of Rh-negative status is high and Rh-immunoglobulin is routinely provided to Rh-negative women, administration of anti-D immunoglobulin should occur at the time of management of the abortion or ectopic or molar pregnancy. The dose of Rh-immunoglobulin may be reduced from 300 mcg (the dose used after a term birth) to 50 mcg in pregnancies less than 12 weeks duration. Rh testing is not a requirement for management of abortions or ectopic or molar pregnancies where it is not available or the prevalence of Rh-negative status is low.

VAGINAL BLEEDING IN LATER PREGNANCY AND LABOUR

S-21

PROBLEMS

- Vaginal bleeding after 22 weeks of pregnancy
- Vaginal bleeding in labour before giving birth

TABLE S-8. Types of bleeding

Type of Bleeding	Probable Diagnosis	Action
Blood-stained mucus (show)	Onset of labour	Proceed with management of normal labour and childbirth (page C-77)
Any other bleeding	Antepartum haemorrhage	Determine cause (Table S-9, page S-22)

GENERAL MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- **SHOUT FOR HELP.** Urgently mobilize all available personnel.
- Perform a **rapid evaluation** of the woman's general condition, vital signs (pulse, blood pressure, respiration), level of consciousness, presence of anxiety and/or confusion, volume of blood loss, whether bleeding is accompanied by pain, colour and temperature of skin (**page C-1**).

Do not do a vaginal examination at this stage.

- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.
- Check the fetal heart rate and ask about fetal movements:
 - If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-109**).
 - If **fetal heart cannot be heard**, ask several other persons to listen or use a Doppler stethoscope, if available.

- If fetal movements are not felt or the **fetal heart cannot be heard, suspect fetal death (page S-156).**
 - Start an IV infusion and infuse IV fluids (**page C-34**).
- Note:** Send a blood sample for haemoglobin or haematocrit and type and screen, and order blood for possible transfusion, before infusing IV fluids.

DIAGNOSIS

TABLE S-9. Diagnosis of antepartum haemorrhage

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • Bleeding after 22 weeks gestation (may be retained in the uterus) • Intermittent or constant abdominal pain 	<ul style="list-style-type: none"> • Shock • Tense/tender uterus • Decreased/absent fetal movements • Fetal distress or absent fetal heart sounds 	Abruptio placentae, page S-23
<ul style="list-style-type: none"> • Bleeding (intra-abdominal and/or vaginal) • Severe abdominal pain (may decrease after rupture) 	<ul style="list-style-type: none"> • Shock • Abdominal distension/free fluid • Abnormal uterine contour • Tender abdomen • Easily palpable fetal parts • Absent fetal movements and fetal heart sounds • Rapid maternal pulse 	Ruptured uterus, page S-24
<ul style="list-style-type: none"> • Bleeding after 22 weeks gestation 	<ul style="list-style-type: none"> • Shock • Bleeding may be precipitated by intercourse • Relaxed uterus • Fetal presentation not in pelvis; lower uterine pole feels empty • Normal fetal condition 	Placenta praevia, page S-25

SPECIFIC MANAGEMENT

ABRUPTIO PLACENTAE

Abruptio placentae is the detachment of a normally located placenta from the uterus before birth of the baby.

- Assess clotting status using a bedside clotting test (**page S-3**). Failure of a clot to form after seven minutes, or a soft clot that breaks down easily, suggests coagulopathy (**page S-24**).
- Transfuse as necessary, preferably with fresh blood (**page C-37**).
- If **bleeding is heavy** (evident or hidden), deliver as soon as possible:
 - If the **cervix is fully dilated**, assist birth of the baby using an obstetric vacuum (**page P-33**).
 - If **vaginal birth is not imminent**, perform a caesarean (**page P-53**).

Note: In every case of abruptio placentae, be prepared for postpartum haemorrhage (**page S-29**).

- If **bleeding is light to moderate** (the woman is not in immediate danger), the course of action depends on the fetal heart rate:
 - If the **fetal heart rate is normal or absent**:
 - If the woman is in labour and uterine **contractions are poor**, augment labour with oxytocin (**page P-23**).
 - If the **cervix is unfavourable** (has a Bishop score of 5 or less, **Table P-6, page P-19**), perform a caesarean (**page P-53**).
 - If the **fetal heart rate is abnormal** (less than 100 or more than 180 beats per minute):
 - Perform rapid vaginal birth.
 - If **vaginal birth is not possible**, perform an immediate caesarean (**page P-53**).

COAGULOPATHY (CLOTTING FAILURE)

Coagulopathy is both a cause and a result of massive obstetric haemorrhage. It can be triggered by abruptio placentae, fetal death in utero, eclampsia, amniotic fluid embolism and many other causes. The clinical picture ranges from major haemorrhage, with or without thrombotic complications, to a clinically stable state that can be detected only by laboratory testing.

Note: In many cases of acute blood loss, the development of coagulopathy can be prevented if blood volume is restored promptly by infusion of IV fluids (normal saline or Ringer's lactate).

- Treat the possible cause of coagulation failure:
 - abruptio placentae (**page S-23**)
 - eclampsia (**page S-57**).
- Use blood products to help control haemorrhage (**page C-37**):
 - Give fresh whole blood, if available, to replace clotting factors and red cells.
 - If **fresh whole blood is not available**, choose one of the following based on availability:
 - fresh frozen plasma for replacement of clotting factors (15 mL/kg body weight);
 - packed (or sedimented) red cells for red cell replacement;
 - cryoprecipitate to replace fibrinogen; or
 - platelet concentrates (if bleeding continues and the platelet count is less than 20,000).

RUPTURED UTERUS

The amount and type of vaginal bleeding will depend on the uterine site and if rupture involves the bladder; vaginal bleeding may be modest, despite major intra-abdominal haemorrhage. Bleeding tends to be heavy when the cervix and upper vaginal wall are involved. Rupture of the lower uterine segment into the broad ligament, however, will not release blood into the abdominal cavity (**Fig. S-2, page S-25**). Haematuria may occur if the rupture extends into the bladder.

FIGURE S-2. Rupture of lower uterine segment into broad ligament will not release blood into the abdominal cavity

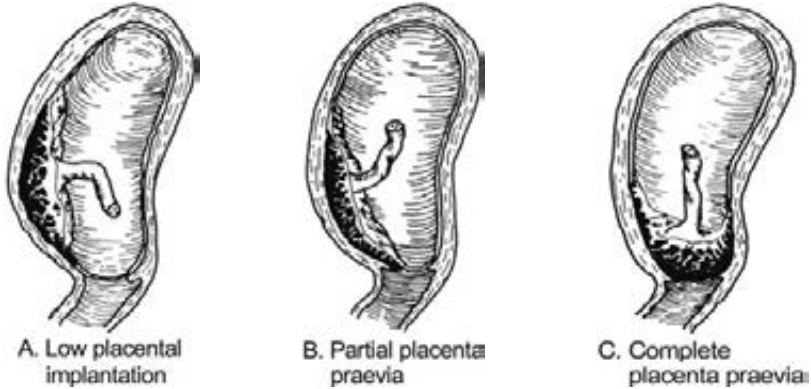


- Restore blood volume by infusing IV fluids (normal saline or Ringer's lactate) before surgery.
- When stable, immediately perform a laparotomy to facilitate birth of the baby and delivery of the placenta.
- If the **uterus can be repaired** with less operative risk than hysterectomy (the **edges of the tear are not necrotic**), repair the uterus (**page P-113**). This involves less time and blood loss than hysterectomy.
- If the **uterus cannot be repaired**, perform subtotal hysterectomy (**page P-122**). If the **tear extends through the cervix and vagina**, total hysterectomy might be necessary.

Because there is an increased risk of rupture with subsequent pregnancies, the option of permanent contraception needs to be discussed with the woman after the emergency is over.

PLACENTA PRAEVIA

Placenta praevia is implantation of the placenta at or near the cervix (**Fig. S-3, page S-26**).

FIGURE S-3. Implantation of the placenta at or near the cervix

Warning: Do not perform a vaginal examination unless preparations have been made for an immediate caesarean. A careful speculum examination may be performed to rule out other causes of bleeding such as cervicitis, trauma, cervical polyps and cervical malignancy. The presence of these, however, does not rule out placenta praevia.

- Restore blood volume by infusing IV fluids (normal saline or Ringer's lactate).
- Assess the amount of bleeding:
 - If **bleeding is heavy and continuous**, arrange for caesarean birth irrespective of fetal maturity (**page P-53**).
 - If **bleeding is light or has stopped** and the **fetus is alive but premature**, consider expectant management until birth of the baby or heavy bleeding occurs:
 - Keep the woman in the hospital until she has given birth.
 - Correct anaemia with ferrous sulfate or ferrous fumarate 60 mg by mouth daily for six months.
 - Ensure that blood is available for transfusion, if required.
 - If **bleeding recurs**, decide management after weighing benefits and risks for the woman and fetus of further expectant management versus planned birth.

CONFIRMING THE DIAGNOSIS

- If a **reliable ultrasound examination** can be performed, localize the placenta. If **placenta praevia is confirmed and the fetus is mature**, plan for the woman to give birth (**page S-25**).
- If **ultrasound is not available** or the report is unreliable and the **pregnancy is less than 37 weeks**, manage as placenta praevia until 37 weeks.
- If **ultrasound is not available** or the report is unreliable and the **pregnancy is 37 weeks or more**, examine the woman and be prepared for either vaginal or caesarean birth, as follows:
 - Have IV lines running and cross-matched blood available.
 - Examine the woman in the operating theatre with the surgical team present.
 - Use a vaginal speculum to examine the cervix.
- If the **cervix is partly dilated and placental tissue is visible** (placenta praevia is confirmed), plan for the woman to give birth.
- If the **cervix is not dilated**, cautiously palpate the vaginal fornices:
 - If **spongy tissue is felt** (placenta praevia is confirmed), plan for the woman to give birth.
 - If a **firm fetal head is felt** (major placenta praevia is ruled out), proceed to induction (**page P-17**).
- If a **diagnosis of placenta praevia is still in doubt**, perform a cautious digital examination:
 - If **soft tissue is felt within the cervix** (placenta praevia is confirmed), plan for the woman to give birth.
 - If **membranes and fetal parts are felt** both centrally and marginally (placenta praevia is ruled out), proceed to induction (**page P-17**).

BIRTH OF THE BABY

- Plan for the woman to give birth if:
 - the fetus is mature;
 - the fetus is dead or has an anomaly not compatible with life (e.g. anencephaly); or

- the woman's life is at risk because of excessive blood loss.
 - If there is **low placental implantation (Fig. S-3 A, page S-26)** and **bleeding is light**, vaginal birth may be possible. Otherwise, perform a caesarean (**page P-53**).
- Note:** Women with placenta praevia are at high risk for postpartum haemorrhage and placenta accreta/increta, a common finding at the site of a previous caesarean scar.
- **If caesarean is performed** and there is **bleeding from the placental site:**
 - Under-run the bleeding sites with sutures.
 - Infuse oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at 60 drops per minute.
 - **If bleeding occurs during the postpartum period**, initiate appropriate management (**page S-30**). This may include artery ligation (**page P-117**) or hysterectomy (**page P-121**).

Postpartum haemorrhage (PPH) is commonly defined as blood loss in excess of 500 mL within 24 hours after birth, while severe PPH is defined as blood loss of 1000 mL or more within the same timeframe. There are, however, some problems with these definitions:

- Estimates of blood loss are notoriously low, often half the actual loss. Blood is mixed with amniotic fluid and sometimes with urine. It is dispersed on sponges, towels and linens, in buckets, and on the floor.
- The importance of a given volume of blood loss varies with the woman's haemoglobin level before she gives birth. A woman with a normal haemoglobin level will tolerate blood loss that would be fatal for an anaemic woman.

Even healthy, nonanaemic women can have catastrophic blood loss.

- Bleeding can occur at a slow rate over several hours; the condition might not be recognized until the woman suddenly enters shock.

Risk assessment in the antenatal period does not effectively predict which women will have PPH. **Active management of the third stage of labour should be offered to all women in labour because it reduces the incidence of PPH due to uterine atony (page C-102).** Oxytocin (10 IU IM/IV) is the uterotonic drug of choice for active management of the third stage of labour.

Close monitoring of postpartum uterine tone, vaginal bleeding, pulse and blood pressure is recommended for all postpartum women to ensure prompt identification of and rapid response to uterine atony, excessive bleeding and haemodynamic changes.

PROBLEMS

- Increased vaginal bleeding within the first 24 hours after childbirth (primary PPH)
- Increased vaginal bleeding following the first 24 hours after childbirth (secondary PPH)

Continuous slow bleeding or sudden bleeding is an emergency; intervene early and aggressively.

IMMEDIATE MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- **SHOUT FOR HELP.** Urgently mobilize all available personnel.
- Perform a **rapid evaluation** of the woman's general condition, vital signs (pulse, blood pressure, respiration), level of consciousness, presence of anxiety and/or confusion, blood loss, and skin colour and temperature (**page C-1**).
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep in mind that shock could develop as you evaluate the woman further because her status might worsen rapidly. If **shock develops**, it is important to begin treatment immediately.
- Massage the uterus to expel blood and blood clots. Blood clots trapped in the uterus will inhibit effective uterine contractions.
- Give oxytocin 10 units IM (or IV as an infusion if an IV infusion line is already in place) (**Table S-11, page S-32**).
- Start an IV infusion and infuse isotonic crystalloids (e.g. normal saline or Ringer's lactate) (**page C-34**).

Note: Send a blood sample for haemoglobin or haematocrit and type and screen, and order blood for possible transfusion, before infusing IV fluids.

- Anticipate the need for blood early, and transfuse as necessary (**page C-37**).
- Catheterize the bladder.
- Check to see if the placenta has been expelled, and examine the placenta to be certain it is complete.
- Examine the cervix, vagina and perineum for tears.
- Determine the cause of PPH (**Table S-10, page S-31**) and manage accordingly.
- Continue close observation and monitoring of blood loss and clinical parameters, including vital signs, during and following specific management of the underlying cause of PPH.

DIFFERENTIAL DIAGNOSIS

TABLE S-10. Differential diagnosis of vaginal bleeding after childbirth

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Cause
<ul style="list-style-type: none"> • Primary PPH^{a,b} • Uterus soft and not contracted 	<ul style="list-style-type: none"> • Shock 	Atonic uterus, page S-32
<ul style="list-style-type: none"> • Primary PPH^{a,b} 	<ul style="list-style-type: none"> • Complete placenta • Uterus contracted 	Tears of cervix, vagina or perineum, pages S-43 and P-95 and P-97
<ul style="list-style-type: none"> • Placenta not delivered within 30 minutes after birth of infant 	<ul style="list-style-type: none"> • Primary PPH^{a,b} • Uterus contracted 	Retained placenta, pages S-43 and P-91
<ul style="list-style-type: none"> • Portion of maternal surface of placenta missing, or torn membranes with vessels 	<ul style="list-style-type: none"> • Primary PPH^{a,b} • Uterus contracted 	Retained placenta fragments, pages S-44 and P-71
<ul style="list-style-type: none"> • Uterine fundus not felt on abdominal palpation • Slight or intense pain 	<ul style="list-style-type: none"> • Inverted uterus apparent at vulva • Primary PPH^{a,c} 	Inverted uterus, page S-45
<ul style="list-style-type: none"> • Primary PPH^a (bleeding is intra-abdominal and/or vaginal) • Severe abdominal pain (may decrease after rupture) 	<ul style="list-style-type: none"> • Shock • Tender abdomen • Rapid maternal pulse 	Ruptured uterus, page S-24
<ul style="list-style-type: none"> • Bleeding occurs more than 24 hours after childbirth • Uterus softer and larger than expected for elapsed time since childbirth 	<ul style="list-style-type: none"> • Bleeding is variable (light or heavy, continuous or irregular) and foul-smelling • Anaemia 	Secondary PPH, page S-46

^a Bleeding in the first 24 hours after childbirth.

^b Bleeding may be light if a blood clot blocks the cervix or if the woman is lying on her back.

^c There might be no bleeding with complete inversion.

SPECIFIC MANAGEMENT

ATONIC UTERUS

UTERINE MASSAGE AND MEDICINES

An atonic uterus fails to contract after childbirth:

- Continue to massage the uterus.
- Use uterotonic drugs (**Table S-11**):
 - Intravenous oxytocin alone is the uterotonic drug of choice for the treatment of PPH.
 - If **intravenous oxytocin is unavailable, or if the bleeding does not respond to oxytocin**, use IV ergometrine, oxytocin-ergometrine fixed dose, or a prostaglandin (including misoprostol).
 - If **oxytocin and other uterotonics fail to stop the bleeding** or if the bleeding may be partly due to trauma, administer tranexamic acid.
- **If bleeding continues:**
 - Check placenta again for completeness.
 - If there are **signs of retained placental fragments** (absence of a portion of maternal surface or torn membranes with vessels), remove remaining placental tissue (**page S-44**).
 - Assess clotting status using a bedside clotting test (**page S-3**). Failure of a clot to form after seven minutes, or a soft clot that breaks down easily, suggests coagulopathy (**page S-24**).

TABLE S-11. Use of medicines in the management of PPH

	Dose and Route ^a	Continuing Dose ^a	Maximum Dose	Precautions and Contraindications
Oxytocin	IV: Infuse 20 units in 1 L at fastest flow rate possible IM: 10 units	IV: Infuse 20 units in 1 L IV fluids at 40 drops per minute	Not more than 3 L of IV fluids containing oxytocin	Do not give as an IV bolus
Ergometrine/methylergometrine	IM or IV (slowly): 0.2 mg	Repeat 0.2 mg IM after 15 minutes If required,	Five doses (total 1.0 mg)	High blood pressure, pre-eclampsia, heart disease, retained placenta

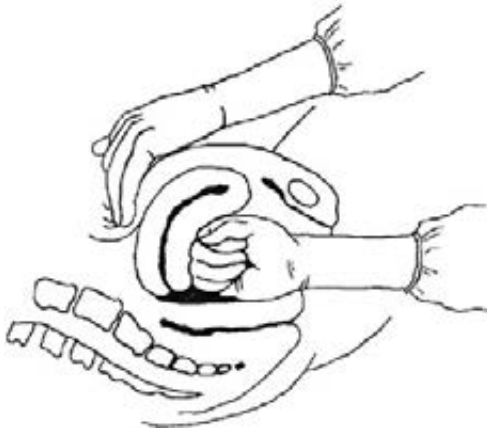
	Dose and Route ^a	Continuing Dose ^a	Maximum Dose	Precautions and Contraindications
		give 0.2 mg IM or IV (slowly) every four hours		
15-Methyl Prostaglandin F2 alpha	IM: 0.25 mg	0.25 mg every 15 minutes	Eight doses (total 2 mg)	Asthma Do not give IV
Misoprostol PGE1	Sublingual: 800 mcg	Repeat 200–800 mcg	Not more than 1600 mcg	
Tranexamic acid	IV (slowly): 1 g	Repeat after 30 minutes if bleeding continues	Not more than 10 mg per kg body weight, three to four times daily	History of coagulopathy or active intravascular clotting, convulsions

^a Note: Drip rate calculated using a giving set of 20 drops/mL

Prostaglandins should not be given intravenously. They can be fatal.

BIMANUAL UTERINE COMPRESSION

- If **bleeding continues** in spite of management above, perform bimanual compression of the uterus until appropriate care is available (**Fig. S-4, page S-34**):
 - Wearing sterile gloves, insert a hand into the vagina and remove any blood clots from the lower part of the uterus or cervix.
 - Form a fist.
 - Place the fist into the anterior fornix and apply pressure against the anterior wall of the uterus.
 - With the other hand, press deeply into the abdomen behind the uterus, applying pressure against the posterior wall of the uterus.
 - Maintain compression until bleeding is controlled and the uterus contracts.

FIGURE S-4. Bimanual compression of the uterus**EXTERNAL AORTIC COMPRESSION**

- Compress the aorta (**Fig. S-5, page S-35**) as a temporizing measure until appropriate care is available:
 - Apply downward pressure with a closed fist over the abdominal aorta directly through the abdominal wall.
 - The point of compression is just above the umbilicus and slightly to the left.
 - Aortic pulsations can be felt easily through the anterior abdominal wall in the immediate postpartum period.
 - With the other hand, palpate the femoral pulse to check the adequacy of compression:
 - If the **pulse is palpable** during compression, the pressure exerted by the fist is inadequate.
 - If the **femoral pulse is not palpable**, the pressure exerted is adequate.
 - Maintain compression until bleeding is controlled or alternative measures can be taken.

FIGURE S-5. Compression of abdominal aorta and palpation of femoral pulse



Packing the uterus is ineffective and wastes precious time.

INTRAUTERINE BALLOON TAMPONADE

- If **bleeding continues** in spite of bimanual and aortic compression, perform intrauterine balloon tamponade (**Fig. S-6, page S-38**):
 - When a balloon catheter designed specifically for treatment of PPH is not available, low-cost adaptations such as a condom balloon tamponade can function as a substitute (**page S-36**).
 - Before performing the procedure for condom balloon tamponade:
 - Provide emotional support and encouragement.
 - Insert an indwelling Foley catheter into the bladder.
- Procedure for condom balloon tamponade:
 - Review general care principles (**page C-25**). Apply antiseptic solution to the perineal area and vagina (**page C-35**).
 - Prior to commencing procedure, secure a condom to the end of a Foley catheter.
 - Perform a vaginal examination to identify the cervix.

- Gently insert a high-level disinfected or sterile speculum into the vagina.
- Gently grasp the anterior lip of the cervix with a ring or sponge forceps.

Note: A ring or sponge forceps is preferable, as it is less likely than the tenaculum to tear the cervix.

- Hold the catheter with a high-level disinfected or sterile forceps and gently introduce it through the cervix. Ensure that the inflatable bulb or catheter is beyond the internal cervical os.
- Once the balloon end has been placed in the uterine cavity, inflate the condom with 300–500 mL of warm saline solution.
- Inflate the condom until it is visible in the cervix. Beware of overfilling the balloon as this might cause the balloon to bulge out of the cervix and be expelled.
- If there is **no bleeding through the cervix**, the tamponade test is positive. No further fluid is added and further surgery is not required at this stage.
- If **bleeding continues**, consider surgical interventions (see **page S-41**).
- Pack the upper vagina with roller gauze to prevent expulsion of the balloon.
- Palpate the uterine fundus abdominally and mark with a pen.

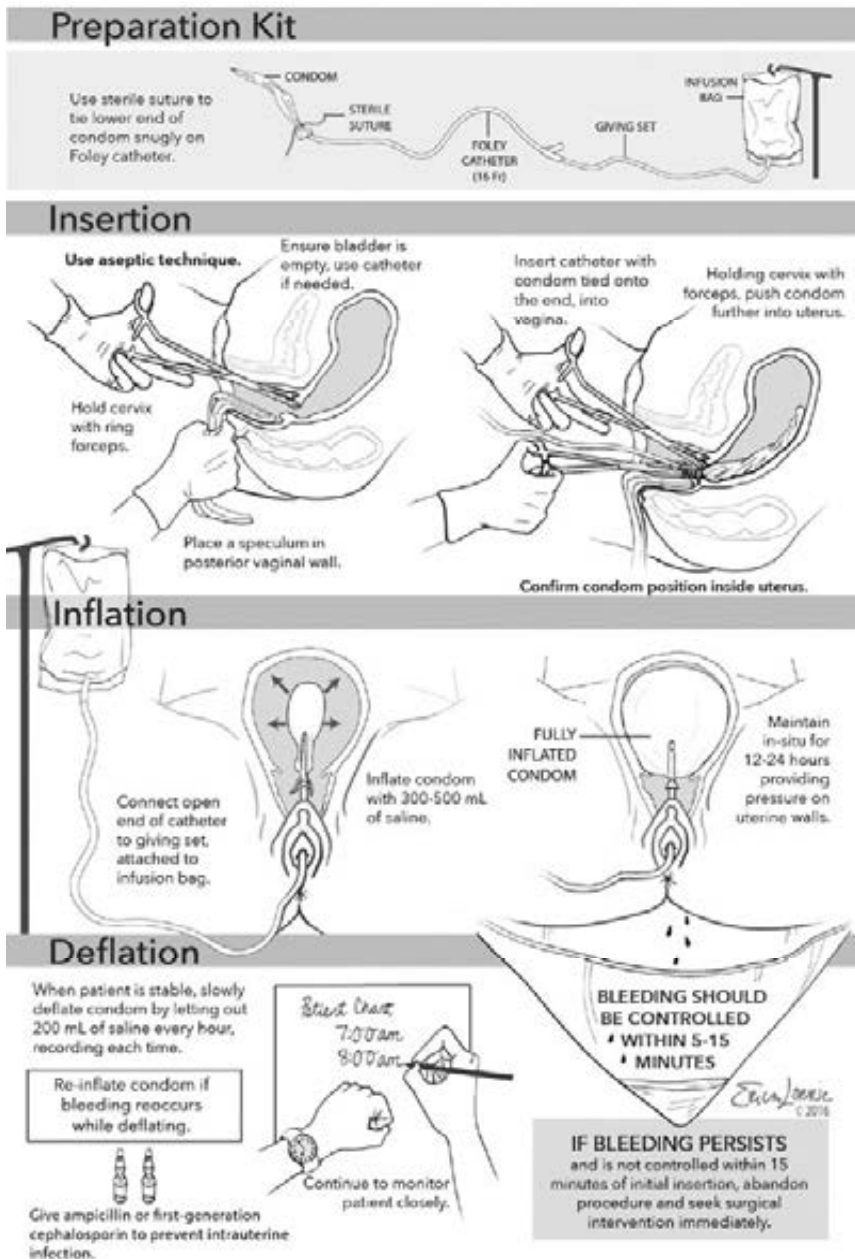
Note: This mark is used as a reference line from which any uterine enlargement or distension would be noted during the period of observation.

- Give oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at 60 drops per minute.
- A single dose of antibiotics (ampicillin or first-generation cephalosporin) is recommended:
 - ampicillin 2 g IV;
 - OR cefazolin 1 g IV.

Post-procedure care:

- Review postoperative care principles (**page C-71**).
- Monitor vital signs, uterine fundal height and vaginal bleeding.
- Monitor urine output every hour.

- After 6–24 hours, if the uterus fundus remains at the same level and there is no active vaginal bleeding, deflate the balloon 50–100 mL every hour as long as there is no further bleeding at each interval.
 - If **there is no further vaginal bleeding** 30 minutes after the balloon is totally deflated, remove the balloon and stop the oxytocin.
 - If the **woman starts to bleed when the balloon is deflated or the oxytocin has stopped**, reinflate the balloon and recommence the oxytocin infusion; prepare for surgical interventions when her condition becomes stable.
- Remove the urinary catheter once the woman is stable.

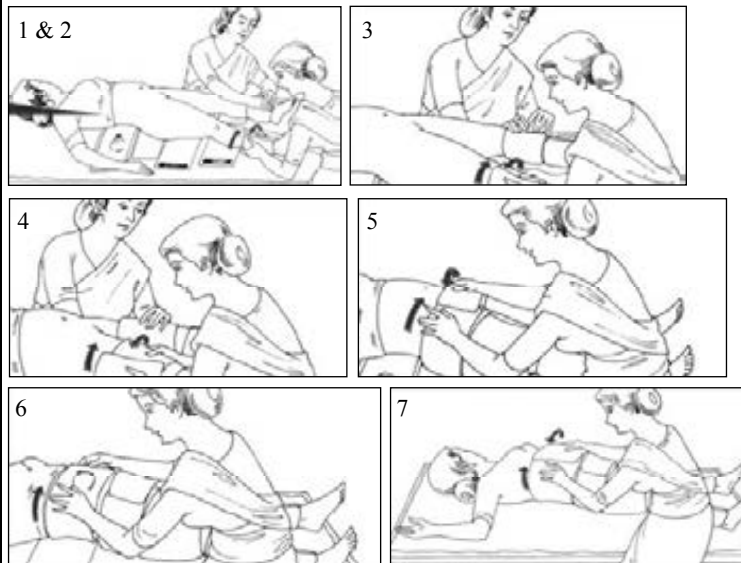
FIGURE S-6. Intrauterine balloon tamponade

BOX S-3. Non-pneumatic anti-shock garment

If available, apply a non-pneumatic anti-shock garment (NASG) as a temporizing measure until appropriate care is available. An NASG applies pressure to the lower body and abdomen, thereby stabilizing vital signs and resolving hypovolaemic shock. Follow the manufacturer's instructions below to apply and remove the NASG.

Application

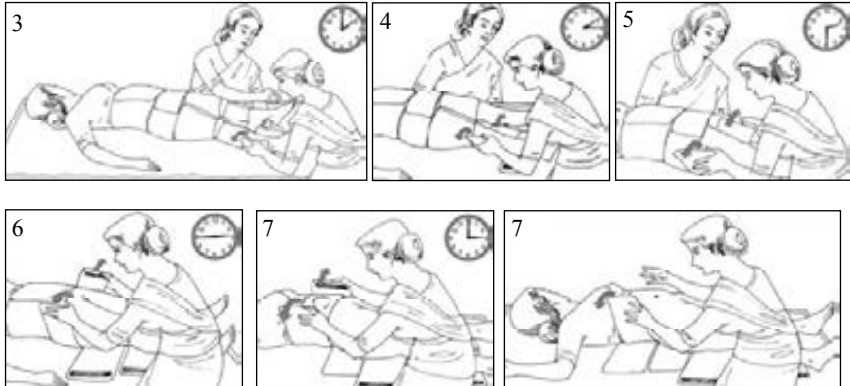
1. Place the NASG under the woman, with the top edge at the level of her lowest rib.
2. Close segments 1 tightly around the ankles; check for snap sound.
3. Close segments 2 tightly around each calf; check for snap sound; leave the knee free so that the leg can bend.
4. Close segments 3 tightly around each thigh; check for snap sound; leave the knee free so that the leg can bend.
5. Close segment 4 around pelvis with lower edge at level of pubic bone.
6. Close segment 5 with pressure ball over the umbilicus.
7. Finish closing the NASG using segment 6.

**Note:**

- Segments 1, 2 and 3 can be applied by two persons simultaneously.
- Segments 4, 5 and 6 should only be applied by one person.
- Make sure the woman can breathe normally with segment 6 in place.

Removal

1. Only remove the NASG when the woman has been stable for two hours (bleeding less than 50 mL per hour; pulse less than 100 beats per minute; blood pressure [BP] greater than 90/60 mmHg).
2. The NASG should only be removed by clinicians who have been trained to do so.
3. Take pulse and BP. Confirm that both are stable. Simultaneously remove segments 1 from around both ankles. Wait 15 minutes. Take pulse and BP. If no change:
4. Simultaneously remove segments 2 from around both calves. Wait 15 minutes. Take pulse and BP. If no change:
5. Simultaneously remove segments 3 from around both thighs. Wait 15 minutes. Take pulse and BP. If no change:
6. Remove segment 4 from around pelvis. Wait 15 minutes. Take pulse and BP. If no change:
7. Simultaneously remove segments 5 and 6 from around abdomen. Wait 15 minutes before allowing the woman to sit up.



Caution: If BP falls by 20 mm/HG or pulse increases by 20 bpm after any segment is removed, rapidly replace all segments in any order and consider the need for more saline or blood transfusion.

Adapted from *WHO Compendium of Innovative Health Technologies for Low-Resource Settings*, 2015.

SURGICAL INTERVENTIONS IN THE TREATMENT OF PPH

- If **bleeding does not stop in spite of treatment** with uterotonics, other available conservative interventions (e.g. uterine massage, balloon tamponade), and external or internal pressure on the uterus, surgical interventions should be initiated.
- Conservative approaches should be tried first, followed— if these are not successful—by more invasive procedures. For example, compression sutures may be attempted first; if that intervention fails, uterine or utero-ovarian ligation (**page P-117**) can be tried. If life-threatening bleeding continues even after ligation, subtotal (also called supracervical or total) hysterectomy should be performed.

UTERINE COMPRESSION SUTURES

- Review general care principles (**page C-25**) and operative care principles (**page C-65**).
- Ensure that an IV infusion is in place with 20 units of oxytocin in 1 L of normal saline at 40 drops per minute (0.04 IU/minute or 2 mL/minute) (**Table P-8, page P-26**).
- Give a single dose of prophylactic antibiotics (**page C-50**):
 - ampicillin 2 g IV;
 - OR cefazolin 1g IV.
- Provide appropriate anaesthesia, as may be indicated (**page C-55**).
- Open the abdomen (**page P-54**); reflect the uterovesical fold.

Applying Compression Sutures

- Lift the uterus out of the pelvis in order to apply bimanual pressure.
 - To ensure that the uterus remains exteriorized and compressed throughout the procedure, an assistant should compress the uterus with both hands.

Note: If vaginal bleeding stops with bimanual compression, there is a good chance that the compression suture will be successful.

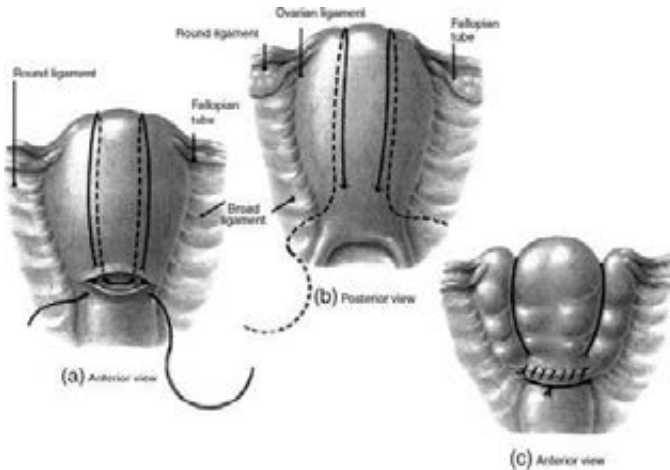
- Using a 36-inch long 0 or 1 chromic catgut (or polyglycolic) suture with round-bodied needle, apply the following sutures (**Fig. S-7, page S-42**):

- Place the first stitch in the lower segment of the uterus, approximately 3 cm from the edge of the right border and 3 cm below the level where the peritoneum was opened. Thread the suture through the uterine cavity to emerge 4 cm above the insertion point and 4 cm from the edge of the right border.

Note: The needle should not completely penetrate the entire thickness of the wall of the uterine cavity.

- Loop the suture over the fundus and re-enter the right lower uterine segment through the posterior wall, symmetrical to that on the front wall.
- Cross the suture to the other side of the lower uterine segment and exit through the left posterior wall.
- Loop the suture back over the fundus to enter the left anterior lower uterine segment opposite and parallel to the initial stitches.
- Pull the free end tightly and tie down securely to compress the uterus, assisted by bimanual compression.
- If **bleeding has stopped**, close the abdomen (**page P-59**).

FIGURE S-7. Uterine compression sutures



UTERINE OR UTERO-OVARIAN ARTERY LIGATION

These conservative surgical measures can also be tried alone or together with compression sutures if bleeding is not resolved with uterotonic drugs, massage and balloon tamponade (**page S-32**).

If bleeding does not stop, further surgical intervention (subtotal or total hysterectomy) is required (**page P-123**).

Post-procedure care:

- Review postoperative care principles (**page C-71**).
- **If there are signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for postpartum endometritis (**page S-130**).
- Give appropriate analgesic drugs (**page C-55**).

TEARS OF CERVIX, VAGINA OR PERINEUM

Tears of the birth canal are the second most frequent cause of PPH. Tears may coexist with atonic uterus. Postpartum bleeding with a contracted uterus is usually due to a cervical or vaginal tear.

- Examine the woman carefully and repair tears to the cervix (**page P-95**) or vagina and perineum (**page P-97**).
- If **bleeding continues**, assess clotting status using a bedside clotting test (**page S-3**). Failure of a clot to form after seven minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-24**).
- Consider use of tranexamic acid (see **Table S-11, page S-32**).

RETAINED PLACENTA

Sometimes there is no bleeding with retained placenta.

- Sometimes a full bladder will hinder delivery of the placenta.
- Ensure that the bladder is empty. Catheterize the bladder, if necessary.
- Ensure that a uterotonic drug has been given as part of active management of the third stage and apply controlled cord traction to remove the placenta.

Note: Avoid forceful cord traction and fundal pressure, as they can cause uterine inversion or cord evulsion.

Do not use ergometrine for retained placenta because it causes tonic uterine contraction, which might delay expulsion.

- If the **placenta is not expelled**, give an additional 10 units oxytocin IM/IV in combination with controlled cord traction.
- If the placenta is not expelled and the woman **is bleeding**, attempt manual removal of the placenta (**P-91**).

Do not use prostaglandin E2 alpha (dinoprostone or sulprostone) for management of retained placenta.

Note: A single dose of antibiotics (ampicillin or first-generation cephalosporin) is recommended if manual removal of the placenta is attempted.

Note: Very adherent tissue may be placenta accreta. Efforts to extract a placenta that does not separate easily may result in heavy bleeding or uterine perforation, which usually require hysterectomy.

- If **bleeding continues**, assess clotting status using a bedside clotting test (**page S-3**). Failure of a clot to form after seven minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-24**).
- If **there are signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for postpartum endometritis (**page S-130**).

RETAINED PLACENTAL FRAGMENTS

Sometimes there is no bleeding with retained placental fragments.

When a portion of the placenta—one or more lobes—is retained, it prevents the uterus from contracting effectively.

- When an incomplete placenta is suspected, feel inside the uterus for placental fragments. Manual exploration of the uterus is similar to the technique described for removal of the retained placenta (**page S-43**).
- Administer a single dose of antibiotics (ampicillin or first-generation cephalosporin) if the uterus is explored:
 - ampicillin 2 g IV;

- OR cefazolin 1 g IV.
- Remove placental fragments by hand, ovum forceps or wide curette (**page P-77**).

Note: Very adherent tissue may be placenta accreta. Efforts to extract fragments that do not separate easily may result in heavy bleeding or uterine perforation, which usually require a hysterectomy.

- If **bleeding continues**, assess clotting status using a bedside clotting test (**page S-3**). Failure of a clot to form after seven minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-24**).

INVERTED UTERUS

The uterus is said to be inverted if it turns inside-out during delivery of the placenta.

- If the **woman is in severe pain**, give morphine 0.1 mg/kg body weight IM.

Note: Withhold or do not give uterotonic drugs until the inversion is corrected.

- Perform repositioning of the uterus (**page P-110**).

Note: With the passage of time the constriction ring around the inverted uterus becomes more rigid and the uterus more engorged with blood. If **bleeding continues**, assess clotting status using a bedside clotting test (**page S-3**). Failure of a clot to form after seven minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-24**).

- Give a single dose of prophylactic antibiotics after correcting the inverted uterus (**page C-35**):
 - ampicillin 2 g IV;
 - OR cefazolin 1 g IV.
- If **there are signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for endometritis (**page S-130**).
- If **necrosis is suspected**, perform vaginal hysterectomy. This may require referral to a tertiary care centre.

SECONDARY POSTPARTUM HAEMORRHAGE

Secondary PPH is defined as increased vaginal bleeding between 24 hours and six weeks after childbirth.

- If **bleeding is severe**, follow steps for general management (**S-30**).
- If **there are signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for postpartum endometritis (**page S-130**).

Secondary PPH might be due to postpartum endometritis and/or retained products of conception.

- Give uterotonic drugs (**Table S-11, page S-32**).
- If the **cervix is dilated**, explore by hand to remove large clots and placental fragments. Manual exploration of the uterus is similar to the technique described for removal of the retained placenta (**page P-91**).
- If the **cervix is not dilated**, evacuate the uterus to remove placental fragments (**page P-91**).
- Rarely, if **bleeding continues**, it may be necessary to consider surgical intervention with uterine and utero-ovarian artery ligation (**page P-117**) or hysterectomy (**page P-123**).
- Perform histopathologic examination of curettings or hysterectomy specimen, if possible, to rule out trophoblastic tumour.

CARE AFTER PPH

Women who have suffered PPH require careful follow-up and special education about self-care and risk of infection.

GENERAL SELF-CARE PRINCIPLES AFTER PPH

Each woman who has been through an emergency situation will respond differently. To deliver effective care, it is important to foster good communication and demonstrate empathy. Women who have experienced PPH will likely require support from family members once they are released from the hospital. Including key support people in aftercare is important. Key principles of care after PPH are as follows:

- Clearly explain the events and the treatment(s) that occurred so that they are understood by the woman and her support person.

- Educate the woman and support person on the symptoms of anaemia and emphasize the importance of an immediate return to the hospital with any symptoms of severe anaemia, increased bleeding or persistent bleeding that does not improve.
- Women who have had excessive bleeding and/or intrauterine procedures are at risk of developing uterine infections. Educate women on the signs and symptoms of intrauterine infection, and encourage them to return to the hospital with any fever, persistent pelvic pain and/or foul-smelling discharge.
- Emphasize the importance of good nutrition, including iron-rich foods, to address the woman's anaemia and improve her general health, and to facilitate milk production and breastfeeding.
- Discuss the importance of maternal recovery, neonatal development and the role of healthy spacing in both. Discuss all available methods of contraception and facilitate initiation of the woman's method of choice.
- Schedule a follow-up visit to check on her progress and address any questions or concerns.

TREATMENT OF ANAEMIA AND PREVENTION OF FUTURE ANAEMIA

- Check for anaemia and evidence of haemodynamic instability after bleeding has been stopped for 24 hours:
 - If there is **evidence of haemodynamic instability**, arrange for a transfusion (**page C-37**).
 - If **haemoglobin is less than 7 g/dL** or **haematocrit is less than 20%** (severe anaemia), arrange for a transfusion (**page C-37**) and give oral iron and folic acid:
 - Give ferrous sulfate or ferrous fumarate 120 mg orally plus folic acid 400 mcg orally once daily for three months.
 - After three months, continue supplementation with ferrous sulfate or ferrous fumarate 60 mg orally plus folic acid 400 mcg orally once daily for three months.
 - If **haemoglobin is 7–11 g/dL**, give ferrous sulfate or ferrous fumarate 60 mg by mouth plus folic acid 400 mcg by mouth once daily for three months.
- Where **hookworm is endemic** (prevalence of 20% or more), give one of the following anthelmintic treatments:

- albendazole 400 mg by mouth in a single dose;
 - OR mebendazole 500 mg by mouth as a single dose or 100 mg every twelve hours for three days;
 - OR levamisole 2.5 mg/kg body weight by mouth once daily for three days;
 - OR pyrantel 10 mg/kg body weight by mouth once daily for three days.
- If **hookworm is highly endemic** (prevalence of 50% or more), repeat the anthelmintic treatment 12 weeks after the first dose.

ELEVATED BLOOD PRESSURE, HEADACHE, BLURRED VISION, CONVULSIONS OR LOSS OF CONSCIOUSNESS

S-49

PROBLEMS

- pregnant woman or a woman who recently gave birth (i.e. is less than six weeks postpartum):
 - is found unconscious or having convulsions (seizures);
 - has elevated blood pressure;
 - complains of severe headache or blurred vision.

GENERAL MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- If the **woman is not breathing or is unconscious or convulsing, SHOUT FOR HELP**. Urgently mobilize all available personnel.
- Perform a rapid evaluation of the woman's general condition (**C-1**) while simultaneously asking her or her relatives about the history of her present and past illnesses.
- If the **woman is not breathing or her breathing is shallow**:
 - Check airway and intubate if required.
 - If she is **not breathing**, assist ventilation using an Ambu bag and mask, or give oxygen at 4–6 L per minute by endotracheal tube.
 - If she is **breathing**, give oxygen at 4–6 L per minute by mask or nasal cannulae.
- If the **woman is unconscious**:
 - check airway, pulse and temperature;
 - position her on her left side;
 - check for neck rigidity.
- If the **woman is convulsing**:
 - Position her on her left side to reduce the risk of aspiration of secretions, vomit and blood.
 - Protect her from injuries (fall), but do not attempt to restrain her.

- **Never leave the woman alone.** Provide constant supervision. A convulsion followed by aspiration of vomit may cause death of the woman and fetus.
- If **eclampsia is diagnosed (Table S-12, page S-52)**, give magnesium sulfate (**Box S-4, page S-59**).
- If the **cause of convulsions has not been determined**, manage as eclampsia and continue to investigate other causes.

DIAGNOSIS OF HYPERTENSIVE DISORDERS OF PREGNANCY

The hypertensive disorders of pregnancy include:

- chronic hypertension (elevation of the blood pressure noted before 20 weeks of gestation or persisting beyond 12 weeks postpartum);
- gestational hypertension;
- mild pre-eclampsia;
- severe pre-eclampsia;
- eclampsia;
- chronic hypertension with superimposed pre-eclampsia.

Headaches, blurred vision, convulsions and loss of consciousness may be associated with hypertension in pregnancy, but they are not necessarily specific to it. Other conditions that may cause convulsions or coma include:

- epilepsy
- complicated malaria
- head injury
- meningitis
- encephalitis.

(See **Table S-12, page S-52** for more information on the differential diagnosis of hypertensive disorders of pregnancy).

BLOOD PRESSURE

Diagnose hypertension in pregnancy if on two consecutive readings taken four hours or more apart:

- **systolic blood pressure** is 140 mmHg or higher and/or
- **diastolic blood pressure is 90 mmHg or higher.**

Note: Blood pressure is in the severe range if the **systolic blood pressure is 160 mmHg** or higher and/or **diastolic blood pressure is 110 mmHg** or higher.

If hypertension occurs for the first time **after 20 weeks of gestation, during labour and/or within 48 hours of giving birth**, it is gestational hypertension, pre-eclampsia or eclampsia, depending on the presence of other features (see **Table S-12, page S-52**).

If hypertension occurs **before 20 weeks of gestation**, it is most likely chronic hypertension. Because some women's blood pressure might not be measured before 20 weeks of gestation, chronic hypertension may be identified for the first time during pregnancy after 20 weeks of gestation. Chronic hypertension will persist beyond 12 weeks postpartum.

PROTEINURIA

The presence of proteinuria changes the diagnosis from gestational hypertension to pre-eclampsia. Because vaginal secretions or amniotic fluid may contaminate a urine specimen, only clean-catch midstream specimens should be used. Catheterization for this purpose is not justified due to the risk of urinary tract infection.

Diagnostic criteria for proteinuria include: two urine dipstick measurements of at least 2+ (30 mg per dL) taken six hours apart; at least 300 mg of protein in a 24-hour urine sample; or a urinary protein/creatinine ratio of 0.3 or greater.

It is important to rule out pre-eclampsia before assigning another etiology for the presence of proteinuria in a pregnant woman with elevated blood pressure. However, other conditions can cause proteinuria and false positive results are possible. Urinary tract infection, severe anaemia, heart failure and difficult labour may all cause proteinuria. Blood in the urine due to catheter trauma or schistosomiasis and contamination from vaginal blood can give false positive results.

Random urine sampling, such as the dipstick test for protein, is a useful screening tool. A change from negative to positive during pregnancy is a warning sign. If dipsticks are not available, a sample of urine can be heated to boiling in a clean test tube. Add a drop of 2% acetic acid to check for persistent precipitates that can be quantified as a percentage of protein to the volume of the total sample.

TABLE S-12. Differential diagnosis of elevated blood pressure, headache, blurred vision, convulsions or loss of consciousness

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms, Signs and Laboratory Findings Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • Systolic blood pressure (SBP) 140 mmHg or higher and/or diastolic blood pressure (DBP) 90 mmHg or higher before the first 20 weeks of gestation 		Chronic hypertension, page S-66
<ul style="list-style-type: none"> • SBP 140 mmHg or higher and/or DBP 90 mmHg or higher before 20 weeks of gestation • After 20 weeks: <ul style="list-style-type: none"> – Proteinuria 2+ on dipstick – Presence of any pre-eclampsia features 		Chronic hypertension with superimposed pre-eclampsia, page S-66
<ul style="list-style-type: none"> • Two readings of SBP 140 mmHg or higher but lower than 160 mmHg and/or DBP 90 mmHg or higher but lower than 110 mmHg four hours apart after 20 weeks of gestation • No proteinuria • No features of pre-eclampsia 		Gestational hypertension, page S-55
<ul style="list-style-type: none"> • Two readings of SBP 140 mmHg or higher but lower than 160 mmHg and/or DBP 90 mmHg or higher but lower than 110 mmHg four hours apart after 20 weeks of gestation • Proteinuria 2+ on dipstick 		Mild pre-eclampsia, page S-56

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms, Signs and Laboratory Findings Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • SBP 160 mmHg or higher and/or DBP 110 mmHg or higher after 20 weeks of gestation • Proteinuria 2+ on dipstick 	<ul style="list-style-type: none"> • Headache (increasing frequency, unrelieved by regular analgesics) • Vision changes (e.g. blurred vision) • Oliguria (passing less than 400 mL urine in 24 hours) • Upper abdominal pain (epigastric pain or pain in right upper quadrant) • Difficulty breathing (rales on auscultation of lungs due to fluid in lungs) • Nausea and vomiting • Hyperreflexia or clonus <p>In facilities with laboratory capacity:</p> <ul style="list-style-type: none"> • Liver enzymes (transaminases) more than twice the normal range • Serum creatinine higher than 1.1 mg/dL or a doubling, or higher, of the baseline serum creatinine concentration in the absence of other renal disease • Platelets less than 100,000 cells/mcL ($100 \times 10^9/L$) 	Severe pre-eclampsia,^{a,b} page S-57
<ul style="list-style-type: none"> • Convulsions • SBP 140 mmHg or higher or DBP 90 mmHg or higher after 20 weeks of gestation 	<ul style="list-style-type: none"> • Coma (unconscious) • Other symptoms and signs of severe pre-eclampsia 	Eclampsia, page S-57
<ul style="list-style-type: none"> • Trismus (difficulty opening mouth and chewing) 	<ul style="list-style-type: none"> • Spasms of face, neck, trunk • Arched back • Board-like abdomen • Spontaneous violent spasms 	Tetanus, page S-67
<ul style="list-style-type: none"> • Convulsions • Past history of convulsions • Normal blood pressure 		Epilepsy,^c page S-68

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms, Signs and Laboratory Findings Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • Fever • Chills/rigors • Headache • Muscle/joint pain 	<ul style="list-style-type: none"> • Enlarged spleen 	Malaria, page S-117
<ul style="list-style-type: none"> • Symptoms and signs of uncomplicated malaria • Coma • Anaemia 	<ul style="list-style-type: none"> • Convulsions • Jaundice 	Severe malaria, page S-121
<ul style="list-style-type: none"> • Headache • Stiff neck • Photophobia • Fever 	<ul style="list-style-type: none"> • Convulsions • Confusion • Drowsiness • Coma 	Meningitis^{c,d} or encephalitis^{c,d}
<ul style="list-style-type: none"> • Headache • Blurred vision 	<ul style="list-style-type: none"> • Vomiting 	Migraine^e

^a If a woman has any one of the symptoms or signs listed for severe pre-eclampsia (with the exception of proteinuria 2+ on the dipstick), diagnose severe pre-eclampsia.

^b The HELLP syndrome is a severe form of pre-eclampsia; the acronym stands for “haemolysis, elevated liver enzymes and low platelets.”

^c If a diagnosis of eclampsia cannot be ruled out, continue treatment for eclampsia.

^d Examine cerebrospinal fluid and give appropriate treatment for meningitis or encephalitis.

^e Give analgesics (e.g. paracetamol 500 mg by mouth as needed).

A small proportion of women with eclampsia have normal blood pressure. Treat all women with convulsions as if they have eclampsia until another diagnosis is confirmed.

Remember:

- Pre-eclampsia often has no symptoms, so it is important to be vigilant with any woman with hypertension in pregnancy and to watch for the subtle or overt onset of symptoms that suggests worsening of disease.
- Oedema of the feet and lower extremities is not considered a reliable sign of pre-eclampsia.

In hypertensive disorders of pregnancy, there might be no symptoms and the only sign might be hypertension.

- Pre-eclampsia can progress rapidly to severe pre-eclampsia. The risk of complications, including eclampsia, increases greatly once pre-eclampsia becomes severe.
- Convulsions with signs of pre-eclampsia indicate eclampsia. These convulsions:
 - can occur regardless of the severity of hypertension;
 - are difficult to predict and typically occur in the absence of headache or visual changes;
 - occur after childbirth in about 25% of cases;
 - are tonic-clonic and resemble grand mal convulsions of epilepsy;
 - may recur in rapid sequence, as in status epilepticus, and may end in death;
 - will not be observed if the woman is alone;
 - may be followed by coma that lasts minutes or hours depending on the frequency of convulsions.

Do not give ergometrine to women with pre-eclampsia, eclampsia or high blood pressure because it can increase blood pressure and increase the risk of stroke or convulsions.

SPECIFIC MANAGEMENT OF HYPERTENSIVE DISORDERS OF PREGNANCY

GESTATIONAL HYPERTENSION

Manage on an outpatient basis:

- Monitor blood pressure, urine (for proteinuria) and fetal condition weekly.
- If **blood pressure worsens or the woman develops features of pre-eclampsia**, manage as pre-eclampsia (**page S-56**).
- If there are **signs of severe fetal growth restriction or fetal compromise**, admit the woman to the hospital for assessment and possible expedited birth.
- Counsel the woman and her family about danger signs indicating severe pre-eclampsia or eclampsia.
- If all **observations remain stable**, allow to proceed with spontaneous labour and childbirth (**page C-77**).

- In women with gestational hypertension, if **spontaneous labour has not occurred before term**, induce labour at term.

MILD PRE-ECLAMPSIA

GESTATION LESS THAN 37 + 0/7 WEEKS

As long as the well-being of the mother and fetus remains stable, the goal is for the woman to reach 37 + 0/7 weeks of gestation while monitoring of maternal and fetal status continues. However, it is important to remain vigilant because pre-eclampsia may progress rapidly to severe pre-eclampsia. The risk of complications, including eclampsia, increases greatly once pre-eclampsia becomes severe. Close monitoring and a high suspicion for worsening disease are important.

If blood pressure **and signs of pre-eclampsia remain unchanged or normalized**, follow up with the woman as an outpatient twice a week:

- Monitor blood pressure, reflexes and fetal condition.
- Monitor for danger signs associated with features of severe pre-eclampsia (**Table S-12, page S-52**).
- Counsel the woman and her family about danger signs associated with severe pre-eclampsia or eclampsia.
- Encourage the woman to eat a normal diet.
- Do not give anticonvulsants or antihypertensives unless clinically indicated (see severe pre-eclampsia and eclampsia, **page S-57**).
- Do not give sedatives or tranquilizers.

If **follow-up as an outpatient is not possible**, admit the woman to the hospital:

- Provide a normal diet.
- Monitor blood pressure (four to six times daily) and urine for daily output.
- Do not give anticonvulsants unless blood pressure increases or other signs of severe pre-eclampsia appear (see severe pre-eclampsia and eclampsia, **page S-57**).
- Do not give sedatives or tranquilizers.

- Do not administer diuretics. Diuretics are harmful and only indicated for use in women with pre-eclampsia who have indications for a diuretic (such as pulmonary oedema).
- Monitor for danger signs associated with severe pre-eclampsia (**page S-57**).

If **blood pressure decreases to normal levels or her condition remains stable**, tell the woman that she can go home:

- Advise her to watch for symptoms and signs of severe pre-eclampsia (**Table S-12, page S-52**).
- See her twice weekly to monitor blood pressure and fetal well-being and to assess for symptoms and signs of severe pre-eclampsia.

If **systolic blood pressure is 160 mmHg or higher and/or diastolic blood pressure is 110 mmHg or higher, or if signs of severe pre-eclampsia appear, even if her blood pressure is normal**, admit the woman and follow recommendations for management of severe pre-eclampsia and eclampsia (**page S-57**).

GESTATION AT OR MORE THAN 37 + 0/7 WEEKS

In women with mild pre-eclampsia at term (37 + 0/7 weeks or more), induction of labour is recommended. Assess the cervix (**page P-18**) and induce or augment labour (**page P-17**).

SEVERE PRE-ECLAMPSIA AND ECLAMPSIA

Severe pre-eclampsia and eclampsia are managed similarly, except that birth must occur within 12 hours of onset of convulsions in eclampsia.

Note: All cases of severe pre-eclampsia should be managed actively. Symptoms and signs of “impending eclampsia” (e.g. blurred vision, hyperreflexia) are unreliable. Once symptoms consistent with severe pre-eclampsia begin, expectant management is not recommended.

GENERAL MANAGEMENT

- Start an IV infusion and infuse IV fluids (**page C-34**).
- Administer magnesium sulfate (**page S-58**).

- Monitor vital signs (pulse, blood pressure, respiration and pulse oximetry), reflexes and fetal heart rate hourly.
 - **If systolic blood pressure remains at 160 mmHg or higher and/or if diastolic blood pressure remains at 110 mmHg or higher, give antihypertensive drugs (page S-60).**

Note: An important principle is to maintain blood pressures above the lower limits of normal.

- Catheterize the bladder to monitor urine output.
- Maintain a strict fluid balance chart (monitor the amount of fluids administered and urine output) to prevent fluid overload.
 - **If urine output is less than 30 mL per hour:**
 - Withhold magnesium sulfate and infuse IV fluids (normal saline or Ringer's lactate) at 1 L in eight hours.
 - Monitor for the development of pulmonary oedema (increased respiratory rate and/or work of breathing, rales on auscultation of lungs).
- **Never leave the woman alone.** A convulsion followed by aspiration of vomit may cause death of the woman and fetus.
- Auscultate the lung bases hourly for rales indicating pulmonary oedema.
 - **If rales are heard,** withhold fluids and administer furosemide 40 mg IV once.
- Assess clotting status with a bedside clotting test (**page S-3**). Failure of a clot to form after seven minutes or a soft clot that breaks down easily suggests coagulopathy (**page S-24**).

ANTICONVULSIVE THERAPY FOR SEVERE PRE-ECLAMPSIA OR ECLAMPSIA

A key factor in anticonvulsive therapy is timely and adequate administration of anticonvulsive drugs. Convulsions in hospitalized women are most frequently caused by under-treatment. **Magnesium sulfate is the drug of choice for preventing and treating convulsions in severe pre-eclampsia and eclampsia.** An intramuscular or intravenous regimen can be used (**Box S-4**).

BOX S-4. Magnesium sulfate regimens for severe pre-eclampsia and eclampsia**Intramuscular Regimen**

Loading dose (IV and IM):

- Give 4 g of 20% magnesium sulfate solution IV over five minutes.
- Follow promptly with 10 g of 50% magnesium sulfate solution: Give 5 g in each buttock as a deep IM injection with 1 mL of 2% lidocaine in the same syringe.

Ensure aseptic technique when giving magnesium sulfate deep IM injection. Warn the woman that she will have a feeling of warmth when the magnesium sulfate is given.

- If convulsions recur after 15 minutes, give 2 g of 50% magnesium sulfate solution IV over five minutes.

Maintenance dose (IM):

- Give 5 g of 50% magnesium sulfate solution with 1 mL of 2% lidocaine in the same syringe by deep IM injection into alternate buttocks every four hours. Continue treatment for 24 hours after birth or the last convulsion, whichever occurs last.

Intravenous Regimen

Intravenous administration can be considered, preferably using an infusion pump, if available:

Loading dose:

- Give 4g of 50% magnesium sulfate solution IV.
- If convulsions recur after 15 minutes, give 2 g of 50% magnesium sulfate solution IV over five minutes.

Maintenance dose (IV):

- Give intravenous infusion 1g/ hour. Continue treatment for 24 hours after childbirth or the last convulsion, whichever occurs last.

- Although magnesium toxicity is rare, a key component of monitoring women with severe pre-eclampsia and eclampsia is assessing for signs of magnesium toxicity. ***Before repeat administration, ensure that:***
 - respiratory rate is at least 16 per minute;
 - patellar reflexes are present;
 - urinary output is at least 30 mL per hour over four hours.
- **If there are signs of toxicity**, delay the next IM dose or withhold the IV infusion of magnesium sulfate (**Box S-5, page S-60**).
- If there are **no signs of toxicity**, give the next IM dose or continue the IV infusion of magnesium sulfate.

BOX S-5. Signs indicating the need to withhold or delay maintenance dose of magnesium sulfate**Closely monitor the woman for signs of magnesium toxicity.**

To prevent magnesium intoxication, it is important to evaluate respiratory rate, deep tendon reflexes and urinary output before administering an additional dose.

Withhold or delay drug if:

- respiratory rate falls below 16 breaths per minute;
- patellar reflexes are absent;
- urinary output falls below 30 mL per hour over preceding four hours.

Keep antidote ready. In case of respiratory arrest:

- assist ventilation (mask and bag, anaesthesia apparatus, intubation);
- give calcium gluconate 1 g (10 mL of 10% solution) IV slowly over three minutes, until respiration begins to counteract the effect of magnesium sulfate.

ANTIHYPERTENSIVE MEDICATIONS

Antihypertensive medications should be started if the **systolic blood pressure is 160 mmHg or higher and/or the diastolic blood pressure is 110 mmHg or higher.**

Note: An important principle is to maintain blood pressures above the lower limits of normal.

The choice and route of administration of an antihypertensive drug for severe hypertension during pregnancy should be based primarily on the prescribing clinician's experience with that particular drug and its cost and local availability, while ensuring that the medication has no adverse fetal effects. If antihypertensive medication for acute treatment of severe hypertension cannot be given intravenously, oral treatment can be given (**Table S-14, page S-62**).

TABLE S-13. Antihypertensive medications and dosing options for acute treatment of severe hypertension

Antihypertensive Options	Dosing
Hydralazine	Intravenous treatment: <ul style="list-style-type: none"> • Administer 5 mg IV, slowly. • Repeat every five minutes until the blood pressure goal has been achieved. • Repeat hourly as needed or give 12.5 mg IM every two hours as needed. • The maximum dose is 20 mg per 24 hours.
Labetalol	Oral treatment: <ul style="list-style-type: none"> • Administer 200 mg. • Repeat dose after one hour until the treatment goal is achieved. • The maximum dose is 1200 mg in 24 hours. Intravenous treatment: <ul style="list-style-type: none"> • Administer 10 mg IV. • If response is inadequate after 10 minutes, administer 20 mg IV. • The dose can be doubled to 40 mg and then 80 mg with 10-minute intervals between each increased dose until blood pressure is lowered below threshold. • The maximum total dose is 300 mg; then switch to oral treatment. Note: Women with congestive heart failure, hypovolaemic shock or predisposition to bronchospasm (asthma) should not receive labetalol.
Nifedipine immediate-release capsule	Oral treatment: <ul style="list-style-type: none"> • Administer 5–10 mg orally. • Repeat dose after 30 minutes if response is inadequate until optimal blood pressure is reached. • The maximum total dose is 30 mg in the acute treatment setting.^a
Alpha methyl dopa	Oral treatment: <ul style="list-style-type: none"> • Administer 750 mg orally. • Repeat dose after three hours until the treatment goal is achieved. • The maximum dose is 3 g in 24 hours.

^a Other treatment options should be considered if blood pressure is not lowered within the acute treatment phase of 90 minutes with 30 mg immediate-release nifedipine.

Once blood pressure is reduced to non-severe levels (lower than 160/110 mmHg), ongoing treatment should be continued using oral medication (Table S-14).

TABLE S-14. Oral antihypertensive medications for non-severe hypertension

Antihypertensive Options	Dosing
Alpha methyl dopa	<ul style="list-style-type: none"> • Administer 250 mg every six to eight hours. • The maximum dose is 2000 mg per 24 hours.
Nifedipine immediate-release capsule ^a	<ul style="list-style-type: none"> • Administer 10–20 mg every 12 hours. • The maximum dose is 120 mg per 24 hours.
Labetalol	<ul style="list-style-type: none"> • Administer 200 mg every six to 12 hours. • The maximum dose is 1200 mg per 24 hours. <p>Note: Women with congestive heart failure, hypovolaemic shock or predisposition to bronchospasm (asthma) should not receive labetalol.</p>

^a **Note:** In some settings, nifedipine is available in more than one formulation (e.g. immediate-release, intermediate-release and sustained-release). Only immediate-release nifedipine is included on WHO's Essential Medicines List (WHO, 2015) and hence in Tables S-13 and S-14. To avoid medication errors, it is important to specify and confirm the nifedipine formulation before administering it.

OPTIMAL TIMING FOR BIRTH

Birth should be considered as soon as the woman's condition has stabilized. The decision about the optimal timing of childbirth should be made on an individual basis, taking into account, among other factors, gestational age, maternal and fetal status and well-being, cervical favourability, and urgency.

Following an eclamptic convulsion, birth of the baby should occur within 12 hours of the onset of convulsions.

Gestation Less than 24 Weeks (Pre-Viable Fetus)

Induction of labour is recommended for women with severe pre-eclampsia if the fetus is not viable or is unlikely to achieve viability within one or two weeks.

- Assess the cervix (**page P-19**) and induce labour as per medical management of inevitable abortion if the gestational age is less than 24 weeks (**Table S-4, page S-13**); or offer dilatation and evacuation (**S-18**) for expedited birth.
- Hysterotomy (incision of the uterus through the abdominal wall at less than 24 weeks of gestation) should be avoided.

Note: Before performing a **hysterotomy**, ensure that:

- coagulopathy has been ruled out;
- safe general or regional anaesthesia is available. Spinal anaesthesia is associated with a risk of hypotension. This risk can be reduced if adequate IV fluids (500–1000 mL) are infused prior to administration of the spinal anaesthesia (**page P-11**).

Do not use local anaesthesia or ketamine in women with pre-eclampsia or eclampsia.

Gestation between 24 and 34 Weeks

In women with severe pre-eclampsia and a viable fetus before 34 weeks of gestation, expectant management is recommended, provided that uncontrolled maternal hypertension, maternal danger signs (e.g. severe headache, visual changes and abdominal pain) and fetal distress are absent and can be monitored. When laboratory services are available, it is advisable to monitor the maternal laboratory values outlined in **Table S-12 (page S-52)** (creatinine, liver transaminases and platelets).

If it is not possible to monitor maternal and fetal well-being, transfer to a tertiary care hospital is recommended. If referral to a tertiary hospital is not possible, manage severe pre-eclampsia as eclampsia.

- Give antenatal corticosteroids to accelerate fetal lung maturation. Antenatal corticosteroid therapy is recommended for women with pregnancies at a gestational age of 24–34 weeks for whom preterm birth is considered imminent (due to severe pre-eclampsia or eclampsia), if the following conditions are met:
 - Gestational age assessment can be accurately undertaken.
 - There is no clinical evidence of maternal infection.
 - Adequate childbirth care is available (including the capacity to recognize and safely manage preterm labour and birth), and the preterm newborn can receive adequate care if needed (including

resuscitation, thermal care, feeding support, infection treatment and safe oxygen use).

Corticosteroids dosing and timing of birth:

- Give two doses of betamethasone 12 mg IM, 24 hours apart, or four doses of dexamethasone 6 mg IM, 12 hours apart.
- If the **maternal or fetal condition is rapidly deteriorating**, expedite birth after the first dose of antenatal corticosteroids. Do not wait to complete the course of antenatal corticosteroids before the woman gives birth.
- Monitor the woman and fetus.
- Monitor fetal growth by symphysis-fundal height (weekly) or ultrasound, if available.
- Give magnesium sulfate (**page S-58**).
 - If **the clinical picture is not worsening, premonitory signs of eclampsia** (e.g. increased reflexes associated with clonus, severe headache or visual disturbance) **are absent** and signs of **severe pre-eclampsia** (diastolic BP is 110 mmHg or higher, systolic BP is 160 mmHg or higher, elevated liver transaminases, elevated serum creatinine, and low platelets) **are not persistent, stop magnesium sulfate** after 24 hours.
- Monitor blood pressure at least every four hours and give antihypertensive medications if **systolic blood pressure is 160 mmHg or higher and/or the diastolic blood pressure is 110 mmHg or higher (page S-60)**.
- If **severe pre-eclampsia or eclampsia persists** (e.g. uncontrolled hypertension despite antihypertensive medications, deterioration in blood tests or non-reassuring fetal status), **expedite the birth (page S-62)**.

Gestation 34 to 36 6/7 Weeks

Note: After 34 completed weeks of gestation, corticosteroids are not recommended for the indication of fetal lung maturation.

In women with severe pre-eclampsia and a viable fetus that is between 34 and 36 + 6/7 weeks of gestation, a policy of expectant management may be recommended, **provided that** uncontrolled maternal hypertension,

worsening maternal status and fetal distress are absent and can be closely monitored.

If any features of worsening severe pre-eclampsia or eclampsia are present, or if close monitoring of the woman and fetus is not feasible, transfer to a higher-level facility. If transfer is not possible, the birth should be expedited.

- Monitor the woman and fetus.
- Monitor fetal growth by symphysis-fundal height (weekly) or ultrasound, if available.
- Give magnesium sulfate (**page S-58**).
 - If **the clinical picture is not worsening, premonitory signs of eclampsia** (e.g. increased reflexes associated with clonus, severe headache or visual disturbance) **are absent** and signs of **severe pre-eclampsia** (diastolic blood pressure is 110 mmHg or higher, systolic blood pressure is 160 mmHg or more, elevated liver transaminases, elevated creatinine, low platelets) **are not persistent, stop magnesium sulfate** after 24 hours.
- Monitor blood pressure at least every four hours and give antihypertensive medications if **systolic blood pressure is 160 mmHg or higher and/or the diastolic blood pressure is 110 mg Hg or higher (page S-60)**.
- If **severe pre-eclampsia or eclampsia persists** (e.g. uncontrolled hypertension despite antihypertensive medications, deterioration in blood tests or non-reassuring fetal status), **expedite the birth (page S-62)**.

Gestation after 37 + 0/7 Completed Weeks

For women with pre-eclampsia at term (37 + 0/7 weeks), regardless of pre-eclampsia severity, giving birth is recommended.

- Assess the cervix (**page P-19**) and induce labour (**page P-17**).
- If **vaginal birth is not anticipated** within 12 hours (eclampsia) or 24 hours (severe pre-eclampsia), perform a caesarean (**page P-53**).
- If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), perform a caesarean (**page P-53**).
- If **safe anaesthesia is not available for caesarean** or if the **fetus is dead**:

- Aim for vaginal birth.
- If the **cervix is unfavourable** (firm, thick, closed), ripen the cervix (**page P-21**).

Note: Before performing a **caesarean**, ensure that:

- coagulopathy has been ruled out;
- safe general or regional anaesthesia is available. Spinal anaesthesia is associated with a risk of hypotension. This risk can be reduced if adequate IV fluids (500–1000 mL) are infused prior to administration of the spinal anaesthesia (**page P-11**).

Do not use local anaesthesia or ketamine in women with pre-eclampsia or eclampsia.

REFERRAL FOR TERTIARY LEVEL CARE

Consider referral of women who have:

- HELLP-syndrome (haemolysis, elevated liver enzymes and low platelets) coagulopathy (**page S-24**);
- persistent coma lasting more than 24 hours after convulsion;
- severe pre-eclampsia and maternal and fetal well-being cannot be adequately monitored;
- uncontrolled hypertension despite treatment with antihypertensives;
- oliguria that persists for 48 hours after giving birth.

CHRONIC HYPERTENSION

- High levels of blood pressure maintain renal and placental perfusion in chronic hypertension; reducing blood pressure will result in diminished perfusion.

Note: Blood pressure should not be lowered below its pre-pregnancy level.

- If the **woman was on an antihypertensive medication before pregnancy** and her **blood pressure is well-controlled**, continue the same medication if acceptable in pregnancy or transfer to medication safely used in pregnancy.

- If the **systolic blood pressure is 160 mmHg or more or the diastolic blood pressure is 110 mmHg or more**, treat with antihypertensive medications (**pages S-60**).
- If **proteinuria or other signs and symptoms of pre-eclampsia are present**, consider superimposed pre-eclampsia and manage as pre-eclampsia (**page S-56**).
- Monitor fetal growth and condition.
- If there are **no complications**, induce labour at term (**page P-17**).
- If **pre-eclampsia develops**, manage as mild pre-eclampsia (**page S-56**) or severe pre-eclampsia (**page S-57**).
- If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-109**).
- If **fetal growth restriction is severe and pregnancy dating is accurate**, assess the cervix (**page P-19**) and induce labour (**page P-17**).

Note: Assessment of gestation by ultrasound in late pregnancy is not accurate. Use a first trimester ultrasound scan, if available, to date the pregnancy.

- Observe for complications, including abruptio placentae (**page S-23**) and superimposed pre-eclampsia (see **page S-56**).

TETANUS

Clostridium tetani may enter the uterine cavity on unclean instruments or hands, particularly during non-professional abortions or noninstitutional births. The newborn is usually infected from unclean instruments used in cutting the cord or from contaminated substances applied as traditional cord dressings. Begin treatment as soon as possible.

- Control spasms with diazepam 10 mg IV slowly over two minutes. If spasms are severe, the woman may have to be paralyzed and put on a ventilator. This may be possible only at a tertiary care centre.
- Provide general care:
 - Nurse in a quiet room but monitor closely;
 - Avoid unnecessary stimuli;
 - Maintain hydration and nutrition;
 - Treat secondary infection.

- Give tetanus antitoxin 3000 units IM to neutralize absorbed toxin.
- Prevent further production of toxin:
 - Remove the cause of sepsis (e.g. remove infected tissue from uterine cavity in a septic abortion);
 - **Give benzylpenicillin 2 million units IV every four hours for 48 hours; then give ampicillin 500 mg by mouth three times per day for 10 days.**

BOX S-6. Tetanus immunization

When the mother has active immunity, the antibodies pass through the placenta, protecting the newborn. A woman is considered protected when she has received two vaccine doses at least four weeks apart, with an interval of at least four weeks between the last vaccine dose and pregnancy termination. Women who last received a vaccination series (five injections) more than 10 years before the present pregnancy should be given a booster. In most women a booster is recommended in every pregnancy.

If an immunized woman has had an **unsafe abortion** or unhygienic birth (or birth attended by an unskilled attendant), give her a booster injection of tetanus toxoid 0.5 mL IM. If she **has not been immunized before**, give her antitetanus serum 1500 units IM and a booster injection of tetanus toxoid 0.5 mL IM after four weeks.

EPILEPSY

Women with epilepsy can present with convulsions in pregnancy. Like many chronic diseases, epilepsy worsens in some women during pregnancy but improves in others. In the majority of women, however, epilepsy is unaffected by pregnancy.

- Observe the woman closely. In general, pregnant women with epilepsy have an increased risk of:
 - pregnancy-induced hypertension;
 - preterm labour;
 - infants with low birth weights;
 - infants with congenital malformations;
 - perinatal mortality.
- Aim to control epilepsy with the smallest dose of a single drug. In early pregnancy avoid drugs that are associated with congenital malformations (e.g. valproic acid).

- If the **woman is convulsing**, give diazepam 10 mg IV slowly over two minutes. Repeat if convulsions recur after 10 minutes.
- If **convulsions continue** (status epilepticus), infuse phenytoin 1 g (approximately 18 mg/kg body weight) in 50-100 mL normal saline over 30 minutes (final concentration not to exceed 10 mg per mL):

Note: Only normal saline can be used to infuse phenytoin. All other IV fluids will cause crystallization of phenytoin.

- Flush IV line with normal saline before and after infusing phenytoin;
 - Do not infuse phenytoin at a rate exceeding 50 mg per minute due to the risk of irregular heartbeat, hypotension and respiratory depression;
 - Complete administration within one hour of preparation.
- If the **woman is known to be epileptic**, give her the same medication that she had been taking. Follow up with her regularly and adjust the dose of medication according to the response.
 - If the **woman is known to be epileptic but cannot recall details of her medication**, give her phenytoin 100 mg by mouth three times per day. Follow up with her regularly and adjust the dose of medication according to her response.
 - Folic acid deficiency may be caused by anticonvulsive drugs. Give folic acid 600 mcg by mouth once daily along with antiepileptic treatment in pregnancy.
 - Phenytoin can cause neonatal deficiency of vitamin K-dependent clotting factors. This can be minimized by giving vitamin K 1 mg IM to the newborn.
 - Evaluation for underlying causes of convulsions is indicated if convulsions are of recent onset. This may be possible only at the tertiary care level.

POSTPARTUM CARE

It is important to continue to monitor blood pressure and remain vigilant for new pre-eclampsia danger signs or worsening pre-eclampsia in the postpartum period because:

- While most women with pre-eclampsia and eclampsia recover within the first 24 hours of giving birth, a minority will remain unstable or deteriorate.
- Some women will present with pre-eclampsia or eclampsia for the first time after giving birth.

MANAGEMENT AFTER CHILDBIRTH

- In women being treated with magnesium sulfate:
 - If magnesium sulfate was started before the birth, continue anticonvulsive therapy for 24 hours after childbirth or the last convulsion, whichever occurs last.
 - If magnesium sulfate was started in the postpartum period, continue anticonvulsive therapy for 24 hours after the last convulsion.
- Monitor blood pressure in all postpartum women.
 - Continue antihypertensive therapy postpartum, if it was started before the woman gave birth.
 - Blood pressures sometimes increase three to seven days after giving birth, so it is important to re-evaluate women one to two weeks after discharge.
 - Start antihypertensive therapy if the woman's systolic blood pressure is 160 mmHg or higher, or if the diastolic pressure is 110 mmHg or higher, during the postpartum period.
- Monitor urine output to ensure that it normalizes if it has been low.
 - If **oliguria persists for 48 hours after giving birth**, transfer to a tertiary care facility.
- Advise the woman and her family to watch for danger signs of severe pre-eclampsia and seek care immediately if they occur.

COUNSELLING TO REDUCE RISK OF PRE-ECLAMPSIA IN FUTURE PREGNANCIES

- Counsel all women treated for pre-eclampsia or eclampsia about the risk of recurrence in future pregnancies and the interventions that may reduce risk of future disease (**Box S-7**).
- Counsel women on the importance of initiating early antenatal care in all future pregnancies and avoiding unwanted pregnancies.

POSTPARTUM FAMILY PLANNING SERVICES

- Due to the increased risk of recurrence of pre-eclampsia and eclampsia in future pregnancies, it is very important that women are appropriately counselled and offered an effective postpartum contraceptive method.
- Women treated for severe pre-eclampsia or eclampsia should have access to long-acting reversible (implants and intrauterine devices) and permanent (tubal ligation and vasectomy) contraceptive methods, which can be given postpartum prior to discharge.
- Provide women with the contraceptive method of their choice (**page C-106**) or link them with follow-up contraception services before discharge.

COUNSELLING TO REDUCE LIFETIME RISK OF CARDIOVASCULAR COMPLICATIONS

- Counsel women treated for pre-eclampsia and eclampsia about their increased risk of future cardiovascular disease (e.g. hypertension, stroke).
- Assess and address the woman's risk factors for cardiovascular disease (e.g. smoking, obesity, lack of physical activity, hyperlipidaemia) before she is discharged from the facility.
- Emphasize the importance of regular medical follow-up and link women to follow-up primary care services before discharge.

BOX S-7. Prevention of pre-eclampsia and eclampsia in subsequent pregnancies

- In areas where dietary calcium intake is low, calcium supplementation during pregnancy (at doses of 1.5–2.0 g elemental calcium/day) is recommended for the prevention of pre-eclampsia for all women, but particularly those at high risk of pre-eclampsia.
- Low-dose acetylsalicylic acid (aspirin, 75 mg) should be initiated before 20 (and, if possible, as early as at 12) weeks of gestation for women at high risk of developing pre-eclampsia if they have one or more of the following risk factors: previous severe pre-eclampsia, diabetes, chronic hypertension, obesity, renal disease, autoimmune disease and multiple pregnancies. This list can be complemented based on local epidemiology.
- In women with risk factors, early detection and management is critical to the management of hypertensive disorders in pregnancy and the prevention of convulsions. These women should be followed up regularly and given clear instructions on when to return to their health care provider. Education of immediate family members is equally important, not only so that they understand the significance of signs of progression of hypertensive disorders in pregnancy, but also to increase social support when hospitalization and changes in work activities are needed. Restriction of calories, fluids or dietary salt intake; vitamin D, C or E supplementation; and rest at home or strict bed rest are not recommended for primary prevention of hypertensive disorders of pregnancy; and some of these interventions may even be harmful to the fetus.

PROBLEMS

- The cervix is not dilated beyond 4 cm after eight hours of regular contractions.
- Cervical dilatation is to the right of the alert line on the partograph.
- The woman has been experiencing labour pains for 12 hours or more without giving birth (prolonged labour).
- The cervix is fully dilated and the woman has the urge to push, but there is no descent.

GENERAL MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- Carefully explain the situation to the woman and talk to her about how you will evaluate her. Listen to the woman and be sensitive to her feelings.
- Perform a **rapid evaluation** of the woman's general condition, vital signs (pulse, blood pressure, respiration), level of consciousness, presence of anxiety and/or confusion, blood loss, and skin colour and temperature (**page C-1**).
- Check the fetal heart rate:
 - If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-109**).
 - If the **fetal heart cannot be heard**, ask several other persons to listen or use a Doppler stethoscope, if available.
 - If the **fetal heart cannot be heard, suspect fetal death (page S-156)**.
- Evaluate the cause of unsatisfactory progress of labour (**Table S-15, page S-74**):
 - Review the partograph (**page C-91**), especially to rule out inadequate uterine activity (**Figure S-10, page S-80**).
 - Test urine for ketones. If ketotic, encourage the woman to eat or drink; otherwise, treat with IV fluids.
 - Assess if the woman is anxious, fearful or distressed by pain:

- If the **woman is distressed by pain**, encourage breathing techniques and a warm bath or shower; if necessary, give analgesic (**page C-55**).
- If the **woman is anxious or fearful**, provide supportive care (**page C-86**).
- Check for malposition, malpresentation and macrosomia.
- Talk to the woman and any support person she would like present about findings and the proposed plan, and obtain consent before initiating treatment.
- Provide specific care for the identified cause.
- Provide supportive care (**page C-86**).

DIAGNOSIS

TABLE S-15. Diagnosis of unsatisfactory progress of labour

Findings	Diagnosis
Cervix not dilated; no palpable contractions or infrequent contractions	False labour, page S-81
Cervix not dilated beyond 4 cm after eight hours of regular contractions	Prolonged latent phase, page S-81
Cervical dilatation to the right of the alert line on the partograph (Fig. S-8, page S-76)	Prolonged active phase, page S-82
Secondary arrest of cervical dilatation and descent of presenting part in presence of good contractions	Cephalopelvic disproportion, page S-82
Secondary arrest of cervical dilatation and descent of presenting part with large caput, third degree moulding, cervix poorly applied to presenting part, oedematous cervix, ballooning of lower uterine segment, formation of retraction band, or maternal and fetal distress (Fig. S-9, page S-78)	Obstruction, page S-83
Two contractions or fewer in 10 minutes, each lasting less than 40 seconds (Fig. S-10, page S-80)	Inadequate uterine activity, page S-83
Presentation other than vertex with occiput anterior	Malpresentation or malposition, page S-85
Cervix fully dilated and woman has urge to push, but no descent	Prolonged expulsive phase, page S-84

Figure S-8, page S-76, is a sample partograph for prolonged active phase of labour. Note that the partograph was not adequately filled out and that this example demonstrates inappropriate management of prolonged labour. The diagnosis of prolonged labour was evident at 14:00 and labour should have been augmented with oxytocin at that time.

- The woman was admitted in active labour at 10:00 with:
 - fetal head 5/5 palpable;
 - cervix dilated 4 cm;
 - inadequate uterine contractions (two in 10 minutes, each lasting less than 20 seconds).
- At 14:00:
 - fetal head still 5/5 palpable;
 - cervix dilated 4 cm and to the right of the alert line;
 - membranes have ruptured spontaneously and amniotic fluid is clear;
 - inadequate uterine contractions (one in 10 minutes, lasting less than 20 seconds).
- At 18:00:
 - fetal head still 5/5 palpable;
 - cervix dilated 6 cm;
 - contractions still inadequate (two in 10 minutes, each lasting less than 20 seconds).
- At 21:00:
 - fetal heart rate 80 per minute;
 - amniotic fluid stained with meconium;
 - no further progress in labour.
- A caesarean is performed at 21:20 due to fetal distress.

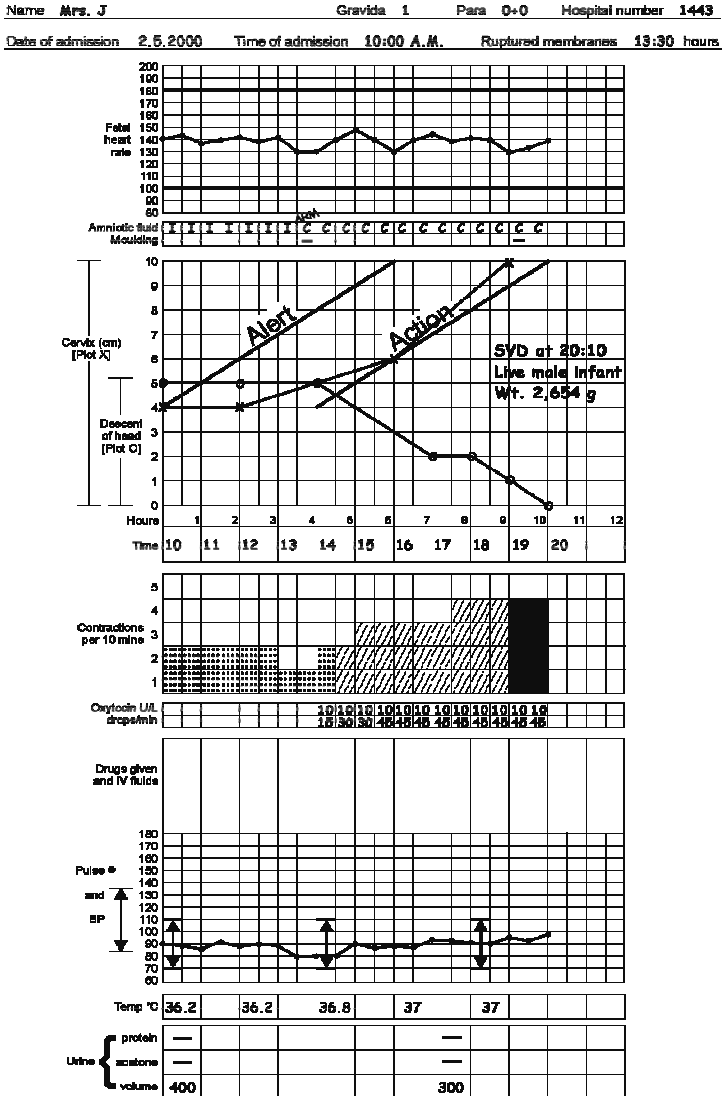
Figure S-9, page S-78, is a sample partograph showing arrest of dilatation and descent in the active phase of labour. Fetal distress and third degree moulding, together with arrest of dilatation and descent in the active phase of labour in the presence of adequate uterine contractions, indicate obstructed labour.

- The woman was admitted in active labour at 10:00 with:
 - fetal head 3/5 palpable;
 - cervix dilated 4 cm;
 - three contractions in 10 minutes, each lasting 20–40 seconds;
 - clear amniotic fluid draining;
 - first degree moulding.
- At 14:00:
 - fetal head still 3/5 palpable;
 - cervix dilated 6 cm and to the right of the alert line;
 - slight improvement in contractions (three in 10 minutes, each lasting 45 seconds);
 - second degree moulding.
- At 17:00:
 - fetal head still 3/5 palpable;
 - cervix still dilated 6 cm;
 - third degree moulding;
 - fetal heart rate 92 per minute;
 - amniotic fluid stained with meconium.
- A caesarean is performed at 17:30 due to fetal distress.

Figure S-10, page S-80, is a sample partograph for poor progress of labour due to inadequate uterine contractions corrected with oxytocin.

- The woman was admitted in active labour at 10:00 with:
 - fetal head 5/5 palpable;
 - cervix dilated 4 cm;
 - two contractions in 10 minutes, each lasting less than 20 seconds.
- At 12:00:
 - fetal head still 5/5 palpable;
 - cervix still dilated 4 cm and to the right of the alert line;
 - no improvement in contractions.
- At 14:00:
 - poor progress of labour due to inefficient uterine contractions diagnosed;
 - augmented labour with oxytocin 10 units in 1 L IV fluids at 15 drops per minute;
 - escalated oxytocin until a good pattern of contractions was established.
- At 19:00:
 - fetal head 1/5 palpable;
 - cervix dilated 10 cm;
 - four contractions in 10 minutes, each lasting 45 seconds.
- Spontaneous vaginal birth occurred at 20:10.

FIGURE S-10. Partograph showing inadequate uterine contractions corrected with oxytocin



SPECIFIC MANAGEMENT

FALSE LABOUR

Examine for urinary tract or other infection (**Table S-17, page S-114**) or ruptured membranes (**page S-159**) and treat accordingly. If none of these are present, discharge the woman and encourage her to return if signs of labour recur or she has danger signs.

PROLONGED LATENT PHASE

Misdiagnosing false labour or prolonged latent phase leads to unnecessary induction or augmentation, which may fail. This can lead to unnecessary caesarean and amnionitis.

The diagnosis of prolonged latent phase is made retrospectively. When contractions cease, the woman is said to have had false labour. When contractions become regular and dilatation progresses beyond 4 cm, the woman is said to have been in the latent phase.

- If a woman has been in the latent phase for more than eight hours and there is little sign of progress, reassess the situation by assessing the cervix:
 - If there has been **no change in cervical effacement or dilatation** and there is no fetal distress, review the diagnosis. The woman might not be in labour.

First explore less invasive interventions that could lead to vaginal birth.

- If there has been a **change in cervical effacement or dilatation**, augment labour using oxytocin (**page P-23**).

Note: Do not use oral misoprostol for labour augmentation.

Do not perform amniotomy as a sole intervention for treatment of confirmed delay in labour, especially in settings with high HIV prevalence.

- Continue to monitor the woman and fetus.
- Reassess cervical dilatation every four hours.
- If the **woman has not entered the active phase after eight hours of oxytocin** infusion, perform a caesarean (**page P-53**).
- If there are **signs of infection** (fever, foul-smelling vaginal discharge):
 - Augment labour immediately with oxytocin (**page P-23**).

- Give a combination of antibiotics until the baby is born: ampicillin 2 g IV every six hours PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
- If the **woman gives birth vaginally**, continue antibiotics until resolution of clinical signs and symptoms (e.g. fever, uterine tenderness, purulent lochia) for 24–48 hours.
- If the **woman has a caesarean**, continue antibiotics until resolution of clinical signs and symptoms (e.g. fever, uterine tenderness, purulent lochia) for 24–48 hours.

Once labour augmentation has begun, the woman should never be left alone.

PROLONGED ACTIVE PHASE

- Assess uterine contractions:
 - If **contractions are inefficient** (less than three contractions in 10 minutes, each lasting less than 40 seconds), suspect inadequate uterine activity (**page S-83**).
 - If **contractions are efficient** (three or more contractions in 10 minutes, each lasting more than 40 seconds), suspect cephalopelvic disproportion (**page S-82**), obstruction (**page S-83**), malposition or malpresentation (**page S-85**).
- If there are **no signs of cephalopelvic disproportion or obstruction** and the **membranes are intact**, augment labour using oxytocin (**page P-23**). **Do not** rupture the membranes, especially in settings with high HIV prevalence.
- Provide general methods of labour support, which may improve contractions and accelerate progress (**page C-86**).

CEPHALOPELVIC DISPROPORTION

Cephalopelvic disproportion occurs because the fetus is too large or the maternal pelvis is too small. If **labour persists with cephalopelvic disproportion**, it may become arrested or obstructed.

The best test to determine if a pelvis is adequate is a trial of labour. **Clinical pelvimetry is of limited value.**

- If **cephalopelvic disproportion is confirmed** (Table S-15, page S-74):
 - If the **fetus is alive**, perform a caesarean (page P-53).
 - If the **fetus is dead**:
 - Perform a craniotomy (page P-65).
 - If the **operator is not proficient in craniotomy**, perform a caesarean (page P-53).

OBSTRUCTION

Note: Rupture of an unscarred uterus is usually caused by obstructed labour.

- If the **fetus is alive, the cervix is fully dilated** and the **fetal head is not more than 1/5 above** the symphysis pubis, or the leading bony edge of the **fetal head is at 0 station or below**, assist the birth of the baby using an obstetric vacuum (page P-33).
- If the **fetus is alive** and the head is **between 1/5 and 3/5** above the symphysis pubis or the leading bony edge of the **fetal head is at -2 station**, perform a caesarean (page P-53).
- If the **fetus is alive** but the **cervix is not fully dilated** or if the **fetal head is too high for vacuum-assisted birth** (the head is more than 3/5 above the symphysis pubis or the leading bony edge of the fetal head is above -2 station), perform a caesarean (page P-53).
- If the **fetus is dead**:
 - Perform a craniotomy (page P-65).
 - If the **operator is not proficient in craniotomy**, perform a caesarean (page P-53).

INADEQUATE UTERINE ACTIVITY

If **contractions are inefficient** (two contractions or less in 10 minutes, each lasting less than 40 seconds) and **cephalopelvic disproportion and obstruction have been excluded**, the most probable cause of prolonged labour is inadequate uterine activity. Augment labour using oxytocin (page P-23).

Inefficient contractions are less common in a multigravida than in a primigravida. Hence, every effort should be made to rule out disproportion in a multigravida before augmenting with oxytocin.

PROLONGED EXPULSIVE PHASE

Maternal expulsive efforts increase fetal risk by reducing the delivery of oxygen to the placenta. Encourage spontaneous maternal “pushing” during contractions; avoid telling the woman to take a deep breath and hold it (closed-glottis pushing) while she makes prolonged pushing efforts. Assist the woman in assuming a position of her choice, including upright positions.

- If **malpresentation and obvious obstruction have been excluded**, augment labour with oxytocin (**page P-23**).
- If there is **no descent after augmentation**:
 - Assist the birth of the baby using an obstetric vacuum (**page P-33**) or forceps (**page P-41**) if the **fetal head is not more than 1/5 above the symphysis pubis** or the leading bony edge of the **fetal head is at 0 station**.
 - **Perform a caesarean (page P-53) if:**
 - the fetal head is between 1/5 and 3/5 above the symphysis pubis or the leading bony edge of the fetal head is between 0 station and -2 station; or
 - the fetal head is more than 3/5 above the symphysis pubis or the leading bony edge of the fetal head is above -2 station.

Malpositions are abnormal positions of the vertex of the fetal head (with the occiput as the reference point) relative to the maternal pelvis.

Malpresentations are all presentations of the fetus other than vertex.

PROBLEM

- The fetus is in an abnormal position or presentation that may result in prolonged or obstructed labour.

GENERAL MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- Perform a **rapid evaluation** of the general condition of the woman, including vital signs (pulse, blood pressure, respiration), level of consciousness, presence of anxiety and/or confusion, volume of blood loss, whether bleeding is accompanied by pain, and skin colour and temperature (**page C-1**).
- Assess the fetal condition:
 - Listen to the **fetal heart rate** immediately after a contraction:
 - Count the fetal heart rate for a full minute at least once every 30 minutes during the active phase and every five minutes during the second stage.
 - If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-109**).
 - If the **membranes have ruptured**, note the colour of the draining amniotic fluid:
 - The presence of thick meconium indicates the need for close monitoring and possible intervention for management of fetal distress (**page S-109**).
 - The absence of fluid draining after rupture of the membranes is an indication of reduced volume of amniotic fluid, which may be associated with fetal distress.
- Provide encouragement and supportive care (**page C-86**).

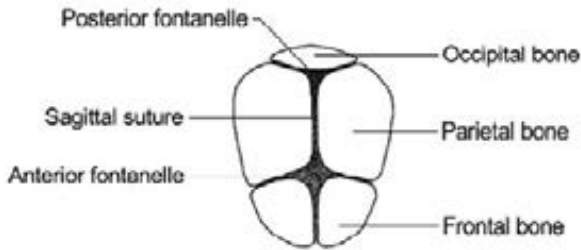
- Review progress of labour using a partograph (**page C-91**).

Note: Observe the woman closely. Malpresentations increase the risk for uterine rupture because of the potential for obstructed labour.

DIAGNOSIS

- The most common presentation is the vertex of the fetal head. **If the vertex is not the presenting part**, see **Table S-16**, page **S-88**.
- If the **vertex is the presenting part**, use landmarks of the fetal skull to determine the position of the fetal head (**Fig. S-11**).

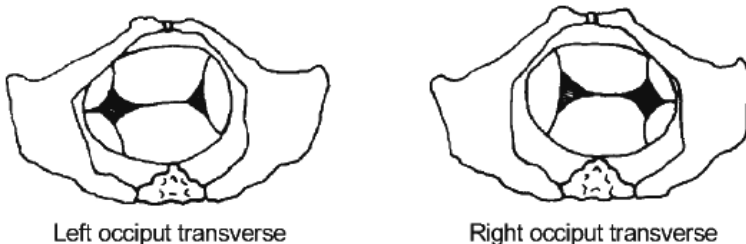
FIGURE S-11. Landmarks of the fetal skull



DETERMINE THE POSITION OF THE FETAL HEAD

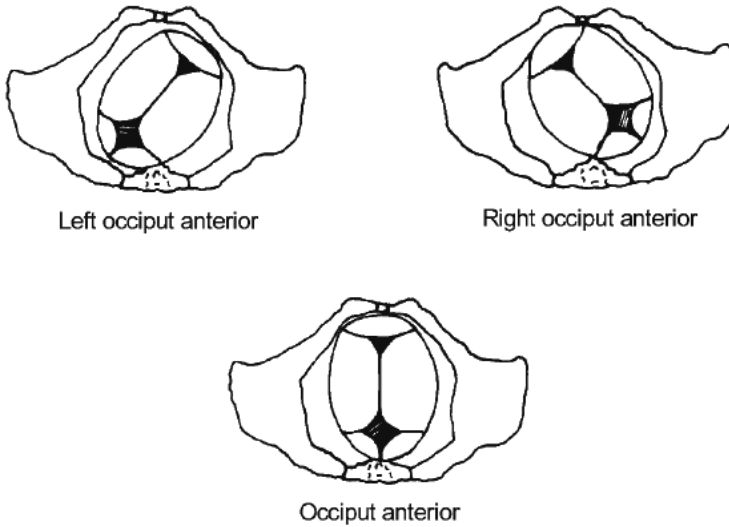
- The fetal head normally engages in the maternal pelvis in an occiput transverse position, with the fetal occiput transverse in the maternal pelvis (**Fig. S-12**).

FIGURE S-12. Occiput transverse positions



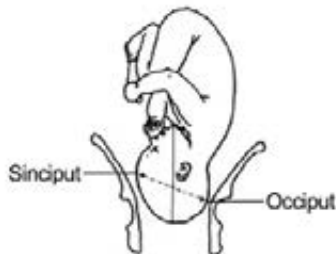
- With descent, the fetal head rotates so that the fetal occiput is anterior in the maternal pelvis (**Fig. S-13**). Failure of an occiput transverse position to rotate to an occiput anterior position should be managed as an occiput posterior position (**page S-88**).

FIGURE S-13. Occiput anterior positions






- An additional feature of a normal presentation is a well-flexed vertex (**Fig. S-14**), with the fetal occiput lower in the vagina than the sinciput.

FIGURE S-14. Well-flexed vertex



- If the **fetal head is well-flexed with occiput anterior or occiput transverse** (in early labour), proceed with birth of the baby (**page C-98**).
- If the **fetal head is not occiput anterior**, identify and manage the malposition (**Table S-16**).
- If the **fetal head is not the presenting part or the fetal head is not well-flexed**, identify and manage the malpresentation (**Table S-16**).

TABLE S-16. Diagnosis of malpositions

Symptoms and Signs	Figure
<p>Occiput posterior position occurs when the fetal occiput is posterior in relation to the maternal pelvis (Fig. S-15 and Fig. S-16).</p> <p>On abdominal examination, the lower part of the abdomen is flattened, fetal limbs are palpable anteriorly and the fetal heart may be heard in the flank.</p> <p>On vaginal examination, the posterior fontanelle is towards the sacrum and the anterior fontanelle may be easily felt if the head is deflexed.</p> <p>For management, see page S-91.</p>	<p>FIGURE S-15</p>  <p>Occiput posterior</p> <p>FIGURE S-16</p>  <p>Left occiput posterior</p>
<p>Occiput transverse position occurs when the fetal occiput is transverse to the maternal pelvis (Fig. S-17). If an occiput transverse position persists into the later part of the first stage of labour, it should be managed as an occiput posterior position (page S-91).</p>	<p>FIGURE S-17</p>  <p>Left occiput transverse</p>

Symptoms and Signs

Figure

Brow presentation is caused by partial extension of the fetal head so that the occiput is higher than the sinciput (**Fig. S-18**).

On **abdominal examination**, more than half the fetal head is above the symphysis pubis and the occiput is palpable at a higher level than the sinciput.

On **vaginal examination**, the anterior fontanelle and the orbits are felt.

For management, see **page S-92**.

FIGURE S-18



Face presentation is caused by hyperextension of the fetal head so that neither the occiput nor the sinciput is palpable on vaginal examination (**Fig. S-19** and **Fig. S-20**).

On **abdominal examination**, a groove may be felt between the occiput and the back.

On **vaginal examination**, the face is palpated, the examiner's finger enters the mouth easily and the bony jaws are felt.

For management, see **page S-92**.

FIGURE S-19

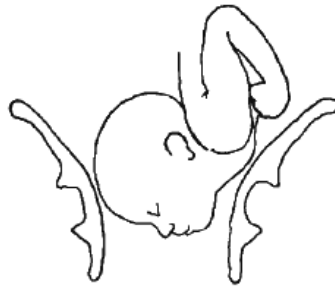


FIGURE S-20



Symptoms and Signs

Figure

Compound presentation occurs when an arm prolapses alongside the presenting part. Both the prolapsed arm and the fetal head present in the pelvis simultaneously (**Fig. S-21**).

For management, see **page S-94**.



FIGURE S-21

Breech presentation occurs when the buttocks and/or the feet are the presenting parts.

On **abdominal examination**, the head is felt in the upper abdomen and the breech in the pelvic brim. Auscultation locates the fetal heart higher than expected with a vertex presentation.

On **vaginal examination during labour**, the buttocks and/or feet are felt; thick, dark meconium is normal.

For management, see **page S-95**.

Complete (flexed) breech presentation occurs when both legs are flexed at the hips and knees (**Fig. S-22**).

Frank (extended) breech presentation occurs when both legs are flexed at the hips and extended at the knees (**Fig. S-23**).

Footling breech presentation occurs when a leg is extended at the hip and the knee (**Fig. S-24**).

FIGURE S-22



FIGURE S-23



FIGURE S-24



Symptoms and Signs

Figure

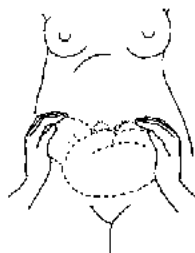
Transverse lie and shoulder presentation occur when the long axis of the fetus is transverse (**Fig. S-25**). The shoulder is typically the presenting part.

On **abdominal examination**, neither the head nor the buttocks can be felt at the symphysis pubis and the head is usually felt in the flank.

On **vaginal examination**, a shoulder may be felt, but not always. An arm may prolapse, and the elbow, arm or hand may be felt in the vagina.

For management, see **page S-97**.

FIGURE S-25



SPECIFIC MANAGEMENT

OCCIPUT POSTERIOR POSITIONS

Spontaneous rotation to the anterior position occurs in 90% of cases. Arrested labour may occur when the head does not rotate and/or descend. Birth of the baby may be complicated by perineal tears or extension of an episiotomy.

- If there are **signs of obstruction but the fetal heart rate is normal**, allow the woman to walk around or change position to encourage spontaneous rotation.
- If there are **signs of obstruction and the fetal heart rate is abnormal** (less than 100 or more than 180 beats per minute) at any stage, perform a caesarean (**page P-53**).
- If the **cervix is not fully dilated and there are no signs of obstruction**, augment labour with oxytocin (**page P-23**).
- If the **cervix is fully dilated but there is no descent** in the expulsive phase of the second stage of labour, assess for signs of obstruction (**Table S-15, page S-74**):
 - If there are **no signs of obstruction**, augment labour with oxytocin (**page P-23**).

- If the cervix is fully dilated:
 - If the **fetal head is no more than 2/5 above** the symphysis pubis, or the leading bony edge of the **fetal head is at 0 station**, assist birth of the baby using an obstetric vacuum (**page P-33**) or forceps (**page P-41**).
 - Otherwise, perform a caesarean (**page P-53**).

BROW PRESENTATION

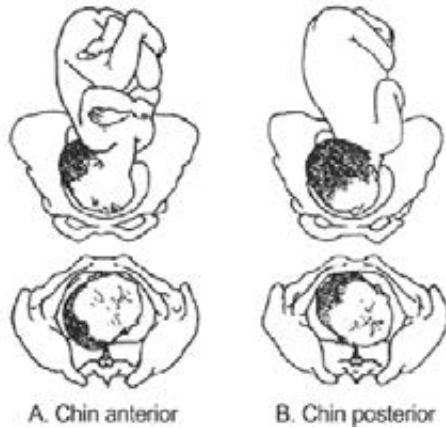
In brow presentation, engagement is usually impossible and arrested labour is common. Spontaneous conversion to either vertex presentation or face presentation can rarely occur, particularly when the fetus is small or when there is fetal death with maceration. It is unusual for spontaneous conversion to occur with an average-sized live fetus once the membranes have ruptured.

- If the **fetus is alive**, perform a caesarean (**page P-53**).
- If the **fetus is dead**:
 - If the **cervix is not fully dilated**, perform a caesarean (**page P-53**).
 - If the **cervix is fully dilated**:
 - Perform a craniotomy (**page P-65**).
 - If the **operator is not proficient in craniotomy**, perform a caesarean (**page P-53**).

Do not use an obstetric vacuum or outlet forceps with brow presentation.

FACE PRESENTATION

The chin serves as the reference point in describing the position of the head. It is necessary to distinguish chin-anterior positions, in which the chin is anterior in relation to the maternal pelvis (**Fig. S-26 A, page S-93**), from chin-posterior positions (**Fig. S-26 B, page S-93**).

FIGURE S-26. Face presentation

Prolonged labour is common. Descent and birth of the head by flexion may occur in the chin-anterior position. In the chin-posterior position, however, the fully extended head is blocked by the sacrum. This prevents descent and labour is arrested.

CHIN-ANTERIOR POSITION

- If the **cervix is fully dilated**:
 - Allow normal childbirth to proceed (**page C-98**).
 - If there is **slow progress** and **no sign of obstruction** (**Table S-15, page S-74**), augment labour with oxytocin (**page P-23**).
 - If **descent is unsatisfactory**, assist the birth of the baby using forceps (**page P-41**).
- If the **cervix is not fully dilated and there are no signs of obstruction**, augment labour using oxytocin (**page P-23**). Review progress as with vertex presentation.

CHIN-POSTERIOR POSITION

- If the **cervix is fully dilated**, perform a caesarean (**page P-53**).
- If the **cervix is not fully dilated**, monitor descent, rotation and progress. If there are signs of obstruction, perform a caesarean (**page P-53**).
- If the **fetus is dead**:
 - Perform a craniotomy (**page P-65**).
 - If the **operator is not proficient in craniotomy**, perform a caesarean (**page P-53**).

Do not use an obstetric vacuum for face presentation.

COMPOUND PRESENTATION

Spontaneous vaginal birth can occur only when the fetus is very small or dead and macerated. Arrested labour occurs in the expulsive phase of the second stage of labour.

- Replacement of the prolapsed arm is sometimes possible:
 - Assist the woman in assuming the knee-chest position (**Fig. S-27**).
 - Push the arm above the pelvic brim and hold it there until a contraction pushes the head into the pelvis.
 - Proceed with management for normal childbirth (**page C-98**).

FIGURE S-27. Knee-chest position



- If the **procedure fails or if the cord prolapses**, perform a caesarean (**page P-53**).

BREECH PRESENTATION

Prolonged labour with breech presentation is an indication for an urgent caesarean. Failure of labour to progress must be considered a sign of possible cephalopelvic disproportion (**Table S-15, page S-74**).

The frequency of breech presentation is high in preterm labour.

EARLY LABOUR

Ideally, every breech birth should take place in a hospital with the ability to perform an emergency caesarean.

- Attempt external cephalic version (**page P-15**) if:
 - breech presentation is present at or after 37 weeks (before 37 weeks, a successful version is more likely to spontaneously revert back to breech presentation);
 - vaginal birth is possible;
 - facilities for emergency caesarean are available;
 - membranes are intact and amniotic fluid is adequate;
 - there are no complications (e.g. fetal growth restriction, uterine bleeding, previous caesarean birth, fetal abnormalities, twin pregnancy, hypertension, fetal death).
- If **external version is successful**, proceed with normal childbirth (**page C-98**).
- If **external version fails**, proceed with vaginal breech birth (below) or caesarean (**page P-53**).

VAGINAL BREECH BIRTH

- A vaginal breech birth (**page P-45**) by a skilled health care provider is safe and feasible under the following conditions:
 - complete or frank breech (**Fig. P-15, page P-45**);
 - adequate clinical pelvimetry;
 - fetus is not too large;
 - no previous caesarean for cephalopelvic disproportion;
 - fetal head is flexed.

- Examine the woman regularly and record progress on a partograph (**page C-91**).
- If the **membranes rupture**, examine the woman immediately to exclude cord prolapse.
- **Note:** Do not rupture the membranes.
- If the **cord prolapses and birth is not imminent**, perform a caesarean (**page P-53**).
- If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute) or prolonged labour, perform a caesarean (**page P-53**).

Note: Meconium is common with breech labour and is not a sign of fetal distress if the fetal heart rate is normal.

The woman should not push until the cervix is fully dilated. Full dilatation should be confirmed by vaginal exam.

CAESAREAN BIRTH FOR BREECH PRESENTATION

- A caesarean birth (**page P-53**) is safer than vaginal breech birth and recommended in cases of:
 - double footling breech;
 - a small or malformed pelvis;
 - a very large fetus;
 - a previous caesarean for cephalopelvic disproportion; or
 - a hyperextended or deflexed head.

Note: Elective caesarean does not improve the outcome in preterm breech birth.

COMPLICATIONS

Fetal complications of breech presentation include:

- cord prolapse;
- birth trauma as a result of extended arm or head, incomplete dilatation of the cervix, or cephalopelvic disproportion;

- asphyxia from cord prolapse, cord compression, placental detachment or entrapped head;
- damage to abdominal organs; and
- broken neck.

TRANSVERSE LIE AND SHOULDER PRESENTATION

- If a **woman is in early labour and the membranes are intact**, attempt external version (**page P-15**):
 - If **external version is successful**, proceed with normal childbirth (**page C-98**).
 - If **external version fails** or is not advisable, perform a caesarean (**page P-53**).
- Monitor for signs of cord prolapse. If the **cord prolapses and birth is not imminent**, perform a caesarean (**page P-53**).

Note: Ruptured uterus may occur if the woman is left unattended (**page S-24**).

In modern practice, persistent transverse lie in labour is managed by performing a caesarean whether the fetus is alive or dead.

PROBLEM

- The fetal head has been born but the shoulders are stuck and cannot be delivered.

GENERAL MANAGEMENT

- Be prepared for shoulder dystocia at all births, especially if a large baby is anticipated.
- Have several persons available to help.

Shoulder dystocia cannot be predicted.

DIAGNOSIS

- The fetal head is born but remains tightly applied to the vulva.
- The chin retracts and depresses the perineum.
- Traction on the head fails to deliver the shoulder, which is caught behind the symphysis pubis.

MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- **SHOUT FOR HELP.** Urgently mobilize all available personnel.
- Make an adequate episiotomy (**page P-85**) to reduce soft tissue obstruction and to allow space for manipulation.
- With the woman on her back, ask her to flex both thighs, bringing her knees as far up as possible towards her chest (**Fig. S-28, page S-100**). Ask two assistants to push her flexed knees firmly up onto her chest.
- Wearing sterile gloves:
 - Apply firm, continuous traction downwards on the fetal head to move the **shoulder that is anterior under the symphysis pubis**.
Note: Avoid excessive traction on the fetal head as this may result in brachial plexus injury.
 - Have an assistant simultaneously apply suprapubic pressure downwards to assist delivery of the shoulder.
Note: Do not apply fundal pressure. This will further impact the shoulder and can result in uterine rupture.
- If the **shoulder has still not been born**:
 - Insert a hand into the vagina along the baby's back.

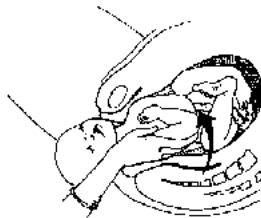
- Apply pressure to the shoulder that is anterior in the direction of the baby's sternum to rotate the shoulder and decrease the diameter of the shoulders.
- If needed, apply pressure to the shoulder that is posterior in the direction of the sternum.
- If the **shoulder still is not born despite the above measures**:
 - Insert a hand into the vagina.

FIGURE S-28. Assistant pushing flexed knees firmly towards chest



- Grasp the humerus of the arm that is posterior and, keeping the arm flexed at the elbow, sweep the arm across the chest. This will provide room for the shoulder that is anterior to move under the symphysis pubis (**Fig. S-29**).

FIGURE S-29. Grasping the humerus of the arm that is posterior and sweeping the arm across the chest



- If all of the **above measures fail to deliver the shoulder**, other options include:
 - Fracture the clavicle to decrease the width of the shoulders and free the shoulder that is anterior.
 - Apply traction with a hook in the axilla to extract the arm that is posterior.

PROBLEM

- A woman in labour has an overdistended uterus or symphysis-fundal height more than expected for the period of gestation.

GENERAL MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- Prop up the woman.
- Confirm accuracy of calculated gestational age, if possible.

DIAGNOSIS

- If **only one fetus is felt** on abdominal examination, consider wrong dates, a single large fetus (**page S-102**) or an excess of amniotic fluid (**page S-102**).
- If **multiple fetal poles and parts are felt** on abdominal examination, suspect multiple pregnancy. Other signs of multiple pregnancy include:
 - fetal head small in relation to the uterus;
 - uterus larger than expected for gestation;
 - more than one fetal heart heard with Doppler fetal stethoscope.

Note: An acoustic fetal stethoscope cannot be used to confirm the diagnosis, as one heart may be heard in different areas.

- Use **ultrasound examination**, if available, to:
 - identify the number, presentations and sizes of fetuses;
 - assess the volume of amniotic fluid.
- If **ultrasound service is not available**, perform radiological examination (anteroposterior view) for number of fetuses and presentations.

SPECIFIC MANAGEMENT

SINGLE LARGE FETUS

- Manage as for normal labour (**page C-77**).
- Anticipate and prepare for prolonged and obstructed labour (**page S-83**), shoulder dystocia (**page S-99**), and PPH (**page S-29**).

EXCESS AMNIOTIC FLUID

- Allow labour to progress.
- Monitor the condition of the woman and the fetus (**page C-88**).
- Monitor progress of labour (**page C-89**); use a partograph in the active phase of labour.
- If the **woman is uncomfortable because of uterine distension**, aspirate excess amniotic fluid:
 - Palpate for the location of the fetus.
 - Prepare the skin with an antiseptic (**page C-35**).
 - Under aseptic conditions, insert a 20-gauge spinal needle through the abdominal and uterine walls and withdraw the stylet.
 - Aspirate the fluid using a large syringe. Alternatively, attach an infusion set to the needle and allow the fluid to slowly drain into a container.
 - When the woman is no longer uncomfortable because of overdistension, replace the stylet and remove the needle.
- If **rupture of membranes is indicated** for other reasons, rupture the membranes with an amniotic hook or a Kocher clamp (**page P-29**).
- Check for cord prolapse when membranes rupture. If the **cord prolapses and birth is not imminent**, perform a caesarean (**page P-53**).

MULTIPLE PREGNANCY

FIRST BABY

- Start an IV infusion and slowly infuse IV fluids (**page C-34**).
- Monitor fetuses by intermittent auscultation of the fetal heart rates. If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-109**).

- Check presentation:
 - For a **vertex presentation**, allow labour to progress as for a single vertex presentation (**page C-82**), and:
 - monitor the condition of the woman and the fetuses (**page C-88**);
 - monitor progress in labour (**page C-89**); use a partograph in the active phase of labour.
 - For a **breech presentation**, apply the same guidelines as for a singleton breech presentation (**page S-95**), and:
 - monitor the condition of the woman and the fetuses (**page C-88**);
 - monitor progress in labour (**page C-89**); use a partograph in the active phase of labour.
 - For a **transverse lie**, perform a caesarean (**page P-53**).

Leave a clamp on the maternal end of the umbilical cord and do not attempt to deliver the placenta until the last baby is born.

SECOND OR ADDITIONAL BABY(S)

- Immediately after the first baby is born:
 - palpate the abdomen to determine the lie of the unborn baby(s);
 - correct to longitudinal lie by external version (**page P-15**);
 - check fetal heart rate(s).
- Perform a vaginal examination to determine:
 - if the cord has prolapsed (**page S-111**);
 - whether the membranes are intact or ruptured; and
 - the presentation of the other baby(s).

Vertex Presentation

- If the **fetal head is not engaged**, manoeuvre the head into the pelvis manually (hands on abdomen), if possible.
- If the **membranes are intact**, rupture the membranes with an amniotic hook or a Kocher clamp.
- Check the fetal heart rate between contractions.
- If **contractions are inadequate after birth of the first baby**, augment labour with oxytocin using rapid escalation (**Table P-8, page P-26**) to produce good contractions (three contractions in 10 minutes, each lasting more than 40 seconds).
- If **spontaneous vaginal birth does not occur within two hours** of good contractions, or if there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), perform a caesarean (**page P-53**).

Breech Presentation

- If the **baby is estimated to be no larger than the first baby**, and if the **cervix has not contracted**, consider assisted breech birth or breech extraction (**page P-45**) or vaginal breech birth (**page S-95**):
 - If there are **inadequate or no contractions after birth of the first baby**, escalate oxytocin infusion at a rapid but controlled rate (**Table P-8, page P-26**) to produce good contractions (three contractions in 10 minutes, each lasting more than 40 seconds).
 - If the **membranes are intact** and the **breech has descended**, rupture the membranes with an amniotic hook or a Kocher clamp (**page P-29**).
 - Check the fetal heart rate between contractions. If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), perform breech extraction (**page P-45**).
- If **vaginal birth is not possible**, perform a caesarean (**page P-53**).

Transverse Lie

- If the **membranes are intact**, attempt external version (**page P-15**).
- If **external version fails** and the **cervix is fully dilated and membranes are still intact**, attempt internal podalic version:

Note: Do not attempt internal podalic version if the provider is untrained, if the membranes have ruptured and the amniotic fluid has drained, or if the uterus is scarred. Do not persist if the baby does not turn easily.

- Wearing sterile gloves, insert a hand into the uterus and grasp the baby's foot.
- Gently rotate the baby down.
- Proceed with breech extraction (**page P-45**).
- Check fetal heart rate between contractions.
- If **external version fails** and **internal podalic version is not advisable or fails**, perform a caesarean (**page P-53**).
- Give oxytocin 10 units IM or give ergometrine 0.2 mg IM within one minute after birth of the last baby and continue active management of the third stage to reduce postpartum blood loss (**page C-102**).

COMPLICATIONS

- Maternal complications of multiple pregnancy include:
 - anaemia
 - abortion
 - gestational hypertension and pre-eclampsia
 - excess amniotic fluid
 - poor contractions during labour
 - retained placenta
 - postpartum haemorrhage.
- Placental/fetal complications include:
 - placenta praevia
 - abruptio placentae
 - placental insufficiency
 - preterm birth
 - low birth weight
 - malpresentations
 - cord prolapse
 - congenital anomalies.

PROBLEM

- A woman in labour has a scarred uterus from a previous uterine surgery.

GENERAL MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- Start an IV infusion and infuse IV fluids (**page C-34**).
- If possible, identify the reason for the uterine scar. Caesarean and other uterine surgeries (e.g. repair of a previous uterine rupture or excision of an ectopic pregnancy implanted in the cornua) leave a scar in the uterine wall. This scar can weaken the uterus, leading to uterine rupture during labour (**Box S-8**).

BOX S-8. Rupture of uterine scars

- **Vertical scars** from a previous caesarean can rupture before labour or during the latent phase.
- **Transverse scars** typically rupture during active labour or during the expulsive phase of second stage of labour.
- The rupture may extend only a short distance into the myometrium with little pain or bleeding. The fetus and placenta may remain in the uterus and the fetus may survive for minutes or hours.

SPECIFIC MANAGEMENT

Studies have shown that in more than 50% of cases with low transverse caesarean scars, the baby can be born vaginally. The frequency of rupture of low transverse scars during a carefully monitored trial of labour is reported as less than 1%.

TRIAL OF LABOUR

- Ensure that conditions are favourable for trial of labour, including the following:
 - The previous surgery involved a low transverse caesarean incision.

- The fetus is in a normal vertex presentation.
- Emergency caesarean can be carried out immediately if required.
- If these **conditions are not met, or if the woman has a history of two lower uterine segment caesarean scars or ruptured uterus**, perform a caesarean (**page P-53**).
- Monitor the condition of the woman and the fetus (**page C-88**).
- Monitor the progress of labour (**page C-89**); use a partograph in the active phase of labour.
- If **cervical dilatation crosses to the right of the alert line** of the partograph, diagnose the cause of slow progress and take appropriate action (**Table S-15, page S-74**):
 - If there is slow progress in labour due to **inefficient uterine contractions** (**Table S-15, page S-74**), augment labour using oxytocin (**page P-23**).
 - If there are **signs of cephalopelvic disproportion or obstruction** (**Table S-15, page S-74**), perform a caesarean immediately (**page P-53**).
- If there are **signs of impending uterine rupture** (rapid maternal pulse, persistent abdominal pain and suprapubic tenderness, fetal distress), perform a caesarean immediately (**page P-53**).
- If **uterine rupture is suspected**, perform a caesarean immediately (**page P-53**) and repair the uterus (**page P-113**) or perform a hysterectomy (**page P-121**).

PROBLEMS

- Abnormal fetal heart rate (less than 100 or more than 180 beats per minute)
- Thick meconium-stained amniotic fluid

GENERAL MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- Prop up the woman or place her on her left side.
- Stop oxytocin if it is being administered.
- Give oxygen 4–6 L by mask or nasal cannulae.

SPECIFIC MANAGEMENT

ABNORMAL FETAL HEART RATE

BOX S-9. Abnormal fetal heart rate

- A **normal fetal heart rate** may slow during a contraction but usually recovers to normal as soon as the uterus relaxes.
- A **very slow fetal heart rate** in the absence of contractions or persisting after contractions is suggestive of fetal distress.
- A **rapid fetal heart rate** may be a response to maternal fever, drugs causing rapid maternal heart rate (e.g. terbutaline or ritodrine), hypertension or amnionitis. In the absence of a rapid maternal heart rate, a rapid fetal heart rate should be considered a sign of fetal distress.

- If a **maternal cause is identified** (e.g. maternal fever, bleeding, drugs), initiate appropriate management:
 - If there is **bleeding with intermittent or constant pain**, suspect abruption placentae (**page S-23**).
 - If there are **signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for amnionitis (**page S-163**).
 - If the **fetal heart rate is heard but is depressed** and the **mother has had sedatives**, wait for the effect of the drugs to wear off and then recheck.

- If a **maternal cause is not identified** and the **fetal heart rate remains abnormal** throughout at least three contractions, perform a vaginal examination (**page C-90**) to check for explanatory signs of distress:
 - If the cord is **below the presenting part or in the vagina**, manage as prolapsed cord (**page S-111**).
- If **fetal heart rate abnormalities persist** or there are **additional signs of distress** (thick meconium-stained fluid), plan for the woman to give birth:
 - If the **cervix is fully dilated** and the **fetal head is not more than 1/5 above** the symphysis pubis, or the leading bony edge of the **fetal head is at 0 station**, assist the birth of the baby using an obstetric vacuum (**page P-33**) or forceps (**page P-41**).
 - If the **cervix is not fully dilated**, or the **fetal head is more than 1/5 above** the symphysis pubis, or the leading bony edge of the **fetal head is above 0 station**, perform a caesarean (**page P-53**).

MECONIUM

- Meconium staining of amniotic fluid is seen frequently as the fetus matures, and by itself it is not an indicator of fetal distress. A slight degree of meconium without fetal heart rate abnormalities is a warning of the need for vigilance.
- **Thick meconium** suggests passage of meconium in reduced amniotic fluid and may indicate the need for expedited childbirth and management of the neonatal upper airway at birth to prevent meconium aspiration (**page S-167**).
- In **breech presentation**, meconium is passed in labour because of compression of the fetal abdomen. This is not a sign of distress unless it occurs in early labour.

PROBLEMS

- The umbilical cord lies in the birth canal below the fetal presenting part.
- The umbilical cord is visible at the vagina following rupture of the membranes.

GENERAL MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- Give oxygen at 4–6 L per minute by mask or nasal cannulae.

SPECIFIC MANAGEMENT

PULSATING CORD

If the **cord is pulsating**, the fetus is alive.

- Diagnose the stage of labour by an immediate vaginal examination (**Table C-8, page C-78**).
- If the woman is in the **first stage of labour**, perform the following in all cases:
 - Wearing sterile gloves, insert a hand into the vagina. Push the presenting part up to decrease pressure on the cord and dislodge the presenting part from the pelvis.
 - Place the other hand on the abdomen in the suprapubic region to keep the presenting part out of the pelvis.
 - Once the presenting part is firmly held above the pelvic brim, remove the other hand from the vagina. Keep the hand on the abdomen until a caesarean can be performed.
 - If available, give tocolytics (**page S-146**) to reduce contractions.
 - Perform immediate caesarean (**page P-53**).
- If the woman is in the **second stage of labour**:
 - Expedite birth with obstetric vacuum (**page P-33**) or forceps (**page P-41**).

- For **breech presentation**, perform breech extraction (**page P-45**) and apply Piper or long forceps to the after-coming head (**page P-49**).
- Prepare for resuscitation of the newborn (**page S-167**).

CORD NOT PULSATING

If the **cord is not pulsating**, the fetus is dead. Proceed with birth of the baby in the manner that is safest for the woman.

PROBLEM

- A woman has a fever (temperature of 38°C or more) during pregnancy or labour.

IMMEDIATE MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- Perform a **rapid evaluation** of the woman's general condition, vital signs (pulse, blood pressure, respiration), level of consciousness, presence of anxiety and/or confusion, blood loss, and skin colour and temperature (**page C-1**).
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further, because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.
- Check the fetal heart rate and ask about fetal movements, depending on gestational age:
 - If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-109**).
 - If the **fetal heart cannot be heard**, ask several other persons to listen or use a Doppler stethoscope, if available.
 - If fetal movements are not felt or the **fetal heart cannot be heard, suspect fetal death (page S-156)**.

DIAGNOSIS

TABLE S-17. Differential diagnosis of fever during pregnancy and labour

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
Dysuria Increased frequency and urgency of urination	Retropubic/suprapubic pain Abdominal pain Fever infrequently present	Cystitis, page S-116
Spiking fever/chills Dysuria Increased frequency and urgency of urination Flank pain	Retropubic/suprapubic pain Loin pain/tenderness Tenderness in rib cage (costovertebral angle area) Anorexia Nausea/vomiting	Acute pyelonephritis, page S-116
Foul-smelling vaginal discharge in first 22 weeks Fever/chills Tender uterus	Lower abdominal pain Rebound tenderness Prolonged bleeding Purulent cervical discharge	Septic abortion, Table S-2, page S-9
Fever/chills Maternal tachycardia Abdominal pain Fetal tachycardia	History of loss of fluid Foul-smelling watery discharge after 22 weeks Tender uterus Light vaginal bleeding	Amnionitis, page S-163
Cough with expectoration Chest pain	Consolidation Rapid/difficulty breathing Rhonchi/rales (wheezing)	Pneumonia, page S-153
Fever/chills Headache Muscle/joint pain	Enlarged spleen	Uncomplicated malaria, page S-118
Symptoms and signs of uncomplicated malaria Coma Anaemia	Convulsions Jaundice	Severe malaria, page S-121
Fever Headache Dry cough Malaise Anorexia	Confusion Stupor	Typhoid ^a

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
Enlarged spleen		
Fever	Muscle/joint pain	Hepatitis ^b
Malaise	Urticaria	
Anorexia	Enlarged spleen	
Nausea		
Dark urine and pale stool		
Jaundice		
Enlarged liver		

^a Give ampicillin 1 g by mouth every six hours for 14 days OR give amoxicillin 1 g by mouth every eight hours for 14 days. Alternative therapy will depend on local sensitivity patterns; consider injectable third-generation cephalosporin in regions where fluoroquinolone resistance is high.

^b Provide supportive therapy and observe.

GENERAL MANAGEMENT

- Encourage rest.
- Encourage increased fluid intake by mouth.
- Use a fan or tepid sponge, and if necessary, open a window to help decrease temperature.
- Consider paracetamol 500–1000 mg every six to eight hours (maximum of 4000 mg in 24 hours) to help decrease temperature.

SPECIFIC MANAGEMENT

URINARY TRACT INFECTIONS

TESTS

Urine dipstick, microscopy and culture tests can be used to evaluate for a urinary tract infection, but they will not differentiate between cystitis and acute pyelonephritis.

- A dipstick leukocyte esterase test can be used to detect white blood cells, protein or blood; a nitrate reductase test can be used to detect nitrites.
- Microscopy of a urine specimen may show white cells in clumps, bacteria and, sometimes, red cells.

- Urine culture and sensitivity tests should be done, if available, to identify the organism and its antibiotic sensitivity.

Note: Urine examination requires a clean-catch midstream specimen to minimize the possibility of contamination. Contamination may be indicated by presence of many epithelial cells noted on microscopy.

CYSTITIS

Cystitis is infection of the bladder (lower urinary tract).

- Treat with an antibiotic (**page C-49**). Antibiotic options include the following:
 - amoxicillin 500 mg by mouth every eight hours for three days;
 - nitrofurantoin 100 mg by mouth every eight hours for three days.

Note: Avoid nitrofurantoin at term as it can cause neonatal haemolysis.
- If **treatment fails** or if **infection recurs two or more times during pregnancy**, check urine culture and sensitivity, if available, and treat with an antibiotic appropriate for the organism.

ACUTE PYELONEPHRITIS

Acute pyelonephritis is an infection of the upper urinary tract, mainly of the renal pelvis, which may also involve the renal parenchyma. Acute pyelonephritis can cause significant illness in pregnant women and should be promptly investigated and treated in every pregnant woman with fever, urinary symptoms and flank pain.

- If **shock is present or suspected**, initiate immediate treatment (**page S-1**).
- Start an IV infusion and infuse IV fluids at 150 mL per hour (**page C-34**).
- Check urine dipstick and urine culture if possible and begin empiric antibiotic treatment promptly (pending results of urine culture, if available).
- Treat with an IV antibiotic until the woman is fever-free for 48 hours (**page C-50**):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.

- Once the **woman is fever-free for 48 hours, is drinking well and is not vomiting**, switch from an IV to an oral antibiotic, for a total of 14 days treatment. Oral antibiotic options include, among others:

- amoxicillin 1 g by mouth every eight hours to complete 14 days of treatment.

Note: Clinical response is expected within 48 hours. If there is **no clinical response in 48 hours**, re-evaluate urine culture results (if available) and antibiotic coverage. Also re-evaluate diagnosis to be sure that there is not another source of infection.

- Ensure adequate hydration by mouth or IV.
- Give paracetamol 500–1000 mg by mouth three to four times daily as needed for pain and to lower temperature (4000 mg maximum in 24 hours).

Note: If there are **palpable contractions and blood-stained mucus discharge**, suspect preterm labour ([page S-144](#)).

MALARIA

In malaria-endemic areas in Africa, for women accessing care for malaria, either uncomplicated or severe:

- Treat and then follow up with intermittent preventive treatment in pregnancy (IPTp):
 - Provide IPTp with sulfadoxine/pyrimethamine (three tablets, each tablet containing 500 mg/25 mg) to all pregnant women as part of routine antenatal care, ideally as directly observed therapy.
 - Start treatment early in the second trimester (from 13 weeks gestational age).
 - Give IPTp at each antenatal care visit, as long as visits are at least one month apart.
 - Ensure that the woman receives at least three doses during pregnancy.
 - Promote the use of insecticide-treated nets.
- Promote the use of insecticide-treated nets.

Note:

- Folic acid at a daily dose of 5 mg or more should not be given together with sulfadoxine/pyrimethamine as this counteracts the efficacy of the antimalarial. However, folic acid doses of 0.4 mg daily during pregnancy, as recommended by WHO, can be safely administered.
- Women infected with HIV and taking co-trimoxazole prophylaxis should not be given IPTp due to a higher risk of adverse events.

Source: WHO, *WHO Policy Brief for the Implementation of Intermittent Preventive Treatment of Malaria in Pregnancy Using Sulfadoxine-Pyrimethamine (IPTp-SP)*, April 2013.

UNCOMPLICATED MALARIA

There are five important malaria parasites: *Plasmodium (P.) falciparum*, *P. vivax*, *P. ovale*, *P. malariae* and *P. knowlesi*. Symptomatic falciparum malaria in pregnant women may cause severe disease and death if it is not recognized and **treated early**. When malaria presents as an acute illness with fever, it cannot be reliably distinguished from many other causes of fever on clinical grounds. Malaria should be considered the most likely diagnosis in a pregnant woman with fever who has been exposed to malaria.

In the presence of fever in high transmission areas, a rapid test should be performed to rule out malaria comorbidity

- Women **without pre-existing immunity** to malaria (living in non-malarial areas) are susceptible to the more severe complications of malaria (**page S-121**).
- Women **with acquired immunity** to malaria are at high risk for developing severe anaemia and giving birth to low birth weight babies.

Note: If the malaria species is not known with certainty, treat as uncomplicated *P. falciparum* malaria.

TESTS

- If **facilities for testing are not available**, begin therapy with antimalarial drugs based on clinical suspicion (e.g. headache, fever, joint pain).

- In areas of high transmission, always treat for malaria if malaria cannot be ruled out, even though there might be another cause of fever.
- Where available, the following tests will confirm the diagnosis:
 - microscopy of a thick and thin blood film:
 - thick blood film is more sensitive at detecting parasites (absence of parasites does not rule out malaria);
 - thin blood film helps to identify the parasite species; and
 - rapid antigen detection tests.

If suspicion of malaria remains, repeat the test in six hours.

ACUTE, UNCOMPLICATED P. FALCIPARUM MALARIA

Chloroquine-resistant falciparum malaria is widespread. Resistance to other medications (e.g. quinine, sulfadoxine/pyrimethamine, mefloquine) also occurs. It is therefore important to follow national treatment guidelines. The antimalarials considered safe in the first trimester of pregnancy are quinine, chloroquine, clindamycin, mefloquine and proguanil. Medications contraindicated in pregnancy include primaquine, tetracycline, doxycycline and halofantrine.

First Trimester

- Give **quinine salt** (dihydrochloride or sulfate) 10 mg/kg body weight by mouth three times daily **PLUS clindamycin** 300 mg every six hours for seven days.
- If **clindamycin is not available**, treat with quinine monotherapy: quinine salt (dihydrochloride or sulfate) 10 mg/kg body weight by mouth three times daily for seven days.
- An artemisinin-based combination therapy (ACT) can be used if quinine is not available, or if quinine plus clindamycin fails, or if adherence to seven-day treatment with quinine cannot be guaranteed.

Second and Third Trimesters

- Treat orally based on national policy with any of the ACTs (assuming a body weight of 50 kg or more):

- artemether (80 mg) PLUS lumefantrine (480 mg) twice daily for three days;
- artesunate (200 mg) PLUS amodiaquine (540 mg) once daily for three days;
- artesunate (200 mg) PLUS mefloquine (440 mg) once daily for three days;
- dihydroartemisinin (160mg) PLUS piperazine (1280 mg) once daily for three days;
- artesunate (200 mg) once daily for three days PLUS sulfadoxine/pyrimethamine (1500/75 mg) single dose only on day one.

Note: Quinine is associated with an increased risk of hypoglycaemia in late pregnancy. It should be used, in combination with clindamycin, only if effective alternatives are not available.

P. VIVAX, OVALE, MALARIAE, KNOWLESII MALARIA

First Trimester

Areas with Chloroquine-Sensitive *P. Vivax* Parasites

Chloroquine is the treatment of choice in areas with chloroquine-sensitive vivax malaria.

- Give **chloroquine** 10 mg/kg body weight by mouth once daily for two days followed by 5 mg/kg body weight by mouth on day three.

Areas with Chloroquine-Resistant *P. Vivax* Parasites

Chloroquine-resistant *P. vivax* has been reported in several countries.

Before considering second-line drugs for treatment failure with chloroquine, clinicians should exclude poor patient compliance and a new infection with *P. falciparum*. If **diagnostic testing is not available**, treat as for falciparum malaria. The treatment option for confirmed chloroquine-resistant vivax malaria is quinine salt (dihydrochloride or sulfate) 10 mg/kg body weight by mouth three times a day for seven days.

Note: The dose of quinine is the same for all species of malaria.

Second and Third Trimesters

Areas with Chloroquine-Sensitive *P. Vivax* Parasites

ACT and chloroquine alone are the two treatment options in areas with chloroquine-sensitive vivax malaria (see dosage under **First Trimester and Second and Third Trimesters** in the **Acute, Uncomplicated *P. Falciparum* Malaria**, page S-119).

Areas with Chloroquine-Resistant *P. Vivax* Parasites

Treat with ACT (see **Second and Third Trimester in the Acute, Uncomplicated *P. Falciparum* Malaria**, page S-119).

ANTI-RELAPSE TREATMENT

Primaquine is contraindicated in pregnant women and mothers who are breastfeeding an infant less than six months of age.

To prevent relapse in *P. vivax* or *P. ovale* malaria, consider weekly chemoprophylaxis with chloroquine until childbirth and breastfeeding are completed. Then, on the basis of G6PD (glucose-6-phosphate dehydrogenase) status, treat with primaquine to prevent future relapse.

TREATMENT OF LIVER STAGES OF VIVAX AND OVALE MALARIA

Vivax and ovale malaria may remain dormant in the liver. From time to time, these dormant stages are released into the blood, causing a new, symptomatic vivax or ovale infection. A 14-day course of primaquine (0.25–0.5 mg/kg body weight daily) should be used to clear the liver stages, but primaquine should not be given to pregnant women or women breastfeeding an infant less than six months of age.

SEVERE MALARIA

Women in the second and third trimesters of pregnancy are more likely to have severe malaria than other adults. Severe malaria in pregnancy may be misdiagnosed as eclampsia. **If a pregnant woman living in a malarial area has fever, headaches or convulsions, and malaria cannot be excluded, treat the woman for both malaria and eclampsia.**

Pregnant women with severe malaria are particularly prone to hypoglycaemia, pulmonary oedema, anaemia and coma. Fetal death and premature labour are common.

- Severe malaria may also present immediately after giving birth.
- Women with severe malaria have a higher risk of a bacterial infection; therefore, co-morbid bacterial infections should be ruled out or managed appropriately.

ANTIMALARIAL DRUGS

Parenteral antimalarial drugs should be given to pregnant women with severe malaria in full doses without delay. Mortality from untreated severe malaria (particularly cerebral malaria) approaches 100%. With prompt, effective antimalarial treatment and supportive care, the rate falls to 10–20% overall.

Parenteral Artesunate

- Parenteral artesunate is the treatment of choice for severe malaria **in all trimesters**:
 - Begin treatment with IV or IM route for at least 24 hours and until the woman can tolerate oral medications.
 - Then give a complete oral treatment with ACT **for three days**.

Loading Dose

Give artesunate 2.4 mg/kg body weight IV every 12 hours for at least 24 hours, until the woman can tolerate oral medications.

Maintenance Dose

- Give artesunate 1.2 mg/kg body weight IV as a single bolus once daily beginning on the second day of treatment.
- Continue the maintenance dosing schedule until the woman is conscious and able to swallow; then give artesunate 2 mg/kg body weight by mouth once daily to complete seven days of treatment.

If **artesunate is not available**, give intramuscular artemether:

INTRAMUSCULAR ARTEMETHER**Loading Dose**

- Give artemether 3.2 mg/kg body weight IM as a single dose on the first day of treatment

Maintenance Dose

- Give artemether 1.6 mg/kg body weight IM once daily beginning on the second day of treatment.
- Continue the maintenance dosing schedule until the woman is conscious and able to tolerate oral medications; then give a complete dose of ACT.

If **artemether is unavailable**, **parenteral quinine** should be started immediately and continued until artemether is obtained.

QUININE DIHYDROCHLORIDE**Loading Dose**

- Infuse quinine dihydrochloride 20 mg/kg body weight in IV fluids (5% dextrose) over four hours:
 - **Never give an IV bolus injection of quinine.**
 - If it is **definitely known that the woman has taken an adequate dose of quinine** (1.2 g) within the preceding 12 hours, do **not** give the loading dose. Proceed with the maintenance dose (see below).
 - If the **history of treatment is not known or is unclear**, give the loading dose of quinine.
 - Use 100–500 mL 5% dextrose, depending on the woman's fluid balance state.
- Wait four hours (eight hours from the start of the first dose) before giving the maintenance dose.

Maintenance Dose

- Infuse quinine dihydrochloride 10 mg/kg body weight over four hours. Repeat every eight hours from the start of the last dose (i.e. quinine infusion for four hours, no quinine for four hours, quinine infusion for four hours, etc.).

Note: Monitor blood glucose levels for hypoglycaemia every hour while the woman is receiving quinine IV (**page S-55**).

- Continue the maintenance dosing schedule until the woman is conscious and able to tolerate oral medication. Then give:
 - quinine dihydrochloride or quinine sulfate 10 mg/kg body weight by mouth every eight hours to complete seven days of treatment;
 - OR ACT (**page S-119**).

Women with severe malaria require intensive nursing care, preferably in an intensive care unit. Clinical observations should be made as frequently as possible and should include monitoring of vital signs, coma score, urine output and fetal well-being. Blood glucose should be monitored every four hours, if possible, particularly in unconscious patients.

Note: The antipyretic of choice, if body temperature is higher than 38°C, is paracetamol. Aspirin or ibuprofen should not be given because of the risks of gastrointestinal bleeding and renal impairment.

CONVULSIONS

- If **convulsions occur**, maintain airways, place patient on her side and give diazepam 10 mg IV slowly over two minutes.
- If **eclampsia is diagnosed in addition to malaria**, prevent subsequent convulsions with magnesium sulfate (**Box S-4, page S-59**).
- If **eclampsia is excluded**, prevent subsequent convulsions with phenytoin (see below).

PHENYTOIN

Loading Dose

- Infuse phenytoin 1 g (approximately 18 mg/kg body weight) in 50–100 mL normal saline over 30 minutes (final concentration not to exceed 10 mg per mL):

Note: Only normal saline can be used to infuse phenytoin. All other IV fluids will cause crystallization of phenytoin.

- Flush IV line with normal saline before and after infusing phenytoin.

- Do not infuse phenytoin at a rate exceeding 50 mg per minute due to the risks of irregular heartbeat, hypotension and respiratory depression.
- Complete administration within one hour of preparation.

Maintenance Dose

- Give phenytoin 100 mg IV slowly over two minutes or by mouth every eight hours beginning at least 12 hours after the loading dose.

FLUID BALANCE

- Maintain a strict fluid balance chart and monitor the amount of fluids administered and urine output to ensure that there is no fluid overload. Assess clinical status regularly.

Note: Women with severe malaria are prone to fluid overload.

- If **pulmonary oedema develops**:
 - prop up the woman;
 - give oxygen at 4 L per minute by mask or nasal cannulae; and
 - give furosemide 40 mg IV as a single dose.
- If **urine output is poor** (less than 30 mL per hour):
 - measure serum creatinine; and
 - rehydrate with IV fluids (normal saline, Ringer's lactate).
- If **urine output does not improve**, give furosemide 40 mg IV as a single dose and continue to monitor urine output.
- If **urine output is still poor** (less than 30 mL per hour over four hours) and the **serum creatinine is more than 2.9 mg/dL**, refer the woman to a tertiary care centre, if possible, for management of renal failure.

HYPOGLYCAEMIA

Hypoglycaemia in severe malaria is common and can occur at any time during the illness, especially after initiation of quinine therapy. There sometimes are no symptoms.

- Monitor blood glucose levels using a stick test every four hours.

Note: If the **woman is receiving quinine IV**, monitor blood glucose levels every hour.

- If **hypoglycaemia is detected**, give 50% dextrose 50 mL IV followed by dextrose (5% or 10%) 500 mL infused over eight hours.

Note: Monitor blood glucose levels and adjust infusion accordingly.

- Monitor fluid balance carefully (**page S-125**).

ANAEMIA

Severe malaria is often accompanied by anaemia.

- Monitor haemoglobin levels daily.
- Transfuse as necessary (**page C-37**).
- Monitor fluid balance (**page S-125**).
- Give furosemide 20 mg IV or by mouth with each unit of blood.
- Prescribe ferrous sulfate or ferrous fumarate 60 mg by mouth PLUS folic acid 400 mcg by mouth once daily upon discharge.

PROBLEM

- A woman has a fever (temperature 38°C or more) more than 24 hours after giving birth.

IMMEDIATE MANAGEMENT

When managing the woman’s problem, apply basic principles when providing care (page C-25).

- Perform a **rapid evaluation** of the woman’s general condition, vital signs (pulse, blood pressure, respiration), level of consciousness, presence of anxiety and/or confusion, blood loss, and skin colour and temperature (**page C-1**).
- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further, because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.

DIAGNOSIS

TABLE S-18. Differential diagnosis of fever after childbirth

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • Fever/chills • Lower abdominal pain • Purulent, foul-smelling lochia • Tender uterus 	<ul style="list-style-type: none"> • Light vaginal bleeding^a • Shock 	Postpartum endometritis, page S-130
<ul style="list-style-type: none"> • Persistent spiking fever/chills • Lower abdominal pain and distension • Tender uterus 	<ul style="list-style-type: none"> • Poor response to antibiotics • Swelling in adnexa or pouch of Douglas • Pus obtained upon culdocentesis 	Pelvic abscess, page S-131
<ul style="list-style-type: none"> • Low-grade fever/chills • Lower abdominal pain • Absent bowel sounds 	<ul style="list-style-type: none"> • Rebound tenderness • Abdominal distension • Anorexia • Nausea/vomiting 	Peritonitis, page S-131

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
	<ul style="list-style-type: none"> • Shock 	
<ul style="list-style-type: none"> • Breast pain and tenderness three to six days after giving birth 	<ul style="list-style-type: none"> • Hard, enlarged breasts • Both breasts affected 	Breast engorgement, page S-132
<ul style="list-style-type: none"> • Breast pain and tenderness • Reddened, wedge-shaped area on breast 	<ul style="list-style-type: none"> • Inflammation preceded by engorgement • Usually only one breast affected 	Mastitis, page S-133
<ul style="list-style-type: none"> • Firm, very tender breast • Overlying erythema 	<ul style="list-style-type: none"> • Fluctuant swelling in breast • Draining pus 	Breast abscess, page S-133
<ul style="list-style-type: none"> • Unusually tender wound with bloody or serous discharge 	<ul style="list-style-type: none"> • Slight erythema (extending beyond edge of incision) 	Wound abscess, wound seroma or wound haematoma, page S-135
<ul style="list-style-type: none"> • Painful and tender wound • Erythema and oedema beyond edge of incision 	<ul style="list-style-type: none"> • Hardened edges of wound • Purulent discharge • Reddened area around wound 	Wound cellulitis, page S-135
<ul style="list-style-type: none"> • Dysuria • Increased frequency and urgency of urination 	<ul style="list-style-type: none"> • Retropubic/suprapubic pain • Abdominal pain 	Cystitis, page S-116
<ul style="list-style-type: none"> • Spiking fever/chills • Dysuria • Increased frequency and urgency of urination • Flank pain 	<ul style="list-style-type: none"> • Retropubic/suprapubic pain • Loin pain/tenderness • Tenderness in in rib cage (costovertebral angle area) • Anorexia • Nausea/vomiting 	Acute pyelonephritis, page S-116
<ul style="list-style-type: none"> • Spiking fever despite antibiotics • Swelling in the affected leg • Calf muscle tenderness 	<ul style="list-style-type: none"> • Warmth and redness of the affected leg 	Deep vein thrombosis^b
<ul style="list-style-type: none"> • Abrupt onset of pleuritic chest pain • Shortness of breath • Tachypnea • Hypoxia • Tachycardia 	<ul style="list-style-type: none"> • Dry cough • Cough with bloody sputum • Swollen leg or arm • Dizziness or syncope 	Pulmonary embolism^c
<ul style="list-style-type: none"> • Fever 	<ul style="list-style-type: none"> • Consolidation 	Pneumonia, page

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • Difficulty in breathing • Cough with expectoration • Chest pain 	<ul style="list-style-type: none"> • Rapid breathing • Rhonchi/rales • Reduced oxygen saturation 	S-153
<ul style="list-style-type: none"> • Fever • Decreased breath sounds (may occur postoperatively) 		Atelectasis^d
<ul style="list-style-type: none"> • Fever • Chills/rigors • Headache • Muscle/joint pain 	<ul style="list-style-type: none"> • Enlarged spleen 	Uncomplicated malaria, page S-118
<ul style="list-style-type: none"> • Symptoms and signs of uncomplicated malaria • Coma • Anaemia 	<ul style="list-style-type: none"> • Convulsions • Jaundice 	Severe malaria, page S-121
<ul style="list-style-type: none"> • Fever • Headache • Dry cough • Malaise • Anorexia • Enlarged spleen 	<ul style="list-style-type: none"> • Confusion • Stupor 	Typhoid^e
<ul style="list-style-type: none"> • Fever • Malaise • Anorexia • Nausea • Dark urine and pale stool • Jaundice • Enlarged liver 	<ul style="list-style-type: none"> • Muscle/joint pain • Urticaria • Enlarged spleen 	Hepatitis^f

^a Light bleeding: takes longer than five minutes for a clean pad or cloth to be soaked.

^b Give heparin infusion.

^c Anticoagulants are the treatment of choice.

^d Encourage the woman to move about freely and breathe deeply. Antibiotics are not necessary.

^e Give ampicillin 1 g by mouth every six hours for 14 days OR amoxicillin 1 g by mouth every eight hours for 14 days. Alternative therapy will depend on local sensitivity patterns.

^f Provide supportive therapy and observe.

Note: Tachycardia is a common symptom presenting together with fever due to temperature increase and pain.

GENERAL MANAGEMENT

- Encourage rest.
- Ensure adequate hydration by mouth or IV.
- Use a fan or tepid sponge and, if necessary, open a window to help decrease temperature.
- Consider paracetamol 500–1000 mg (oral tablets or rectal suppositories) every six to eight hours to help decrease temperature (maximum 4000 mg in 24 hours).

SPECIFIC MANAGEMENT

POSTPARTUM ENDOMETRITIS

Postpartum endometritis is a major cause of maternal death. Delayed or inadequate treatment of postpartum endometritis may result in pelvic abscess, peritonitis, septic shock, deep vein thrombosis, pulmonary embolism, chronic pelvic infection with recurrent pelvic pain and dyspareunia, tubal blockage, or infertility.

- Transfuse as necessary. Use packed cells, if available (**page C-37**).
- Give the woman a combination of antibiotics for 24–48 hours after complete resolution of clinical signs and symptoms (fever, uterine tenderness, purulent lochia, leucocytosis) (**page C-49**):
 - Clindamycin phosphate 600 mg IV every eight hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.

If clindamycin is not available administer:

- Ampicillin 2 g IV every 6 hours;
- PLUS gentamicin 5 mg/kg body weight IV every 24 hours.

When available, clindamycin (in combination with gentamycin) is more effective than ampicillin or a penicillin antibiotic for the treatment of postpartum endometritis.

- **If fever is still present 72 hours after starting antibiotics**, re-evaluate and revise diagnosis.

Note: Oral antibiotics are not necessary after stopping IV antibiotics.

- **If retained placental fragments** are suspected, perform a digital exploration of the uterus to remove clots and large pieces. Use ovum forceps or a wide curette if required.

- If there is **no improvement** with conservative measures and there are **signs of general peritonitis** (fever, rebound tenderness, abdominal pain), perform a laparotomy to drain the pus.
- If the **uterus is necrotic and septic**, perform subtotal hysterectomy (**page P-122**).

PELVIC ABSCESS

- Give a combination of antibiotics before draining the abscess; continue antibiotics until the woman is fever-free for 48 hours (**page C- 50**):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
 - PLUS metronidazole 500 mg IV every eight hours.
- If the abscess is **fluctuant in the cul-de-sac**, drain the pus through the cul-de-sac (**page P-81**). If the **spiking fever continues**, perform a laparotomy.

PERITONITIS

- Provide nasogastric suction.
- Start an IV infusion and infuse IV fluids (**page C- 34**).
- Give the woman a combination of antibiotics until she is fever-free for 48 hours (**page C- 50**):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
 - PLUS metronidazole 500 mg IV every eight hours.
- Identify and treat the underlying cause of the peritonitis.
- Perform additional diagnostics such as X-ray or ultrasound to assist in identifying the underlying cause.
- The type of surgical intervention needed depends on the diagnosis of the cause of the peritonitis. For example, closure may need to be performed for an intestinal or uterine perforation, whereas an abscess may need to be drained.

BREAST ENGORGEMENT

Breast engorgement is an exaggeration of the lymphatic and venous engorgement that occurs before lactation. It is not the result of overdistension of the breast with milk.

BREASTFEEDING

- If the **woman is breastfeeding** and the **baby is able to suckle**:
 - Encourage the woman to breastfeed more frequently, without restrictions, using both breasts at each feeding.
 - Show the woman how to hold the baby and help the baby attach.
- If the **woman is breastfeeding** and the **baby is not able to suckle**, encourage the woman to express milk by hand or with a pump.
- Relief measures before feeding or expression may include:
 - Applying warm compresses to the breasts just before breastfeeding, or encouraging the woman to take a warm shower;
 - Massaging the woman's neck and back; and
 - Having the woman express some milk manually before breastfeeding, and wetting the nipple area to soften the areola to help the baby latch on properly and easily.
- Relief measures after feeding or expression may include:
 - Supporting breasts with a binder or bra;
 - Applying cold compresses to the breasts between feedings to reduce swelling and pain.
- Give ibuprofen 200–400 mg every six to eight hours orally (maximum dose of 1200 mg in 24 hours);
 - OR paracetamol 500–1000 mg every six to eight hours orally as an appropriate alternative (maximum 4000 mg in 24 hours).
- Follow up in three days to ensure response.

NOT BREASTFEEDING

- If the **woman is not breastfeeding**:
 - Encourage her to support breasts with a binder or bra.
 - Apply cold compresses to the breasts to reduce swelling and pain.
 - Avoid massaging or applying heat to the breasts.

- Avoid stimulating the nipples.
- Give ibuprofen 200–400 mg every six to eight hours (maximum dose 1200 mg in 24 hours);
 - OR paracetamol 500–1000 mg every six to eight hours orally as an appropriate alternative (maximum dose 4000 mg in 24 hours).
- Follow up in three days to ensure response.

BREAST INFECTION

MASTITIS

- Treat with antibiotics (**page C-50**):
 - cloxacillin 500 mg by mouth every six hours for 10 days;
 - OR erythromycin 250 mg every eight hours for 10 days.
- Encourage the woman to:
 - continue breastfeeding;
 - support the breasts with a binder or bra; and
 - apply cold compresses to the breasts between feedings to reduce swelling and pain.
- Give the woman ibuprofen 200–400 mg every six to eight hours (maximum dose 1200 mg in 24 hours);
 - OR paracetamol 500–1000 mg every six to eight hours as an appropriate alternative (maximum dose 4000 mg in 24 hours).
- Follow up in three days to ensure response.

BREAST ABSCESS

Antibiotic Treatment

- Treat with antibiotics (**page C-50**):
 - cloxacillin 500 mg by mouth every six hours for 10 days;
 - OR erythromycin 250 mg every eight hours for 10 days.

Surgical Treatment

Pus must be drained either by incision and drainage or ultrasound-guided needle aspiration (which may need to be repeated).

- Drain the abscess:
 - General anaesthesia (e.g. ketamine, **page P- 13**) is usually required.
 - Make the incision radially, extending from near the areolar margin toward the periphery of the breast, to avoid injury to the milk ducts.
 - Wearing sterile gloves, use a finger or tissue forceps to break up the pockets of pus.
 - Loosely pack the cavity with gauze.
 - Remove the gauze pack after 24 hours and replace with a smaller gauze pack.
- If there is **still pus in the cavity**:
 - Place a gauze pack in the cavity and bring the edge out through the wound as a wick, to facilitate drainage of any remaining pus;
 - OR perform ultrasound-guided aspiration for abscesses in which overlying skin is intact and the abscess is less than 5 cm in diameter.
 - Local anaesthesia is generally sufficient.
 - This can often be done as an outpatient procedure.
- If **laboratory capacity is available**, send drained or aspirated pus for culture and sensitivity testing.

Note: A large surgical incision should be avoided because it could damage the areola and milk ducts and interfere with subsequent breastfeeding.

Supportive Treatment

- Encourage the woman to:
 - continue breastfeeding even when there is collection of pus;
 - support breasts with a binder or bra;
 - apply cold compresses to the breasts between feedings to reduce swelling and pain.
- Give ibuprofen 200–400 mg by mouth every six to eight hours as needed (maximum dose 1200 mg in 24 hours);
 - OR paracetamol 500–1000 mg by mouth every six to eight hours (maximum dose 4000 mg in 24 hours).

- Reassess in two to three days to determine the woman's clinical status.
- Review danger signs with the woman (fever, etc.).
- For women with a breast abscess, more frequent assessment and wound dressing is necessary.

INFECTION OF PERINEAL AND ABDOMINAL WOUNDS

WOUND ABSCESS, WOUND SEROMA AND WOUND HAEMATOMA

- If there is **pus or fluid**, open and drain the wound.
- Remove infected skin or subcutaneous sutures and debride the wound. Do not remove fascial sutures.
- If there is an **abscess without cellulitis**, antibiotics are not required.
- Place a damp dressing on the wound and have the woman return to change the dressing every 24 hours.
- Advise the woman to practice good hygiene and to wear clean pads or cloths that she changes often.

WOUND CELLULITIS AND NECROTIZING FASCIITIS

- If there is **fluid or pus**, open and drain the wound.
- Remove infected skin or subcutaneous sutures and debride the wound. Do not remove fascial sutures.
- If **infection is superficial and does not involve deep tissues**, monitor for development of an abscess and give a combination of antibiotics (**page C-50**):
 - ampicillin 500 mg by mouth every six hours for five days.
- If the **infection is deep, involves muscles and is causing necrosis** (necrotizing fasciitis), give a combination of antibiotics until necrotic tissue has been removed and the woman is fever-free for 48 hours (**page C-50**):
 - penicillin G 2 million units IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
 - PLUS metronidazole 500 mg IV every eight hours;

Note: Necrotizing fasciitis requires wide surgical debridement. Perform delayed primary closure two to four weeks later, depending on resolution of infection.

- If the **woman has a severe infection or necrotizing fasciitis**, admit her to the hospital for management, and change the wound dressing twice daily.

PROBLEM

- The woman is experiencing abdominal pain in the first 22 weeks of pregnancy. Abdominal pain might be the first presentation in serious complications such as abortion or ectopic pregnancy.

GENERAL MANAGEMENT

When managing the woman’s problem, apply basic principles when providing care (page C-25).

- Perform a **rapid evaluation** of the woman’s general condition, including vital signs (pulse, blood pressure and respiration), level of consciousness, presence of anxiety and/or confusion, blood loss, and skin colour and temperature (**page C-1**).

Note: Appendicitis should be suspected in any woman having abdominal pain. Appendicitis can be confused with other more common problems in pregnancy that cause abdominal pain (e.g. ectopic pregnancy, abruptio placentae, twisted ovarian cysts, pyelonephritis).

- If **shock is suspected**, immediately begin treatment (**page S-1**). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.
- Check the fetal heart rate, depending on gestational age.

DIAGNOSIS

TABLE S-19. Diagnosis of abdominal pain in early pregnancy

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • Abdominal pain • Adnexal mass on vaginal examination 	<ul style="list-style-type: none"> • Palpable, tender discrete mass in lower abdomen • Light^a vaginal bleeding 	Ovarian cyst,^b page S-138

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • Lower abdominal pain • Low-grade fever • Rebound tenderness 	<ul style="list-style-type: none"> • Abdominal distension • Anorexia • Nausea/vomiting • Paralytic ileus • Increased white blood cells • No mass in lower abdomen • Site of pain higher than expected 	Appendicitis, page S-139
<ul style="list-style-type: none"> • Dysuria • Increased frequency and urgency of urination • Abdominal pain 	<ul style="list-style-type: none"> • Retropubic/suprapubic pain 	Cystitis, page S-116
<ul style="list-style-type: none"> • Dysuria • Spiking fever/chills • Increased frequency and urgency of urination • Abdominal pain 	<ul style="list-style-type: none"> • Retropubic/suprapubic pain • Loin pain/tenderness • Tenderness in rib cage • Anorexia • Nausea/vomiting 	Acute pyelonephritis, page S-116
<ul style="list-style-type: none"> • Low-grade fever/chills • Lower abdominal pain • Absent bowel sounds 	<ul style="list-style-type: none"> • Rebound tenderness • Abdominal distension • Anorexia • Nausea/vomiting • Shock 	Peritonitis, page S-131
<ul style="list-style-type: none"> • Abdominal pain • Light bleeding • Closed cervix • Uterus slightly larger than normal • Uterus softer than normal 	<ul style="list-style-type: none"> • Fainting • Tender adnexal mass • Amenorrhoea • Cervical motion tenderness 	Ectopic pregnancy, page S-15

^a Light bleeding: takes longer than five minutes for a clean pad or cloth to be soaked.

^b Ovarian cysts can be asymptomatic and are sometimes first detected on physical examination.

SPECIFIC MANAGEMENT

OVARIAN CYSTS

Ovarian cysts in pregnancy can cause abdominal pain due to torsion or rupture. Ovarian cysts most commonly undergo torsion and rupture during the first trimester.

- If a **woman is in severe pain**, suspect torsion or rupture. Perform immediate laparotomy.

Note: If **findings at laparotomy are suggestive of malignancy** (solid areas in the tumour, growth extending outside the cyst wall), the specimen should be sent for immediate histological examination and the woman should be referred to a tertiary care centre for evaluation and management.

- If the **cyst is more than 10 cm and is asymptomatic**:
 - If it is **detected during the first trimester**, observe for growth or complications.
 - If it is **detected during the second trimester**, remove by laparotomy to prevent complications.
- If the **cyst is between 5 and 10 cm**, follow up. Laparotomy might be required if the cyst increases in size or fails to regress.
- If the **cyst is less than 5 cm**, it will usually regress on its own and does not require treatment.

APPENDICITIS

- Give a combination of antibiotics before surgery and continue until the woman is postoperative and fever-free for 48 hours (**page C-50**):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours;
 - PLUS metronidazole 500 mg IV every eight hours.
- Perform an immediate surgical exploration (regardless of stage of gestation) and perform appendectomy, if required.

Note: Delaying diagnosis and treatment can result in rupture of the appendix, which may lead to generalized peritonitis.

- If there are **signs of peritonitis** (fever, rebound tenderness, abdominal pain), give antibiotics as for peritonitis (**page S-131**).

Note: The presence of peritonitis increases the likelihood of abortion or preterm labour.

- If the **woman is in severe pain**, give morphine 0.1 mg/kg body weight IM.
- Tocolytic drugs might be needed to prevent preterm labour (**page S-146**).

ABDOMINAL PAIN IN LATER PREGNANCY AND AFTER CHILDBIRTH

S-141

PROBLEMS

- The woman is experiencing abdominal pain after 22 weeks of pregnancy.
- The woman is experiencing abdominal pain during the first six weeks after childbirth.

IMMEDIATE MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- Perform a **rapid evaluation** of the woman's general condition, vital signs (pulse, blood pressure, respiration,), level of consciousness, presence of anxiety and/or confusion, blood loss, and skin colour and temperature (page C-1).
- If **shock is suspected**, immediately begin treatment (page S-1). Even if signs of shock are not present, keep shock in mind as you evaluate the woman further, because her status may worsen rapidly. If **shock develops**, it is important to begin treatment immediately.

Note: Appendicitis should be suspected in any woman having abdominal pain. Appendicitis can be confused with other more common causes of abdominal pain in pregnancy. If **appendicitis occurs in late pregnancy**, the infection may be walled off by the gravid uterus. The size of the uterus rapidly decreases after birth, allowing the infection to spill into the peritoneal cavity. In these cases, appendicitis presents as generalized peritonitis.

- If the woman is pregnant, check the fetal heart rate and ask about fetal movements:
 - If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (page S-109).
 - If the **fetal heart cannot be heard**, ask several other persons to listen, or use a Doppler stethoscope, if available.
 - If fetal movements are not felt or the fetal heart cannot be heard, suspect fetal death (page S-156).

DIAGNOSIS

TABLE S-20. Differential diagnosis of abdominal pain in later pregnancy and after childbirth

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • Palpable contractions • Blood-stained mucus discharge (show) or watery discharge before 37 weeks 	<ul style="list-style-type: none"> • Cervical dilatation and effacement • Light vaginal bleeding^a 	Possible preterm labour, page S-144
<ul style="list-style-type: none"> • Palpable contractions • Blood-stained mucus discharge (show) or watery discharge at or after 37 weeks 	<ul style="list-style-type: none"> • Cervical dilatation and effacement • Light vaginal bleeding^a 	Possible term labour, page C-77
<ul style="list-style-type: none"> • Intermittent or constant abdominal pain • Bleeding after 22 weeks' gestation (may be retained in the uterus) 	<ul style="list-style-type: none"> • Shock • Tense/tender uterus • Decreased/absent fetal movements • Fetal distress (e.g. a very slow or rapid fetal heart rate) or absent fetal heart sounds 	Abruptio placentae, page S-23
<ul style="list-style-type: none"> • Severe abdominal pain (may decrease after rupture) • Bleeding (intra-abdominal and/or vaginal) 	<ul style="list-style-type: none"> • Shock • Abdominal distension/free fluid • Abnormal uterine contour • Tender abdomen • Easily palpable fetal parts • Absent fetal movements and fetal heart sounds • Rapid maternal pulse 	Ruptured uterus, page S-24
<ul style="list-style-type: none"> • Fever/chills • Maternal tachycardia • Abdominal pain • Fetal tachycardia 	<ul style="list-style-type: none"> • History of loss of fluid • Foul-smelling watery discharge after 22 weeks • Tender uterus • Light vaginal bleeding^a 	Amnionitis, page S-163
<ul style="list-style-type: none"> • Dysuria • Increased frequency and urgency of urination 	<ul style="list-style-type: none"> • Retropubic/suprapubic pain • Abdominal pain 	Cystitis, page S-116

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • Spiking fever/chills • Dysuria • Increased frequency and urgency of urination • Flank pain 	<ul style="list-style-type: none"> • Retropubic/suprapubic pain • Loin pain/tenderness • Tenderness in rib cage • Anorexia • Nausea/vomiting 	Acute pyelonephritis, page S-116
<ul style="list-style-type: none"> • Lower abdominal pain • Low-grade fever • Rebound tenderness 	<ul style="list-style-type: none"> • Abdominal distension • Anorexia • Nausea/vomiting • Paralytic ileus (absent bowel sounds) • Increased white blood cells • No mass in lower abdomen • Site of pain higher than expected 	Appendicitis, page S-139
<ul style="list-style-type: none"> • Lower abdominal pain • Fever/chills • Purulent, foul-smelling lochia • Tender uterus 	<ul style="list-style-type: none"> • Light vaginal bleeding^a • Shock 	Postpartum endometritis, page S-130
<ul style="list-style-type: none"> • Persistent spiking fever/chills • Lower abdominal pain and distension • Tender uterus 	<ul style="list-style-type: none"> • Poor response to antibiotics • Swelling in adnexa or pouch of Douglas • Pus obtained upon culdocentesis 	Pelvic abscess, page S-131
<ul style="list-style-type: none"> • Lower abdominal pain • Low-grade fever/chills • Absent bowel sounds 	<ul style="list-style-type: none"> • Rebound tenderness • Guarding • Rigidity • Abdominal distension • Anorexia • Nausea/vomiting • Shock 	Peritonitis, page S-131
<ul style="list-style-type: none"> • Adnexal mass on vaginal examination 	<ul style="list-style-type: none"> • Palpable, tender discrete mass in lower abdomen • Light vaginal bleeding^a 	Ovarian cyst,^b page S-138

^a Light bleeding: takes five minutes or longer for a clean pad or cloth to be soaked

^b Ovarian cysts may be asymptomatic and are sometimes first detected on physical examination.

PRETERM LABOUR

Definitions of preterm birth:

- extremely preterm (less than 28 weeks)
- very preterm (28–31 weeks plus six days)
- moderate to late preterm (32–36 weeks plus six days)

Preterm birth—defined as birth before 37 weeks of gestation—is the single most important determinant of adverse infant outcomes, in terms of survival and quality of life. The most beneficial maternal interventions are those that are aimed at improving outcomes for preterm infants when preterm birth is inevitable, such as administration of:

- antenatal corticosteroid therapy to improve fetal lung maturity and chances of neonatal survival from 24 weeks to 34 weeks of gestation;
- magnesium sulfate up to 32 weeks of gestation to prevent preterm birth-related neurologic complications;
- antibiotics for women with preterm prelabour rupture of membranes and/or clinical signs of infection.

Special care of the preterm newborn to prevent and treat complications of prematurity is critical to newborn survival.

Make every effort to confirm the gestational age of the fetus. The risk of harm of corticosteroid administration may outweigh benefits in late preterm births.

- Provide information to the woman, and any accompanying family members the woman would like to be involved in decision-making, about her diagnosis, treatment options and estimated time for in-patient care if required.

ANTENATAL CORTICOSTEROIDS

Antenatal corticosteroids improve newborn outcomes (e.g. fewer fetal and neonatal deaths, reduced rate of respiratory distress syndrome and duration of mechanical ventilation or oxygen supplementation).

- Confirm the diagnosis of preterm labour by documenting cervical effacement or dilatation over two hours.

- Confirm gestational age of the pregnancy using all available information (last menstrual period, physical exam in early pregnancy, ultrasound performed in the first trimester, symphysis fundal height).
- Provide antenatal corticosteroid therapy to improve fetal lung maturity and chances of neonatal survival for women at risk of preterm birth from 24 weeks to 34 weeks of gestation when the following conditions are met:
 - gestational age assessment can be accurately undertaken;
 - preterm birth is considered imminent;
 - there is no clinical evidence of maternal infection;
 - adequate childbirth care is available (including the capacity to recognize and safely manage preterm labour and birth); and
 - the preterm newborn can receive adequate care if needed (including resuscitation, thermal care, feeding support, infection treatment and safe oxygen use).

If adequate childbirth and preterm newborn care (including resuscitation, thermal care, feeding support, infection treatment and safe oxygen use) are not available in your setting, refer the woman to a hospital where adequate care is available before she gives birth, if possible. If all criteria are met to safely provide corticosteroids, with the exception of the availability of care for preterm infants, consider administration of the first dose of antenatal corticosteroids before transfer.

- If conditions are met, give the following course of corticosteroids to the mother:
 - betamethasone 12 mg IM, two doses 24 hours apart;
 - OR dexamethasone 6 mg IM, four doses 12 hours apart.
- In case of pregestational or gestational diabetes, maintain optimal glycaemic control.
- If **preterm birth does not occur within seven days** after the initial course of corticosteroids, and if subsequent clinical assessment demonstrates that there is a high risk of preterm birth in the next seven days, repeat a single course of antenatal corticosteroids.

TOCOLYSIS

- Give a tocolytic drug (e.g. nifedipine) to provide a window for administration of antenatal corticosteroids and/or in-utero fetal transfer to an appropriate neonatal health care setting:
 - Give a loading dose of 20 mg nifedipine immediate-release capsule sublingually.
 - If required, give an additional 10 mg every 15 minutes up to a maximum of 40 mg in the first hour.
 - Follow up with 20 mg sustained-release tablet orally daily for up to 48 hours or until transfer is completed, whichever comes first.
 - Inform the woman to be aware of side effects of nifedipine such as headache, flushing, dizziness, tiredness, palpitations and itching.
- Monitor maternal and fetal condition (pulse, blood pressure, signs of respiratory distress, uterine contractions, loss of amniotic fluid or blood, fetal heart rate, fluid balance).

Note: Do not give tocolytic drugs for more than 48 hours.

- Do not give a combination of tocolytic agents as there is no additional benefit.
- Tocolytics **should not be used** in the following conditions:
 - preterm prelabour rupture of membranes (PPROM)
 - chorioamnionitis
 - placental abruption
 - cardiac disease.

MAGNESIUM SULFATE

If gestational age is **less than 32 weeks**:

- Give magnesium sulfate to the mother as an intravenous infusion or intramuscular injections to prevent cerebral palsy in the infant (**Table S-21, page S-147**).

TABLE S-21. Possible dosing regimens of magnesium sulfate

Route	Initial dose	Maintenance dose
4 g over 20 minutes	1 g per hour for 24 hours or until birth, whichever occurs earlier	
IV	<ul style="list-style-type: none"> • IV 4 g over 30 minutes OR • IV bolus of 4 g given as single dose and IV 6 g over 20–30 minutes 	2 g per hour
IM	5 g	5 g every four hours for 24 hours or until the woman has given birth, whichever occurs earlier

- Monitor urinary output and signs of magnesium overdose or toxicity (respiratory rate less than 16 breaths per minute and/or absent patellar reflexes).
 - Withhold magnesium sulfate if there are signs of magnesium toxicity (**Box S-5, page S-60**).
 - Restart only after signs of overdose or toxicity disappear.

ANTIBIOTIC

- If amniotic **membranes are intact and there are no clinical signs of infection, do not** give prophylactic antibiotics. If the woman has confirmed Group B streptococcal colonization, give amoxicillin 500 mg by mouth every eight hours for seven days.
- If amniotic **membranes are ruptured (PPROM) or there are clinical signs of infection**, give an antibiotic to reduce the risk of chorioamnionitis in the mother and the risk of neonatal infections (e.g. pneumonia, cerebral abnormality):
 - oral erythromycin 250 mg every six hours for 10 days (or until birth)
 - OR ampicillin 2 g IV every six hours.

Note: Do not use amoxicillin plus clavulanic acid (co-amoxiclav) in case of PPRM; it increases the risk of necrotizing enterocolitis.

MANAGEMENT OF LABOUR

- If labour continues and gestation is less than 37 weeks:
 - monitor progress of labour using the partograph (**page C-91**).

Routine caesarean birth is not recommended to improve newborn outcomes for preterm infants, regardless of cephalic or breech presentation. Avoid vacuum-assisted birth, as the risks of intracranial bleeding in the preterm baby are high.

- Prepare for management of preterm or low birth weight baby and anticipate the need for resuscitation (**page S-167**).

PROBLEM

- A woman is short of breath during pregnancy, labour or after giving birth.

When managing the woman's problem, apply basic principles when providing care (page C-25).

IMMEDIATE MANAGEMENT

- Perform a **rapid evaluation** of the woman's general condition, including vital signs (pulse, blood pressure, respiration), level of consciousness, presence of anxiety and/or confusion, volume of blood loss, whether bleeding is accompanied by pain, and skin colour and temperature (**page C-1**).
- Prop up the woman on her left side.
- Give oxygen at 4–6 L per minute by mask or nasal cannulae.
- **If the woman is pregnant**, check the fetal heart rate and ask about fetal movements, depending on gestational age:
 - If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-109**).
 - If **fetal heart cannot be heard**, ask several other persons to listen, or use a Doppler stethoscope, if available.
 - If fetal movements are not felt or the **fetal heart cannot be heard**, suspect fetal death (**page S-156**).
- Start an IV infusion and infuse IV fluids (**page C-34**).

Note: Obtain haemoglobin estimates using haemoglobinometer or other simple method.

Or send a blood sample for haemoglobin or haematocrit and type and screen, and order blood for possible transfusion, before infusing IV fluids.

DIAGNOSIS

TABLE S-22. Diagnosis of difficulty in breathing

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • Difficulty in breathing • Pallor of conjunctiva, tongue, nail beds and/or palms • Haemoglobin 7g per dL or less • Haematocrit 20% or less 	<ul style="list-style-type: none"> • Lethargy and fatigue • Flat or concave nails 	Severe anaemia, page S-151
<ul style="list-style-type: none"> • Symptoms and signs of severe anaemia 	<ul style="list-style-type: none"> • Oedema • Cough • Rales • Swelling of legs • Enlarged liver • Prominent neck veins 	Heart failure due to anaemia, page S-151
<ul style="list-style-type: none"> • Difficulty in breathing • Diastolic murmur and/or • Harsh systolic murmur with palpable thrill 	<ul style="list-style-type: none"> • Irregular heartbeat • Enlarged heart • Rales • Cyanosis (blueness) • Cough • Swelling of legs • Enlarged liver • Prominent neck veins 	Heart failure due to heart disease, page S-152
<ul style="list-style-type: none"> • Difficulty in breathing • Fever • Cough with expectoration • Chest pain 	<ul style="list-style-type: none"> • Consolidation • Congested throat • Rapid breathing • Rhonchi/rales 	Pneumonia, page S-153
<ul style="list-style-type: none"> • Difficulty in breathing • Wheezing 	<ul style="list-style-type: none"> • Cough with expectoration • Rhonchi/rales 	Bronchial asthma, page S-153
<ul style="list-style-type: none"> • Difficulty in breathing • Hypertension • Proteinuria 	<ul style="list-style-type: none"> • Rales • Frothy cough 	Pulmonary oedema associated with pre-eclampsia^a

^a Withhold fluids and give furosemide 40 mg IV once (page S-125).

SPECIFIC MANAGEMENT

SEVERE ANAEMIA

- Transfuse as necessary (**page C-37**):
 - Use packed cells.
 - If **blood cannot be centrifuged**, let the bag of blood hang until the cells have settled. Infuse the cells slowly and dispose of the remaining serum.
 - Give furosemide 40 mg IV with each unit of packed cells.
- If *Plasmodium falciparum* malaria is suspected, manage as severe malaria (**page S-121**).
- Give ferrous sulfate or ferrous fumarate 120 mg by mouth PLUS folic acid 400 mcg by mouth once daily for six months during pregnancy. Continue for three months postpartum.
- Where **hookworm is endemic** (prevalence of 20% or more), give one of the following anthelmintic treatments:
 - albendazole 400 mg by mouth once;
 - OR mebendazole 500 mg by mouth once or 100 mg two times per day for three days;
 - OR levamisole 2.5 mg/kg body weight by mouth once daily for three days;
 - OR pyrantel 10 mg/kg body weight by mouth once daily for three days.
- If **hookworm is highly endemic** (prevalence of 50% or more), repeat the anthelmintic treatment 12 weeks after the first dose.

HEART FAILURE

HEART FAILURE DUE TO ANAEMIA

- Transfusion is almost always necessary in heart failure due to anaemia (**page C-37**):
 - Use packed or sedimented cells as described for severe anaemia (above).
 - Give furosemide 40 mg IV with each unit of packed cells.

HEART FAILURE DUE TO HEART DISEASE

- Treat acute heart failure. Drugs used may include:
 - morphine 10 mg IM as a single dose;
 - OR furosemide 40 mg IV, repeated as necessary;
 - OR digoxin 0.5 mg IM as a single dose;
 - OR nitroglycerine 0.3 mg under the tongue, repeated in 15 minutes, if necessary.
- Refer to a higher level if needed.

HEART FAILURE DURING LABOUR AND CHILDBIRTH

- Prop up the woman on her left side.
- Limit infusion of IV fluids to decrease the risk of circulatory overload, and maintain a strict fluid balance chart.
- Ensure adequate analgesia (**page C-55**).
- If **oxytocin infusion is required**, use a higher concentration at a slower rate while maintaining a fluid balance chart (e.g. the concentration may be doubled if the number of drops per minute is decreased by half; **Table P-8, page P-26**).

Note: Do not give ergometrine.

- Have the woman avoid sustained bearing-down efforts during the expulsive phase of second stage of labour, if possible.
- If **necessary to decrease the woman's workload**, assist the birth using an obstetric vacuum (**page P-33**) or forceps (**page P-41**).
- Ensure active management of third stage of labour (**page C-102**).

Heart failure is not an indication for caesarean birth.
--

HEART FAILURE DURING CAESAREAN BIRTH

- Use local anaesthesia with conscious sedation (**page P-7**). Avoid spinal anaesthesia.
- Deliver baby and placenta (**page P-56**).

PNEUMONIA

Inflammation in pneumonia affects the lung parenchyma and involves respiratory bronchioles and alveoli. There is loss of lung capacity that is less tolerated by pregnant women.

- A radiograph of the chest might be required to confirm the diagnosis of pneumonia.
- Give erythromycin 500 mg by mouth every six hours for seven days.
- Give steam inhalation.

Consider the possibility of tuberculosis in areas where it is prevalent.

BRONCHIAL ASTHMA

Bronchial asthma complicates 3–4% of pregnancies. Pregnancy is associated with worsening of the symptoms in one third of affected women.

- If **bronchospasm occurs**, give bronchodilators (e.g. salbutamol 4 mg by mouth every four hours OR 250 mcg aerosol every 15 minutes for three doses).
- If there is **no response to bronchodilators**, give corticosteroids such as hydrocortisone 2 mg/kg body weight IV every four hours as needed.
- If there are **signs of infection** (bronchitis), give ampicillin 2 g IV every six hours.
- Avoid the use of prostaglandins. For prevention and treatment of PPH, give oxytocin 10 units IM or give ergometrine 0.2 mg IM.
- After acute exacerbation has been managed, continue treatment with inhaled bronchodilators and inhaled corticosteroids to prevent recurrent acute episodes.

PROBLEM

- Fetal movements are not felt after 22 weeks of gestation or during labour.

IMMEDIATE MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- Reassure the woman and provide emotional support (page C-9).
- Check the fetal heart rate:
 - If the **fetal heart rate is heard but is depressed** and the **woman has had sedatives**, wait for the effect of the drugs to wear off and then recheck.
 - If the **fetal heart cannot be heard**, ask several other persons to listen, or use a Doppler stethoscope, if available.

DIAGNOSIS

TABLE S-23. Diagnosis of loss of fetal movements

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • Decreased/absent fetal movements • Intermittent or constant abdominal pain • Bleeding after 22 weeks of gestation (may be retained in the uterus) 	<ul style="list-style-type: none"> • Shock • Tense/tender uterus • Fetal distress or absent fetal heart sounds 	<p>Abruptio placentae, page S-23</p>
<ul style="list-style-type: none"> • Absent fetal movements and fetal heart sounds • Bleeding (intra-abdominal and/or vaginal) • Severe abdominal pain (may decrease after rupture) 	<ul style="list-style-type: none"> • Shock • Abdominal distension/free fluid • Abnormal uterine contour • Tender abdomen • Easily palpable fetal parts • Rapid maternal pulse 	<p>Ruptured uterus, page S-24</p>

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> Decreased/absent fetal movements Abnormal fetal heart rate (less than 100 or more than 180 beats per minute) 	<ul style="list-style-type: none"> Thick meconium-stained fluid 	Fetal distress, page S-109
<ul style="list-style-type: none"> Absent fetal movements and fetal heart sounds 	<ul style="list-style-type: none"> Symptoms of pregnancy cease Symphysis-fundal height decreases Uterine size decreases 	Fetal death, page S-156

SPECIFIC MANAGEMENT

Intrauterine death can be the result of fetal growth restriction, fetal infection, a cord accident or congenital anomalies. Where syphilis is prevalent, a large proportion of fetal deaths are attributable to this disease.

- If **X-ray is available**, confirm fetal death after five days. Signs include overlapping skull bones, hyper-flexed spinal column, gas bubbles in heart and great vessels, and oedema of the scalp.
- Alternatively, if **ultrasound is available**, confirm fetal death. Signs include absent fetal heart activity, abnormal fetal head shape, reduced or absent amniotic fluid, and doubled-up fetus.
- Explain the problem to the woman and her family (**page C-5**). Discuss the options of expectant or active (induction of labour) management with them:
 - Reassure the woman that in 90% of cases the fetus is spontaneously expelled during the waiting period with no complications.
- If **expectant management is planned**, await spontaneous onset of labour during the next four weeks.
- If **platelets are decreasing, four weeks have passed without spontaneous labour, fibrinogen levels are low or the woman requests it**, consider active management.

- If **induction of labour is planned**, assess the cervix (**Table P-6, page P-19**):
 - If the **cervix is favourable** (has a Bishop score of 6 or more, **Table P-6, page P-19**), labour is usually successfully induced with oxytocin alone (**page P-23**).
 - If the **cervix is unfavourable** (has a Bishop score of 5 or less, **Table P-6, page P-19**), ripen the cervix using prostaglandins (**page P-21**) such as misoprostol, a Foley or balloon catheter (**page P-22**), or oxytocin (**page P-23**).

Note: Do not rupture the membranes because this can cause infection.

Note: Sweeping membranes could reduce the need for formal induction of labour. It is suitable for non-urgent indications for pregnancy termination (**page P-20**).

- Perform caesarean only as a last resort.
- If **spontaneous labour does not occur within four weeks, platelets are decreasing** and the **cervix is unfavourable** (has a Bishop score of 5 or less), or if the **woman requests** it, ripen the cervix using misoprostol (**page P-21**).
- If there are **signs of infection** (fever, foul-smelling vaginal discharge), give antibiotics as for endometritis (**page S-130**).
- If a **clotting test shows failure of a clot to form after seven minutes or a soft clot that breaks down easily**, suspect coagulopathy (**page S-24**).

PROBLEM

- Watery vaginal discharge after 22 weeks of gestation

Prelabour rupture of membranes (PROM) is rupture of the membranes before labour has begun. PROM can occur either when the fetus is immature or preterm (i.e. before 37 weeks)—also called preterm prelabour rupture of membranes (PPROM)—or when the fetus is mature (term).

It is important that the gestational age is accurately assessed (ideally confirmed by ultrasound scan in early pregnancy) and rupture of membranes confirmed in order to avoid inadvisable corticosteroid and antibiotic administration.

IMMEDIATE MANAGEMENT

When managing the woman's problem, apply basic principles when providing care (page C-25).

- Confirm accuracy of calculated gestational age, if possible.
- Document time and history of the reported vaginal fluid loss.
- Perform and record maternal temperature, pulse and blood pressure, respirations and oxygen saturation.
- Auscultate the fetal heart rate and confirm presence of fetal movements.
 - If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-109**).
 - If the **fetal heart cannot be heard**, ask several other persons to listen, or use a Doppler stethoscope, if available.
 - If fetal movements are not felt or the **fetal heart cannot be heard**, suspect fetal death (**page S-156**).
- Perform an abdominal palpation noting: Symphysis fundal height, lie (if appropriate depending on gestational age), presentation (if appropriate depending on gestational age), uterine tenderness/irritability and uterine contractions.

If the woman complains of bleeding in later pregnancy (after 22 weeks), do not do a digital vaginal examination.

CONFIRMING THE DIAGNOSIS

The typical odour of amniotic fluid confirms the diagnosis.

If **membrane rupture is not recent**, or when **leakage is gradual**, confirming the diagnosis might be difficult:

Do not perform a digital vaginal examination; it does not help to establish the diagnosis and can introduce infection.

- Place a vaginal pad over the vulva and examine the pad (visually and by odour) one hour later.
- Use a high-level disinfected or sterile speculum to assess vaginal discharge (amount, colour, odour) and exclude urinary incontinence:
 - Fluid might be seen coming from the cervix or forming a pool in the posterior fornix.
 - Ask the woman to cough; this may cause a gush of fluid.
 - Determine cervical dilatation.
- If available, perform tests:
 - The **nitrazine test** depends on the fact that vaginal secretions and urine are acidic while amniotic fluid is alkaline. Hold a piece of nitrazine paper in a haemostat and touch it against the fluid pooled on the speculum blade. A change from yellow to blue indicates alkalinity (presence of amniotic fluid).

Note: Blood and some vaginal infections give false positive results.
 - For the **ferning test**, spread some fluid on a slide and let it dry. Examine it with a microscope. Amniotic fluid crystallizes and may leave a fern-leaf pattern. False negatives are frequent.

TABLE S-24. Differential diagnosis of vaginal discharge

Presenting Symptom and Other Symptoms and Signs Typically Present	Symptoms and Signs Sometimes Present	Probable Diagnosis
<ul style="list-style-type: none"> • Watery vaginal discharge 	<ul style="list-style-type: none"> • Sudden gush or intermittent leaking of fluid • Fluid seen at introitus • No contractions within one hour 	Prelabour rupture of membranes, page S-159
<ul style="list-style-type: none"> • Fever/chills • Maternal tachycardia • Abdominal pain • Fetal tachycardia 	<ul style="list-style-type: none"> • History of loss of fluid • Foul-smelling watery discharge after 22 weeks • Tender uterus • Light vaginal bleeding^a 	Amnionitis, page S-163
<ul style="list-style-type: none"> • Foul-smelling vaginal discharge • No history of loss of fluid 	<ul style="list-style-type: none"> • Itching • Frothy/curd-like discharge • Abdominal pain • Dysuria 	Vaginitis/cervicitis^b
<ul style="list-style-type: none"> • Bloody vaginal discharge 	<ul style="list-style-type: none"> • Abdominal pain • Loss of fetal movements • Heavy, prolonged vaginal bleeding 	Antepartum haemorrhage, page S-22
<ul style="list-style-type: none"> • Vaginal bleeding • Intermittent or constant abdominal pain 		Abruptio placentae, page S-23
<ul style="list-style-type: none"> • Blood-stained mucus or watery vaginal discharge (show) 	<ul style="list-style-type: none"> • Cervical dilatation and effacement • Contractions 	Possible term labour, page C-77, or possible preterm labour, page S-144

^a Light bleeding: takes longer than five minutes for a clean pad or cloth to be soaked

^b Determine cause and treat accordingly.

SPECIFIC MANAGEMENT

- Provide information about the woman's diagnosis, treatment options and estimated time for inpatient care, if required, to the woman and any accompanying family members the woman would like to be involved in decision-making.

- If there is **vaginal bleeding with intermittent or constant abdominal pain**, suspect abruptio placentae (**page S-23**).
- If there are **palpable contractions and blood-stained mucus discharge**, suspect preterm (**page S-144**) or term (**page C-77**) labour.
- If there are **signs of infection** (fever, foul-smelling vaginal discharge), give the woman antibiotics and manage as for amnionitis, regardless of gestational age (**page S-163**).

Confirm gestational age of the pregnancy using all available information (last menstrual period, physical exam in early pregnancy, ultrasound performed in the first trimester, symphysis fundal height).

- If there are **no signs of infection**, and the **pregnancy is less than 37 weeks** (when fetal lungs are more likely to be immature), give antibiotics to the mother to reduce maternal and neonatal infective morbidity (**page C-49**).
- If gestational age is **between 24 and 34 weeks** and **preterm birth is considered imminent**, give corticosteroids to the mother (**S-144**) to improve fetal lung maturity and chances of neonatal survival.
- If gestational age is **less than 32 weeks** and **preterm birth is likely within the next 24 hours**, consider magnesium sulfate for neuroprotection (**page S-146**).
- Induce labour using oxytocin IV (**page P-23**) or misoprostol (orally or vaginally, in a non-scarred uterus) (**page P-21**) at 37 weeks.
- If there are contraindications for vaginal birth, prepare for caesarean birth at 37 weeks (**page P-53**).
- If the **pregnancy is 37 weeks or more**:
 - If there is confirmed Group B streptococcus colonization, give prophylactic antibiotics to help reduce Group B streptococcus infection in the neonate, even if the woman received antibiotics previously:
 - ampicillin 2 g IV every six hours until birth.
 - Assess the cervix (**page P-19**):
 - If the cervix is favourable (soft, thin, partly dilated), induce labour using oxytocin IV (**page P-23**).

- If the cervix is unfavourable (firm, thick, closed) and there is no scar on the uterus, ripen the cervix using misoprostol (orally or vaginally) (page P-21) or oxytocin IV (page P-23). If there is a previous uterine scar, use oxytocin and monitor the woman closely.
- If there are contraindications for vaginal birth, prepare for caesarean (page P-53).

AMNIONITIS

- Give a combination of antibiotics until the woman gives birth (page C-49):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
- If the **woman gives birth vaginally**, continue treatment for 24–48 hours after the symptoms and signs of infection (e.g. fever, uterine tenderness) have subsided.
- If the **woman has a caesarean**, cleanse the vagina with povidone-iodine before the procedure.
- Assess the cervix (page P-19):
 - If the **cervix is favourable** (soft, thin, partly dilated), induce labour using oxytocin (page P-23).
 - If the **cervix is unfavourable** (firm, thick, closed), ripen the cervix using oral or vaginal misoprostol, or infuse oxytocin where misoprostol use is contraindicated (page P-23); perform a caesarean (page P-53).
- If postpartum **endometritis is suspected** (fever, foul-smelling vaginal discharge), give the woman antibiotics (page S-130).
- If **newborn sepsis is suspected**, arrange for a blood culture, if possible, and antibiotics (page S-182).

IMMEDIATE NEWBORN CONDITIONS OR PROBLEMS S-165

Note: This chapter describes immediate management of newborn problems occurring in the first 24 hours after birth. For further guidance on managing the newborn with immediate or ongoing problems, please refer to WHO documents for the management of sick newborns, including **WHO, *Pocket Book of Hospital Care for Children, 2013***.

PROBLEMS

- The newborn has serious conditions or problems that require immediate attention:
 - gasping or not breathing;
 - breathing with difficulty (less than 30 or more than 60 breaths per minute, indrawing of the chest, or grunting);
 - extremely preterm (less than 28 weeks) or very preterm (28 to less than 32 weeks);
 - very low birth weight (less than 1500 g);
 - central cyanosis (blueness);
 - pallor;
 - lethargy, drowsiness or unconsciousness;
 - movement only when stimulated or no movement at all;
 - hypothermia (cold to the touch and/or axillary temperature less than 36.5°C);
 - hyperthermia (hot to the touch and/or axillary temperature more than 37.5°C);
 - not feeding well;
 - convulsions;
 - jaundice (the face is jaundiced earlier than 24 hours after birth, or the palms or soles are jaundiced at any time).
- The newborn has other conditions or problems that require attention in the birthing room or as soon after birth as possible:
 - moderate to late preterm (32 weeks to 36 weeks plus six days);
 - low birth weight (1500–2500 g);
 - risk of bacterial infection in an apparently normal newborn (**page C-112**);
 - exposure to HIV, syphilis or tuberculosis (**pages S-183–185**).

IMMEDIATE MANAGEMENT

Many serious conditions in newborns—bacterial infections, malformations, severe asphyxia and respiratory distress syndrome due to preterm birth—present in a similar way, with difficulty in breathing, lethargy, and poor or no feeding. It is difficult to distinguish between the conditions without diagnostic methods. Nevertheless, treatment must start immediately, even without a clear diagnosis of a specific cause. Babies with any of these problems should be suspected to have a serious condition and should be transferred without delay to the appropriate service for the care of sick newborns.

Give the first dose of both ampicillin and gentamicin IM in the thigh before referral for possible serious illness, severe umbilical infection or severe skin infection.

- gentamicin 5 mg/kg body weight IM if at term, 4 mg/kg body weight IM if preterm, every 24 hours;
- PLUS ampicillin 50 mg/kg body weight IM every 12 hours.

Inform the mother and birth companion about what is happening and keep them updated as you care for the baby.

SPECIFIC MANAGEMENT

Note: Observe standard infection prevention and control practices when caring for and resuscitating a newborn (**pages C-113**).

GASPING OR NOT BREATHING

- Dry the baby; observe the infant while drying.
- Remove the wet cloth and keep the baby warm by skin-to-skin contact with the mother; cover with a clean, dry cloth. Where available, put a hat on the baby's head.
- If, after drying, the baby is not crying/breathing or does not have good muscle tone or vigorous movements:
 - Stimulate breathing by rubbing the baby's back two or three times.
 - Clear the airway: remove secretions from the baby's mouth, then nose. Suctioning should be done only if amniotic fluid was meconium stained or the mouth or nose is full of secretions.

- In settings where mechanical equipment to generate negative pressure for suctioning is not available and a newly born baby requires suctioning, a bulb syringe (single-use or easy to clean) should be used.
- If, after stimulation and clearing the airway, the baby is still not crying/breathing:
 - **Call for help.**
 - Clamp and cut the cord.
 - Transfer the baby to the newborn resuscitation area (firm, warm surface under a radiant heater).

RESUSCITATION

Airway: Opening the Airway

- Position the newborn (**Fig. S-30**):
 - Place the baby on her back.
 - Position the head in a slightly extended position (“sniffing”) to open the airway.
 - Keep the baby wrapped or covered, except for the face and upper chest.

FIGURE S-30. Correct position of the head for ventilation; note that the neck is less extended than in adults



- If the newborn has thick secretions (mouth or nose) or was delivered through meconium-stained amniotic fluid, quickly clear the airway by suctioning the mouth and nostrils before initiating positive pressure ventilation.

Note: Suction the mouth, nose and oropharynx by direct vision only. Do not suction deep in the throat as this may cause the baby’s heart to slow or

the baby to stop breathing. The only indication for tracheal suctioning is a depressed neonate born through thick meconium-stained amniotic fluid. In this case, tracheal suctioning should be done before initiating positive pressure ventilation.

- Reassess the baby:
 - If the **newborn starts crying or breathing**, no further immediate action is needed. Proceed with initial care of the newborn (**page C-107**).
 - If the **baby is still not breathing**, start ventilating within one minute after birth (see below).

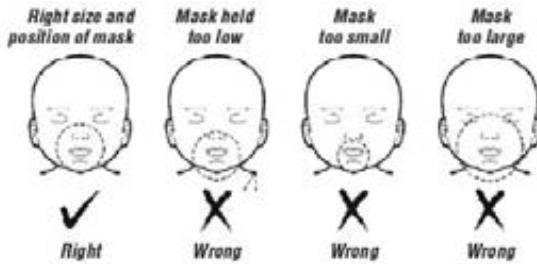
Note: If the baby is not crying/breathing well after the airway is cleared and brief stimulation, the baby needs ventilation with a bag and mask. More stimulation is unlikely to be effective. Prolonged stimulation only wastes time while the baby is becoming sicker.

Breathing: Ventilating the Newborn

Start positive pressure ventilation with a mask and self-inflating bag within one minute of birth.

- Recheck the newborn's position. The neck should be slightly extended (**Fig. S-30, page S-167**).
- Position the mask and check the seal (**Figs. S-31 and S-32**):
 - Stand at the baby's head.
 - Select a mask size that fits over the baby's nose and mouth (**Fig. S-31**): size 1 for normal weight infants, size 0 for small (less than 2.5 kg) infants.
 - Place the mask on the newborn's face. It should cover the chin, mouth and nose.

FIGURE S-31. Fitting mask over face

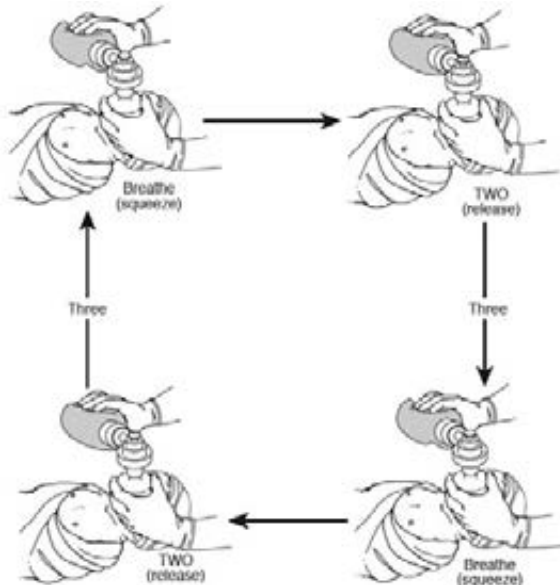


- Form a seal between the mask and the face.
- Squeeze the bag with two fingers only or with the whole hand, depending on the size of the bag.
- Check the seal by ventilating twice and observing the rise of the chest.

FIGURE S-32. Ventilation with bag and mask



- Once a seal is ensured and chest movement is present, ventilate the newborn. Maintain the correct rate (approximately 40 breaths per minute) and pressure (observe the chest for an easy rise and fall):
 - Count out loud: “Breathe—two—three” as you ventilate the baby (**Fig. S-33**). Squeeze the bag as you say “breathe” and release the pressure on the bag as you say “two—three.” This helps you to ventilate with an even rhythm, at a rate that the newborn’s lungs are naturally adapted to.

FIGURE S-33. Timing the rate of ventilation

- If the **baby's chest is rising**, ventilation pressure is probably adequate.

Note: Make sure the chest moves up with each press on the bag; in a very small infant, make sure the chest does not move too much (danger of causing pneumothorax).

- If the **baby's chest is not rising**:
 - Repeat suction of mouth and nose to remove mucus, blood or meconium from the airway.
 - Recheck and correct, if necessary, the position of the newborn (**Fig. S-30, page S-167**).
 - If you hear air escaping from the mask, reposition the mask on the baby's face to improve the seal between mask and face (the most common leak is between the nose and the cheeks).
 - Squeeze the bag harder to increase ventilation pressure.

BOX S-10. Use of oxygen during resuscitation

- For newly born term or preterm (more than 32 weeks' gestation) babies requiring positive pressure ventilation, ventilation should be initiated with air.
- For preterm babies born before or at 32 weeks of gestation, start ventilation with 30% (not 100%) oxygen. If this is not possible, ventilation should be started with air.
- For newborns who continue to have a heart rate of less than 60 beats per minute after 30 seconds of adequate ventilation with air, progressively higher concentrations of oxygen should be considered. However, if oxygen is not available, ventilation should be continued with air.
- If available, and if there is more than one health worker performing newborn resuscitation, pulse oximetry should be used to determine the need for supplemental oxygen and to monitor the needed concentration of oxygen.

- If the **mother of the newborn received morphine** before giving birth, consider administering naloxone **after** vital signs have been established (**Box S-11**).

BOX S-11. Counteracting respiratory depression in the newborn caused by narcotic medications

If the **mother received morphine**, naloxone is the medication to counteract respiratory depression in the newborn caused by these medications.

Note: Do not administer naloxone to newborns whose mothers are suspected of having recently abused narcotic medications.

- If there are **signs of respiratory depression**, begin resuscitation immediately:
 - After vital signs have been established, give naloxone 0.1 mg/kg body weight IV to the newborn.
 - Naloxone may be given IM after successful resuscitation, if the infant has adequate peripheral circulation. Repeated doses may be required to prevent recurrent respiratory depression.
- If there are **no signs of respiratory depression**, but morphine was given to the mother within four hours of giving birth, observe the baby expectantly for signs of respiratory depression and treat as above if they occur.

Evaluate Resuscitation Efforts

- Ventilate for one minute; then stop and quickly:
 - assess if the newborn is breathing spontaneously; and
 - rapidly measure the heart rate (normal is more than 100 beats per minute) by:
 - feeling the umbilical cord pulse;
 - OR listening to the heartbeat with a stethoscope.

Circulation: Chest Compressions

- Decide if chest compressions are needed:
 - When a second skilled provider is present, and the neonate has a heart rate of less than 60 beats per minute after one minute of positive pressure ventilation, consider chest compressions in addition to positive pressure ventilation (see WHO, *Guidelines on Basic Newborn Resuscitation, 2012*).

Note: In newly born babies who do not start breathing within one minute after birth, **priority should be given to providing adequate ventilation rather than to performing chest compressions.**

Chest compressions are of little value unless the lungs are also being ventilated sufficiently.

Continue or Stop Resuscitation

- If **breathing is normal** (30–60 breaths per minute) and there is **no indrawing of the chest** and **no grunting for one minute**, no further resuscitation is needed. Proceed with initial care of the newborn (**page C-107**).
- If the **newborn is not breathing**, or the **breathing is weak**, continue ventilating until spontaneous breathing begins.
- If the **newborn starts crying**, stop ventilating and continue to **observe breathing for five minutes after crying stops**:
 - If **breathing is normal** (30–60 breaths per minute) and there is **no indrawing of the chest** and **no grunting for one minute**, no further resuscitation is needed. Proceed with initial care of the newborn (**page C-107**).

- If the **respiratory rate is less than 30 breaths per minute**, continue ventilating.
- If there is **severe indrawing of the chest**, ventilate with oxygen, if available (**Box S-13, page S-176**). Arrange to transfer the baby to the most appropriate service for the care of sick newborns.
- If the **newborn is not breathing regularly after 20 minutes of ventilation**:
 - Transfer the baby to the most appropriate service for the care of sick newborns.
 - During the transfer, keep the newborn warm and ventilated, if necessary.
- If there is **no gasping or breathing at all after 20 minutes of ventilation**, stop ventilating; the baby is stillborn. Provide emotional support to the mother and family (**page C-9**).
- If the newborn has no detectable heart rate after 10 minutes of effective ventilation, stop resuscitation when no advanced resuscitation care is available. Provide emotional support to the mother and family (**page C-9**).
- If the **heart rate continues to be less than 60 beats per minute without spontaneous breathing after 20 minutes of ventilation**, stop ventilating when no advanced resuscitation care is available. Provide emotional support to the mother and family (**page C-9**).

Care after Successful Resuscitation

- Prevent heat loss:
 - Place the baby skin-to-skin on the mother's chest and cover the baby's body and head.
 - Alternatively, place the baby under a radiant heater.
- Examine the newborn and count the number of breaths per minute:
 - If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute, indrawing of the chest, or grunting), give oxygen by nasal catheter or prongs (**Box S-13, page S-176**).
- Measure the baby's axillary temperature:
 - If the **temperature is 36.5°C or more**, keep the baby in skin-to-skin contact on the mother's chest and encourage breastfeeding.

- If the **temperature is less than 36.5°C**, rewarm the baby (**page S-179**).
- Encourage the mother to begin breastfeeding. A newborn who required resuscitation has a higher risk of developing hypoglycaemia:
 - If **suckling is good**, the newborn is recovering well.
 - If **suckling is not good**, transfer the baby to the appropriate service for the care of sick newborns.
- Ensure frequent monitoring of the newborn during the next 24 hours. If **signs of breathing difficulties recur**, arrange to transfer the baby to the most appropriate service for the care of sick newborns.

BOX S-12. Resuscitation equipment

To avoid delays during an emergency situation, it is **vital to check that equipment for newborn resuscitation is available, functional and in good condition before all deliveries**:

- Have masks available (size 1 for normal weight newborns and size 0 for small newborns).
- **Test vital functions of the ventilation device:**
 - Squeeze the ventilation bag and watch for the valve in the patient outlet to open as you squeeze. This shows the device is ready to deliver air to a patient.
 - Seal the mask tightly to the palm of your hand and squeeze hard enough to open the pressure release valve:
 - If you feel pressure against your hand, the bag is generating adequate pressure.
 - If the valve in the patient outlet opens as you squeeze, this shows that air that cannot be delivered through a blocked airway will escape through the pressure relief valve.
 - If the bag reinflates when you release the grip, the bag is functioning properly.
 - Check the mask rim for any damage that could prevent an airtight mask seal to the face.

CYANOSIS OR BREATHING DIFFICULTY

- If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute, severe indrawing of the lower chest wall, or grunting), give oxygen:
 - Suction the mouth and nose to ensure the airways are clear.
 - Give oxygen at 0.5 L per minute by nasal catheter or nasal prongs (**Box S-13, page S-176**).

- Transfer the baby to the appropriate service for the care of sick newborns. Some newborns may have **fast breathing as the only sign of severe illness**.
- Ensure that the baby is kept warm. Wrap the baby in a soft, dry cloth; cover with a blanket and ensure that the baby's head is covered to prevent heat loss.
- If respiratory distress syndrome is diagnosed in a preterm infant on the basis of clinical or radiological criteria:
 - Provide continuous positive airway pressure (CPAP) in health facilities that can provide quality supportive care to neonates.

If oxygen therapy is to be delivered with CPAP, use low concentrations of blended oxygen and titrate upwards based on the blood oxygen saturation levels. If blenders are not available, use room air.

The use of 100% oxygen is not recommended because of demonstrable harms (see Box S-10).

- Provide surfactant replacement therapy for intubated and ventilated infants in health facilities where intubation, ventilator care, blood gas analysis, newborn nursing care and monitoring are available (*WHO, WHO Pocket Book of Hospital Care for Children, 2013*, and *WHO Recommendations on Interventions to Improve Preterm Birth Outcomes, 2015*).

BOX S-13. Use of oxygen

Give oxygen to neonates who have any of the following:

- central cyanosis or gasping
- grunting with every breath
- difficulty feeding due to respiratory distress
- severe lower chest wall indrawing
- head nodding (i.e. a nodding movement of the head, synchronous with the respiration and indicating severe respiratory distress).

When using oxygen, remember:

- Use supplemental oxygen for cyanosis or difficulty breathing only if the baby's oxygen saturation is 90% or less. Oxygen flow should be regulated to maintain saturation of greater than 90% but less than 95% to avoid eye damage. Oxygen can be discontinued once the infant can maintain saturation over 90% in room air.
- Nasal prongs are the preferred method for delivering oxygen, with a flow rate of 0.5–1 L per minute, increased to 2 L per minute in severe respiratory distress to achieve oxygen saturation greater than 90% but less than 95%.
- Thick secretions should be cleared from the throat by intermittent suction under direct observation, if they are obstructing the airway and the infant is too weak to clear them.

Note: Indiscriminate use of supplemental oxygen for premature infants has been associated with the risk of blindness and chronic respiratory problems (bronchopulmonary dysplasia).

LOW BIRTH WEIGHT OR PRETERM BABY

Newborns weighing 2000 g or less at birth should be provided kangaroo mother care as close to continuously as possible. Kangaroo mother care should be initiated in health facilities as soon as the newborns are clinically stable. The key features of kangaroo mother care for preterm infants are early, continuous and prolonged skin-to-skin contact between the mother and the baby, and exclusive breastfeeding (ideally) or feeding with breastmilk.

Unstable neonates weighing 2000 g or less at birth, or stable newborns weighing less than 2000 g, who cannot be given kangaroo mother care should be cared for in a thermoneutral environment, either under radiant warmers or in incubators.

VERY LOW BIRTH WEIGHT OR VERY PRETERM BABY

If a **baby is very small** (less than 1500 g or less than 32 weeks), severe health problems are likely and include difficulty in breathing, inability to

feed, severe jaundice and infection. Without special thermal protection (e.g. an incubator), the baby is susceptible to hypothermia.

Very small newborns require special care. They should be transferred to the appropriate service for the care of sick and small babies as early as possible. Before and during transfer:

- Ensure that the baby is kept warm. The baby can be transferred in skin-to-skin contact with the mother.
- Place the baby with a diaper, a hat and socks (which is enough when the ambient temperature is 22–24°C) safely in skin-to-skin contact in an upright position between the mother's breasts—chest to chest, with the infant's head turned to one side. Tie the infant to the mother with a cloth.
- If skin-to-skin contact with the mother is not possible:
 - transfer the baby in skin-to-skin contact with the father, a relative or a willing health care provider; OR
 - wrap the baby in a soft, dry cloth; cover with a blanket and ensure that the baby's head is covered to prevent heat loss.
- Encourage the mother to begin breastfeeding or provide alternative breastmilk feeding to prevent hypoglycaemia.
- If **maternal history indicates possible bacterial infection**, give a first dose of antibiotics:
 - gentamicin 3 mg/kg body weight IM;
 - PLUS ampicillin 50 mg/kg body weight IM.
- If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute, indrawing of the chest, or grunting), give oxygen by nasal catheter or prongs (**page S-174**).

MODERATELY PRETERM OR LOW BIRTH WEIGHT BABY

Moderately preterm (32–37 weeks) or low birth weight (1500–2500 g) babies may start to develop problems soon after birth.

- If the **baby has no breathing difficulty and remains adequately warm** while in skin-to-skin contact with the mother, the father or a relative:
 - keep the baby with the mother, father or relative; and

- if possible, encourage the mother to initiate breastfeeding within the first hour.
- If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute, indrawing of the chest, or grunting), give the baby oxygen by nasal catheter or prongs (**page S-174**) and manage as for cyanosis or difficulty breathing (**page S-174**).
- If the baby's **axillary temperature drops below 36.5°C**, rewarm the baby (**page S-179**).
- If the baby develops problems, transfer the baby to the appropriate service for the care of sick newborns as quickly as possible. The baby can be transferred in skin-to-skin contact with the mother, the father or a relative.

LETHARGY

If the **baby is lethargic** (low muscular tone, drowsy, does not move spontaneously or when stimulated), it is very likely that the baby has a severe illness and should be transferred to the appropriate service for the care of sick of newborns.

Before transfer:

- Open and maintain the baby's airway. Give oxygen by nasal prongs if the newborn is cyanosed, in severe respiratory distress or hypoxaemic (oxygen saturation of 90% or less).
- Give bag and mask ventilation (**page S-170**) with oxygen (or room air if oxygen is not available) if there is apnoea or gasping or if the baby's respiratory rate is too slow (less than 20 breaths per minute).
- Give ampicillin and gentamicin (see **S-166**).
- If the baby is drowsy or unconscious, check blood glucose and treat the baby for hypoglycaemia if present. If you cannot check blood glucose quickly, assume that the baby has hypoglycaemia.
- Give the baby vitamin K (if not given before).
- Monitor the infant frequently until transfer to specialized care for sick newborns.

HYPOTHERMIA

Hypothermia can occur quickly in a very small baby, a baby who was not dried immediately after birth, or a baby who was resuscitated or separated from the mother. In these cases, the baby's temperature can quickly drop below normal. Rewarm the baby as soon as possible:

SEVERE HYPOTHERMIA

- If the **baby is very sick** or is **severely hypothermic** (axillary temperature less than 32°C):
 - Transfer the baby as quickly as possible to the appropriate service for the care of preterm or sick newborns.
 - If the **baby is cyanotic** (bluish) or is **having difficulty breathing** (less than 30 or more than 60 breaths per minute, indrawing of the chest, or grunting), treat for breathing difficulty (**page S-174**).
- Before transfer:
 - Remove cold or wet clothing, if present, and thoroughly dry the baby. Dress the baby in warm clothes and a hat, and cover with a warm blanket.
 - Warm the baby immediately using available methods (e.g. incubator, radiant heater, warm room, heated bed, warm clothes, warm blankets, skin-to-skin contact).
 - Give the first dose of antibiotics for sepsis, and keep the tubing of the IV line under the radiant warmer to warm the fluid.
 - Check blood glucose level to rule out hypoglycaemia and treat hypoglycaemia if present.
 - If the **baby shows signs of readiness to suckle**, allow the baby to begin breastfeeding.
- If the **baby cannot be breastfed**, give expressed breastmilk using an alternative feeding method.

MODERATE HYPOTHERMIA

- If the **baby has moderate hypothermia** (temperature higher than 32°C and less than 36.5°C):
 - ensure that the baby is kept warm; and
 - remove cold or wet clothing, if present.

- If the **mother is present**, have her rewarm the baby using skin-to-skin contact if the baby does not have other problems.
- If the **mother is not present or skin-to-skin contact cannot be used**:
 - Wrap the baby in a soft, dry cloth; cover with a blanket and ensure that the baby's head is covered to prevent heat loss.
 - Place the baby in an incubator or under a radiant heater (after covering the baby's body and head). Use another method of rewarming, if necessary.
- Encourage the mother to begin breastfeeding as soon as the baby is ready. If the **baby cannot be breastfed**, give expressed breastmilk using an alternative feeding method.
 - Check blood glucose level to rule out hypoglycaemia and treat hypoglycaemia if present.
 - If the **baby's respiratory rate is more than 60 breaths per minute or the baby has chest indrawing or grunting on expiration**, treat for breathing difficulty (**page S-174**).
- Monitor the baby's axillary temperature hourly until normal (or for at least three hours):
 - If the **baby's temperature has increased at least 0.5°C per hour over the last three hours**, rewarming has been successful; continue measuring the baby's temperature every two hours.
 - If the **baby's temperature does not rise or is rising more slowly than 0.5°C per hour**, look for signs of sepsis (e.g. poor feeding, vomiting, breathing difficulty; and transfer the baby as quickly as possible to the appropriate service for the care of preterm or sick newborns.
 - Once the baby's temperature is normal, measure the temperature every three hours for 12 hours.
 - If the **baby's temperature remains within the normal range**, discontinue measurements.
- If the baby is feeding well and there are no other problems requiring hospitalization, discharge the baby. Advise the mother on how to keep the baby warm at home.

CONVULSIONS

Convulsions in the first hour of life are rare. Convulsions can be due to asphyxia, birth injury, hypoglycaemia or hypocalcaemia, and are also a sign of meningitis or neurologic problems (e.g. hypoxic-ischaemic encephalopathy, intracranial haemorrhage).

Note: Treat clinically apparent seizures with **phenobarbital**, if the seizures last longer than three minutes or if they are brief serial seizures.

- Ensure that the baby is kept warm. Wrap the baby in a soft, dry cloth; cover with a blanket and ensure that the baby's head is covered to prevent heat loss.
- Transfer the baby to the appropriate service for the care of sick newborns as quickly as possible.

The initial management of convulsions includes:

- Check the baby's blood glucose level to rule out hypoglycaemia and treat hypoglycaemia, if present, before antiepileptic medication treatment is considered. If facilities for measuring glucose are not available, consider empirical treatment with glucose.
- If there are clinical signs suggestive of associated sepsis or meningitis, central nervous system infection should be ruled out by doing a lumbar puncture. If present, the infection should be treated with appropriate antibiotics.

Note: If facilities for lumbar puncture are not available, consider empirical antibiotic treatment with ampicillin and gentamicin IV for a neonate with clinical signs of sepsis or meningitis.

- Measure serum calcium (if facilities are available) and treat, if hypocalcaemia is present.
- In the absence of hypoglycaemia, meningitis, hypocalcaemia or another obvious underlying etiology such as hypoxic-ischaemic encephalopathy or intracranial haemorrhage or infarction, pyridoxine treatment in a specialized centre, where this treatment is available, may be considered before antiepileptic medication treatment.
- If the **baby is currently having a convulsion or has had a convulsion within the last hour**, give the baby a loading dose of phenobarbital 20 mg/kg body weight IV over 15 minutes.
 - If an **IV line has not yet been established**, give phenobarbital 20 mg/kg body weight as a single IM injection.

- If **convulsions do not stop within 30 minutes**, give another dose of phenobarbital 10 mg/kg body weight IV slowly over five minutes (or IM if an IV line still has not been established). Repeat one more time after another 30 minutes, if necessary.
- In neonates who continue to have seizures despite administering the maximal tolerated dose of phenobarbital (IV up to a maximum of 40 mg/kg body weight), either midazolam or lidocaine may be used as the second-line agent for control of seizures. (Note that the use of lidocaine requires cardiac monitoring facilities.)
- Watch for apnoea and always have a bag and mask available in case ventilation is required.
- If the **baby has central cyanosis (blue tongue and lips) or other signs of breathing difficulty**, treat for breathing difficulty (page S-174).

Note: Do not use diazepam for convulsions. Diazepam given in addition to phenobarbital will increase the risk of circulatory collapse and respiratory failure.

INITIAL MANAGEMENT OF ASYMPTOMATIC NEWBORNS EXPOSED TO INFECTION

The following suggested guidelines may be modified according to local situations:

- If a neonate has risk factors for infection (i.e. preterm prelabour rupture of membranes; membranes ruptured more than 18 hours before birth; mother had fever higher than 38°C before childbirth or during labour; amniotic fluid was foul smelling or purulent; or mother has documented colonization with Group B streptococcus), the following steps should be taken, even if the mother has no clinical signs of infection:
 - Keep the baby with the mother and encourage the mother to continue breastfeeding.
 - Make arrangements with the appropriate service that cares for sick newborns to take a blood culture.
 - Treat the newborn with prophylactic antibiotics: ampicillin (IM or IV) and gentamicin for at least two days.

- Transfer the baby for further management to the appropriate service that cares for sick newborns.
- If none of the risk factors listed applies, do not treat with antibiotics. Observe the baby for signs of infection for three days:
 - Keep the baby with the mother and encourage her to continue breastfeeding.
 - If **signs of infection occur within three days**, make arrangements with the appropriate service that cares for sick newborns to take a blood culture and start the newborn on antibiotics.

MATERNAL-TO-CHILD TRANSMISSION OF SYPHILIS

Syphilis infection in a pregnant woman can lead to adverse outcomes such as early fetal loss, stillbirth, neonatal death, prematurity, low birth weight and clinical evidence of syphilis in the neonate. To prevent maternal-to-child transmission of syphilis:

- All pregnant women and their partners should be screened and, where indicated, treated for syphilis at the first antenatal visit, preferably before 16 weeks' gestation, and again in late pregnancy.
- If a pregnant woman was not tested during pregnancy, efforts should be made to test for syphilis during labour or the immediate postpartum period, before she is discharged.
- If the **mother has a positive serologic test for syphilis** (at any time during pregnancy or the intrapartum period), treat the newborn regardless of whether the mother was fully or partially treated and whether the newborn or mother has signs of syphilis:
 - Give the baby 37.5 mg/kg body weight (50 000 U/kg body weight) of benzathine benzylpenicillin in a single IM dose.
- If the **mother was not treated for syphilis or she was treated inadequately, or if her treatment status is unknown or uncertain**:
 - Give the mother and her partner(s) benzathine benzylpenicillin 1.8g IM as two injections at separate sites.
 - Refer the mother and her partner(s) for follow-up to a clinic that offers services for sexually transmitted infections.
- Inform the mother of the importance of treatment for her, her newborn and her partner.

- Follow up in four weeks to examine the baby for growth and signs of congenital syphilis.
- Report the case to authorities, if required.
- If the **newborn shows signs of syphilis (Box S-14)**, administer the first dose of antibiotics and transfer the baby to the appropriate service for the care of sick newborns (hospitalization is often indicated to ensure that the infant receives the full course of treatment):
 - procaine benzylpenicillin 50 mg/kg body weight as a single dose by deep IM injection daily for 10 days;
 - OR benzylpenicillin 30 mg/kg body weight every 12 hours IV for the first seven days of life and then 30 mg/kg body weight every eight hours IV for three more days.

Note: Any suspected case of congenital syphilis should be confirmed by testing

BOX S-14. Signs of congenital syphilis

Signs of syphilis include the following:

- low birth weight
- palms of hands and soles of feet with red rash, grey patches, blisters or peeling skin
- “snuffles”: highly infectious rhinitis with nasal obstruction
- abdominal distension due to enlarged liver and/or spleen
- jaundice
- pallor, anaemia
- generalized oedema
- anal condylomata
- paralysis of one limb
- spirochetes seen on dark field examination of lesion, body fluid or cerebrospinal fluid

Some very low birth weight infants with syphilis have signs of severe sepsis with lethargy, respiratory distress, skin petechiae or other bleeding.

INFANTS OF MOTHERS WITH TUBERCULOSIS

If the mother has active lung tuberculosis and was on treatment for less than two months before giving birth, or if tuberculosis was diagnosed after the birth:

- Reassure the mother that it is safe for her to breastfeed her infant.
- Do not give the tuberculosis vaccine (BCG) at birth.
- Give prophylactic isoniazid at 10 mg/kg body weight by mouth once daily.
- Ensure follow-up of the infant with the appropriate service for the care of sick newborns.

INFANTS OF MOTHERS WITH HIV INFECTION

Refer to national guidelines.

SECTION 3
PROCEDURES

TABLE P-1. Indications and precautions for paracervical block

Indications	Precautions
<ul style="list-style-type: none">• Dilatation and curettage• Manual vacuum aspiration	<ul style="list-style-type: none">• Make sure there are no known allergies to lidocaine or related drugs.• Do not inject into a vessel.• Maternal complications are rare but may include haematoma.

- Review general care principles (**page C-25**).
- Prepare 20 mL 0.5% lidocaine solution without adrenaline (**page C-57**).
- Use a 3.5-cm, 22-gauge or 25-gauge needle to inject the lidocaine solution.
- If using a tenaculum to grasp the cervix, first inject 1 mL of 0.5% lidocaine solution into the anterior or posterior lip of the cervix that has been exposed by the speculum.

Note: With incomplete abortion, a ring (sponge) forceps is preferable, as it is less likely than the tenaculum to tear the cervix with traction and does not require the use of lidocaine for placement.

- With the tenaculum or ring forceps on the cervix vertically (one tooth in the external os, the other on the face of the cervix), use slight traction and movement to help identify the area between the smooth cervical epithelium and the vaginal tissue. This is the site for insertion of the needle around the cervix.
- Insert the needle just under the epithelium.

Tip: Some practitioners have suggested the following step to divert the woman’s attention from the insertion of the needle: Place the tip of the needle just over the site selected for insertion and ask the woman to cough. This will “pop” the needle just under the surface of the tissue.

Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer convulsions and death if IV injection of lidocaine occurs.**

- Inject 2 mL of lidocaine solution just under the epithelium, not deeper than 3 mm, at 3, 5, 7 and 9 o'clock (**Fig. P-1**). Optional injection sites are at 2 and 10 o'clock. When correctly placed, a swelling and blanching of the tissue can be noted.
- At the conclusion of the set of injections, wait two minutes and then pinch the cervix with forceps. If the **woman can feel the pinch**, wait two more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

FIGURE P-1. Paracervical block injection sites

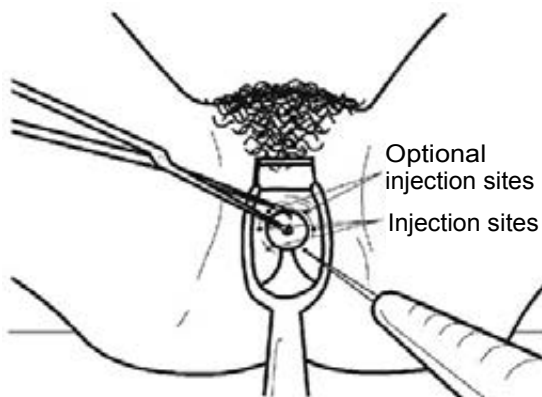


TABLE P-2. Indications and precautions for pudendal block

Indications	Precautions
<ul style="list-style-type: none"> • Instrumental or breech birth • Episiotomy and repair of perineal tears • Craniotomy or craniocentesis 	<ul style="list-style-type: none"> • Make sure there are no known allergies to lidocaine or related drugs. • Do not inject into a vessel.

- Review general care principles (**page C-25**).
- Prepare 40 mL 0.5% lidocaine solution without adrenaline (**page C-57**).

Note: It is best to limit the pudendal block to 30 mL of solution so that a maximum of 10 mL of additional solution may be injected into the perineum during repair of tears, if needed.

- Use a 15-cm, 22-gauge needle to inject the lidocaine.

The target is the pudendal nerve as it passes through the lesser sciatic notch. There are two approaches:

- through the perineum
- through the vagina.

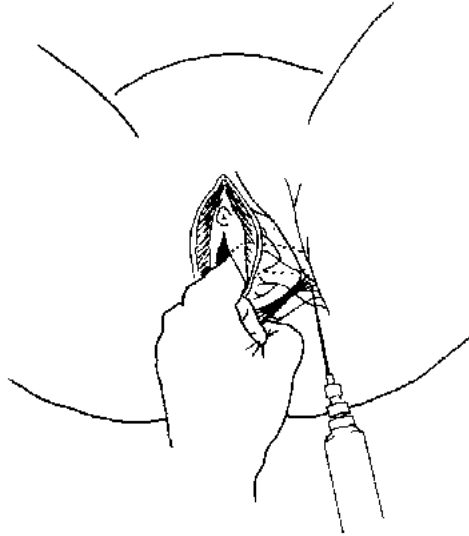
The perineal approach requires no special instrument. For the vaginal approach, a special needle guide (“trumpet”), if available, provides protection for the provider’s fingers.

PERINEAL APPROACH

- Infiltrate the perineal skin on both sides of the vagina using 10 mL of lidocaine solution.

Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer convulsions and death if IV injection of lidocaine occurs.**

- Wearing sterile gloves, place two fingers in the vagina and guide the needle through the perineal tissue to the tip of the woman’s left ischial spine (**Fig. P-2, page P-4**).

FIGURE P-2. Perineal approach

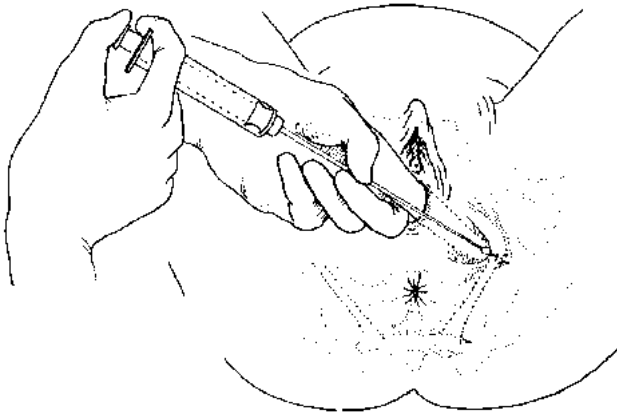
- Inject 10 mL of lidocaine solution in the angle between the ischial spine and the ischial tuberosity.
- Pass the needle through the sacrospinous ligament and inject another 10 mL of lidocaine solution.
- Repeat the procedure on the opposite side.
- If an **episiotomy is to be performed**, infiltrate the episiotomy site in the usual manner at this time (**page P-85**).
- At the conclusion of the set of injections, wait two minutes and then pinch the area with forceps. If the **woman can feel the pinch**, wait two more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

VAGINAL APPROACH

- Wearing sterile gloves, use the left index finger to palpate the woman's left ischial spine through the vaginal wall (**Fig. P-3**).

FIGURE P-3. Vaginal approach without a needle guide



- Use the right hand to advance the needle guide ("trumpet") towards the left spine, keeping the left fingertip at the end of the needle guide.
- Place the needle guide just below the tip of the ischial spine.

Remember to keep the fingertip near the end of the needle guide. Do not place the fingertip beyond the end of the needle guide as needle-stick injury can easily occur.

- Advance a 15-cm, 22-gauge needle with attached syringe through the guide.
- Penetrate the vaginal mucosa until the needle pierces the sacrospinous ligament.

Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer convulsions and death if IV injection of lidocaine occurs.**

- Inject 10 mL of lidocaine solution.
- Withdraw the needle into the guide and reposition the guide to just above the ischial spine.
- Penetrate the vaginal mucosa and aspirate again to be sure that no vessel has been penetrated.
- Inject another 5 mL of lidocaine solution.
- Repeat the procedure on the other side, using the right index finger to palpate the woman's right ischial spine. Use the left hand to advance the needle and needle guide, and inject the lidocaine solution.
- If an **episiotomy is to be performed**, infiltrate the episiotomy site in the usual manner at this time (**page P-85**).
- At the conclusion of the set of injections, wait two minutes and then pinch the area with forceps. If the **woman can feel the pinch**, wait two more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

Local anaesthesia is a safe alternative to general, ketamine or spinal anaesthesia when these anaesthetics or persons trained in their use are not available.

The use of local anaesthesia for caesarean requires that the provider counsel the woman and reassure her throughout the procedure. The provider must keep in mind that the woman is awake and alert, and should use instruments and handle tissue as gently as possible.

TABLE P-3. Indications and precautions for local anaesthesia for caesarean

Indications	Precautions
<ul style="list-style-type: none"> • Caesarean (especially in women with heart failure) 	<ul style="list-style-type: none"> • Avoid use in women with eclampsia, severe pre-eclampsia or previous laparotomy. • Avoid use in women who are obese, apprehensive, or allergic to lidocaine or related drugs. • Avoid use if the provider has little experience in performing caesareans. • Do not inject lidocaine into a vessel.

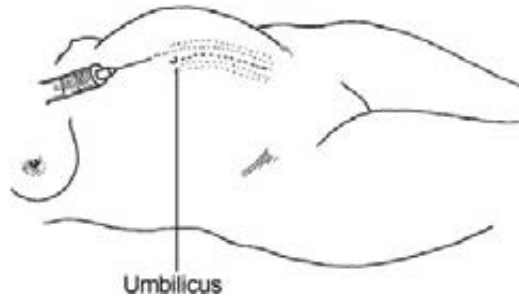
- Review general care principles (**page C-25**) and start an IV infusion (**page C-34**).
- Prepare 200 mL of 0.5% lidocaine solution with 1:200 000 adrenaline (**page C-58**). Usually less than half this volume (approximately 80 mL) is needed in the first hour.
- If the **fetus is alive**:
 - Wait to give morphine 0.1 mg/kg body weight IM and promethazine 25 mg IV to the woman until **after** birth of the baby.
 - Alternatively, morphine and promethazine can be given to the woman before birth, but the baby might need to be given naloxone 0.1 mg/kg body weight IV at birth.
- If the **fetus is dead**, give morphine 0.1 mg/kg body weight IM and promethazine 25 mg IV to the woman before infiltrating the skin and subcutaneous tissue with local anaesthesia.

Talk to the woman and reassure her throughout the procedure.

- Using a 10-cm needle, infiltrate one band of skin and subcutaneous tissue on either side of the proposed incision, two finger breadths apart (**Fig. P-4**).

Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer convulsions and death if IV injection of lidocaine occurs.**

FIGURE P-4. Infiltration of skin and subcutaneous tissue with local anaesthesia for caesarean



- Raise a long wheal of lidocaine solution 3–4 cm on either side of the midline from the symphysis pubis to a point 5 cm above the umbilicus.
- Infiltrate the lidocaine solution down through the layers of the abdominal wall. The needle should remain almost parallel to the skin. Take care not to pierce the peritoneum and insert the needle into the uterus, as the abdominal wall is very thin at term.
- At the conclusion of the set of injections, wait two minutes and then pinch the incision site with forceps. If the **woman can feel the pinch**, wait two more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

Note: If the caesarean is performed under local anaesthesia, make a midline incision that is about 4 cm longer than when general anaesthesia is

used. A **Pfannenstiel's incision should not be used** because it takes longer, retraction is poorer and more local anaesthetic is needed.

The anaesthetic effect can be expected to last about 60 minutes.

Proceed with caesarean (**page P-53**), keeping the following in mind:

- Do not use abdominal packs. Use retractors as little as possible and with a minimum of force.
- Inject 30 mL of lidocaine solution beneath the uterovesical peritoneum as far laterally as the round ligaments. No additional anaesthetic is required. The peritoneum is sensitive to pain; the myometrium is not.
- Inform the woman that she will feel some discomfort from traction when the baby is born. This is usually no more than occurs during vaginal birth.
- Repair the uterus without removing it from the abdomen.
- Additional local anaesthesia may be necessary to repair the abdominal wall.

TABLE P-4. Indications and precautions for spinal anaesthesia

Indications	Precautions
<ul style="list-style-type: none"> • Caesarean • Laparotomy • Repair of third and fourth degree perineal tears 	<ul style="list-style-type: none"> • Make sure there are no known allergies to lidocaine or related drugs. • Avoid use in women with uncorrected hypovolaemia, severe anaemia, coagulation disorders, haemorrhage, local infection, severe pre-eclampsia, eclampsia or heart failure due to heart disease.

- Review general care principles (**page C-25**) and start an IV infusion (**page C-34**).
- Infuse 500–1000 mL of IV fluids (normal saline or Ringer’s lactate) to preload the woman and avoid hypotension. This should be done 30 minutes before anaesthesia.
- Prepare 1.5 mL of the local anaesthetic: 5% lidocaine in 5% dextrose. Add 0.25 mL of adrenaline (1:1000) if the anaesthetic needs to be effective for longer than 45 minutes.
- Ask the woman to lie on her side (or sit up), ensuring that the lumbar spine is well flexed. Ask the woman to flex her head onto her chest and round her back as much as possible.
- Identify and, if required, mark the proposed site of injection. A vertical line from the iliac crest upward will cross the woman’s vertebral column between the spines of the fourth and fifth lumbar vertebrae. Choose this space or the space just above it.

Sterility is critical. Do not touch the point or shaft of the spinal needle with your hand. Hold the needle only by its hub.

- Inject 1% lidocaine solution using a fine needle to anaesthetize the woman’s skin.
- Introduce the finest spinal needle available (22- or 23-gauge) in the midline through the wheal, at a right angle to the skin in the vertical plane.

Note: Fine needles tend to bend.

- If the **needle hits bone**, it might not be in the midline. Withdraw the needle and reinsert it, directing it slightly upwards while aiming for the woman’s umbilicus.

- Advance the spinal needle towards the subarachnoid space. A distinct loss of resistance will be felt as the needle pierces the ligamentum flavum.
- Once the needle is through the ligamentum flavum, push the needle slowly through the dura. There will be another slight loss of resistance as the dura is pierced.
- Remove the stylet. Cerebrospinal fluid should flow out of the needle.
- If **cerebrospinal fluid does not come out**, reinsert the stylet and rotate the needle gently. Remove the stylet to see if the fluid is flowing out. If this fails two times, try another space.
- Inject 1–1.25 mL of the local anaesthetic solution. For pregnant women who have not given birth, a smaller dose of the drug is needed because the available subarachnoid space is reduced due to engorged epidural veins.
- Help the woman lie on her back. Have the operating table tilted to the left or place a pillow or folded linen under her right lower back to decrease supine hypotension syndrome.
- Recheck the woman's blood pressure. A fall in blood pressure is likely. If **there is significant hypotension**, give the woman more IV fluids (500 mL quickly):
 - If this **does not raise her blood pressure**, give ephedrine 0.2 mg/kg body weight IV in 3 mg increments.
 - If **blood pressure continues to fall after giving IV ephedrine** boluses four times, give ephedrine 30 mg IM.
- Give oxygen at 6–8 L per minute by mask or nasal cannulae.
- After injecting the local anaesthetic solution, wait two minutes and then pinch the incision site with forceps. If the **woman can feel the pinch**, wait two minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

- After surgery, keep the woman flat for at least six hours, with only a single pillow beneath her head to prevent post-spinal headache. She must not sit up or strain during this period.

TABLE P-5. Indications and precautions for ketamine anaesthesia

Indications	Precautions
<ul style="list-style-type: none"> • Any procedure that is relatively short (less than 60 minutes) and for which muscle relaxation is not required (e.g. repair of perineal tears or extensive cervical tears, manual removal of placenta, caesarean, drainage of breast abscess) • Suitable as a back-up if inhalation apparatus (or gas supply for a Boyle's anaesthesia machine) fails or if general anaesthesia is used without an inhalation apparatus 	<ul style="list-style-type: none"> • When used alone, ketamine can cause unpleasant hallucinations. Avoid use in women with a history of psychosis. To prevent hallucinations, give the woman diazepam 10 mg IV after the baby is born. • By itself, ketamine does not provide muscular relaxation, so the incision for caesarean might need to be longer. • Ketamine should not be used in women with elevated blood pressure, pre-eclampsia, eclampsia or heart disease.

- Review general care principles (**page C-25**) and start an IV infusion (**page C-34**).
- Ketamine may be given IM or IV or by infusion. The dose of ketamine is variable:
 - Most women will require 6–10 mg/kg body weight IM. Surgical anaesthesia is reached within 10 minutes and lasts up to 30 minutes.
 - Alternatively, give 2 mg/kg body weight IV slowly over two minutes (in which case the action lasts for only 15 minutes).
 - Infusion of ketamine is described below. This is suitable for caesarean.
 - When additional pain relief is needed, give ketamine 1 mg/kg body weight IV.

Ketamine anaesthesia should not be used in women with elevated blood pressure, pre-eclampsia, eclampsia or heart disease.

KETAMINE INFUSION

PREMEDICATION

- Give the woman atropine sulfate 0.6 mg IM 30 minutes prior to surgery.
- Give the woman diazepam 10 mg IV at the time of induction to prevent hallucinations (for caesarean, give diazepam after the baby is born).
- Give the woman oxygen at 6–8 L per minute by mask or nasal cannulae.

INDUCTION AND MAINTENANCE

- Check the woman's vital signs (pulse, blood pressure, respiration, temperature).
- Insert a mouth gag to prevent airway obstruction by the tongue.
- Induction of anaesthesia is achieved by administering ketamine 2 mg/kg body weight IV slowly over two minutes. For short procedures lasting less than 15 minutes, this will provide adequate anaesthesia.
- For longer procedures, infuse ketamine 200 mg in 1 L dextrose at 2 mg per minute (i.e. 20 drops per minute).
- Check the level of anaesthesia before proceeding with the surgery. Pinch the incision site with forceps. If the **woman can feel the pinch**, wait two minutes and then retest.
- Monitor vital signs (pulse, blood pressure, respiration, temperature) every 10 minutes during the procedure.

POST-PROCEDURE CARE

- Discontinue ketamine infusion and administer a postoperative analgesic suited to the type of surgery performed (**page C-64**).
- Maintain observations every 30 minutes until the woman is fully awake; ketamine anaesthesia can take up to 60 minutes to wear off.

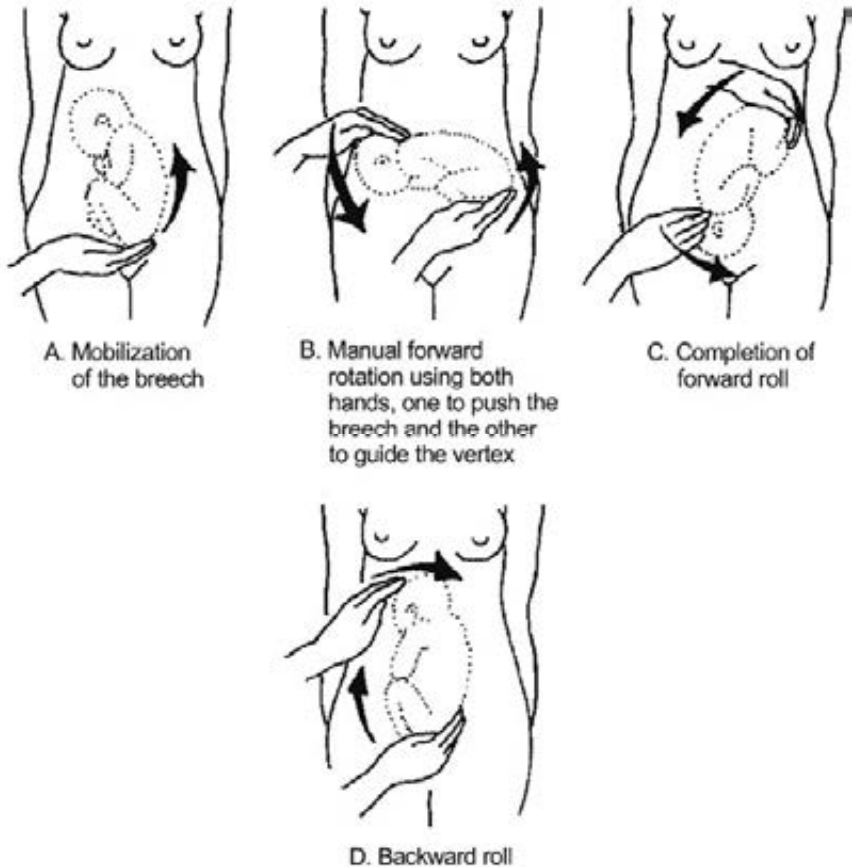
- Review for indications. Do not perform this procedure before 37 weeks or if facilities for emergency caesarean are not available.
- If an ultrasound machine is available, perform an examination to confirm breech position, determine amniotic fluid index, note placental location, and rule out congenital anomalies and the presence of a nuchal cord.
- Have the woman lie on her back, and elevate the foot of the bed.
- Listen to and note the fetal heart rate. If there are **fetal heart rate abnormalities** (less than 100 or more than 180 beats per minute):
 - do not proceed with external version;
 - manage as for fetal distress (**page S-109**).
- Coat the abdomen liberally with ultrasonic gel or oil to decrease friction and lessen the chances of an overly vigorous manipulation.
- Palpate the abdomen to confirm the presentation and position of the fetal head, back and hips.
- To mobilize the breech, gently lift the lowest part of the fetus from the pelvic inlet by grasping above the pubic bone (**Fig. P-5 A, page P-16**).
- Bring the head and buttocks of the fetus closer to each other to achieve forward rotation. Rotate the fetus slowly by guiding the head in a forward roll as the buttocks are lifted (**Fig. P-5 B–C, page P-16**).
- Listen to the fetal heart rate after every attempt at external version. If an **abnormal fetal heart rate is detected**:
 - manage as for fetal distress (**page S-109**); and
 - reassess every 15 minutes.

If the **fetal heart rate does not stabilize within the next 30 minutes**, perform a caesarean (**page P-53**).

- If the **procedure is successful**, have the woman remain lying down for 15 minutes. If there are no **fetal heart rate abnormalities**, discharge the woman. Counsel her to return to the facility for routine antenatal care or if:
 - bleeding or pain occurs; or
 - she believes the baby has returned to the previous presentation; or
 - she believes she is in labour.
- If the **procedure is unsuccessful**, try again using a backward roll (**Fig. P-5 D**).

- If the **procedure is still unsuccessful and the fetal heart rate is good**, tocolytics (**page S-146**) might increase the chances of successful version.
- If the **procedure is still unsuccessful**, attempt version again after one week or if the woman presents in early labour with breech or transverse lie.

FIGURE P-5. External version of a breech presentation



Induction and augmentation of labour are performed for different indications, but some of the methods used are the same regardless of the indication. They should be performed only when there is a clear medical or obstetrical indication and when the expected benefits outweigh the potential harms of uterine hyperstimulation, uterine rupture and fetal distress.

Wherever possible, induction and augmentation of labour should be carried out in facilities where caesarean can be performed.

- **Induction of labour:** artificially stimulating the uterus to start labour
- **Augmentation of labour:** stimulating the uterus during labour to increase the frequency, duration and intensity of contractions

Whenever induction or augmentation of labour is carried out:

- facilities should be available for assessing maternal and fetal well-being;
- personnel who are familiar with the effects of uterotonic drugs and are able to identify and manage both maternal and fetal complications should be present during administration;
- the facility should have the capacity to manage potential adverse effects and failure to achieve vaginal birth;
- supportive care should be provided continuously (**pages C-86–88**);
- women receiving oxytocin, misoprostol or other prostaglandins should never be left unattended;
- if oxytocin is used for induction of labour, the infusion rate of oxytocin should be monitored; and
- betamimetics should be available in case of uterine hyperstimulation.

MONITORING DURING INDUCTION OR AUGMENTATION OF LABOUR

Note: Before beginning induction/augmentation, ensure that staff and essential equipment are available to adequately monitor the woman, the fetus, contractions and the progress of labour.

- Monitor and record maternal and fetal status every 30 minutes.
- Monitor and record the number of contractions in a 10-minute period and their duration in seconds every 30 minutes.
- Assess the progress of labour by:
 - measuring changes in cervical effacement and dilatation (**Fig. C-4 A–E, page C-81**) during the latent phase;
 - measuring the rate of cervical dilatation and fetal descent (**Fig. C-13, page C-96, and Fig. C-3, page C-80**) during the active phase and recording the findings on the partograph;
 - assessing further fetal descent during the second stage of labour.

A vaginal examination should be carried **out once every four hours, after obtaining informed consent and permission from the woman, unless there is a clinical indication to perform an exam more frequently.**

INDUCTION OF LABOUR

INDICATIONS

- Review for indications:
 - women who are known with certainty to have reached 41 weeks (40 weeks plus seven days or more) of gestation;
 - women with prelabour rupture of membranes at term (gestational age of 36 weeks plus seven days or more);
 - women with severe pre-eclampsia at a gestational age when the fetus is not viable or unlikely to achieve viability within one or two weeks;
 - women with pre-eclampsia or gestational hypertension at term, or earlier as clinically indicated (**page S-50**);
 - women with vaginal bleeding at term, or earlier as clinically indicated (**page S-21**);

- women with chorioamnionitis at term, or earlier as clinically indicated (**page S-146**);
- women with fetal growth restriction at term, or earlier as clinically indicated (**page S-156**);
- women with a dead or anomalous fetus (**page S-156**).

Note: Induction of labour is not recommended for women with an uncomplicated pregnancy and gestational age of less than 41 weeks. If gestational diabetes is the only abnormality, but it is well controlled, do not induce labour before 41 weeks of gestation. If **suspected fetal macrosomia at term is the only indication**, do not induce labour.

Women and, if they desire, their support persons should be counselled about induction to assist them in making an informed choice. Prior to induction of labour, the wishes and preferences of each woman should be considered.

ASSESSMENT OF THE CERVIX

The success of induction of labour is related to the condition of the cervix at the start of induction. To assess the condition of the cervix, perform a cervical examination and assign a score based on the criteria in **Table P-6**.

TABLE P-6. Assessment of cervix for induction of labour

Factor	Rating			
	0	1	2	3
Dilatation (cm)	closed	1–2	3–4	more than 5
Length of cervix (cm)	more than 4	3–4	1–2	less than 1
Consistency	firm	average	soft	N/A
Position	posterior	mid	anterior	N/A

- If the cervix is **favourable** (has a score of 6 or more), labour is usually successfully induced with oxytocin alone.
- If the cervix is **unfavourable** (has a score of 5 or less), ripen the cervix using prostaglandins (**page P-21**) such as misoprostol, a Foley or balloon catheter (**page P-22**), or oxytocin (**page P-22**).

METHODS OF INDUCTION OF LABOUR

SWEEPING MEMBRANES

Note: Sweeping membranes could reduce the need for formal induction of labour. It is suitable for non-urgent indications for pregnancy termination.

- Explain the purpose of the procedure to the woman and what will happen, including that it can cause discomfort and bleeding.
- Obtain oral informed consent from the woman before proceeding.

Note: In areas where HIV and/or hepatitis are highly prevalent, it is prudent to leave the membranes intact for as long as possible to reduce perinatal transmission.

- Listen to and note the fetal heart rate.
- Ask the woman to lie on her back, displacing the uterus by performing a left lateral tilt (e.g. rolled blanket under right hip), with her legs bent, feet together and knees apart.
- Wearing sterile gloves, use one hand to assess the cervix and note the consistency, position and effacement, and dilatation (**Table P-6, page P-19**).
- Using the examining hand, rotate one finger against the wall of the uterus beyond the internal cervical os, taking care to avoid rupture of membranes.
- After membrane sweeping, listen to the fetal heart rate during and after a contraction. If the **fetal heart rate is abnormal** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-109**).
- If **fetal distress is not suspected and the woman is not in labour**, inform the woman, sensitively, that she is not in labour and can go home:
 - Advise her to watch for signs of labour (**page C-77**).
 - Advise her to return for assessment if:
 - she has spontaneous rupture of membranes;
 - she has bleeding;
 - no labour is established by 41 completed weeks' gestation;
 - she is experiencing problems; or
 - as clinically indicated.

PROSTAGLANDINS

Prostaglandins are highly effective in ripening the cervix during induction of labour.

- Check and record the woman’s pulse, blood pressure and contractions, and the fetal heart rate.
- Review for indications.
- Obtain oral informed consent from the woman before proceeding.

Monitor uterine contractions and the fetal heart rate of all women undergoing induction of labour with prostaglandins.

- There are many prostaglandin preparations available:
 - Prostaglandin E2 is available in several forms (3 mg pessary or 2–3 mg gel). The prostaglandin is placed high in the posterior fornix of the vagina and may be repeated after six hours if required.
 - Misoprostol is a synthetic analogue of prostaglandin E1. It is highly effective in cervical ripening during induction of labour.

Misoprostol should not be used for women with previous caesarean, who are at increased risk of uterine rupture.

TABLE P-7. Possible routes of misoprostol administration

Route of administration	Dose	If required, repeat after
Oral	25 mcg (dissolve one 200 mcg tablet in 200 mL of water and administer 25 mL of that solution as a single dose)	2 hours
Vaginal Place into the posterior fornix	25 mcg (only if misoprostol is available in the form of a 25 mcg tablet) Do not divide or cut a 200 mcg tablet into smaller pieces, as this is inaccurate.	6 hours

- Monitor the woman, the fetus, contractions, and progress of labour (**page P-18**).
- Discontinue prostaglandins and begin oxytocin infusion if:

- membranes rupture;
- cervical ripening has been achieved; or
- 12 hours have passed.
- **If any contraction lasts longer than 60 seconds, or if there are more than five contractions in 10 minutes, manage as hyperstimulation (page P-30).**

Note: If induction fails, provide the woman with support and information on management options: further attempt to induce labour (the timing should depend on the clinical situation and the woman's wishes) or caesarean birth.

FOLEY/BALLOON CATHETER

A balloon catheter alone or in combination with oxytocin is recommended as an alternative method of induction of labour if prostaglandins are not available or are contraindicated. Compared to prostaglandins, a balloon catheter is associated with a lower risk of uterine hyperstimulation and uterine rupture, and it may therefore be preferred for women with a previous caesarean birth. It should, however, be avoided in women with obvious cervicitis or vaginitis.

The Foley catheter is an effective alternative to balloon catheters sold commercially for cervical ripening and labour induction.

If there is a history of bleeding or ruptured membranes or obvious vaginal infection, do not use a balloon or Foley catheter.

- Check and record the woman's pulse, blood pressure and contractions, and the fetal heart rate.
- Review for indications.
- Obtain oral informed consent from the woman before proceeding.
- Gently insert a high-level disinfected or sterile speculum into the vagina.
- Hold the catheter just below the tip with a high-level disinfected or sterile forceps and gently introduce it through the cervix. Ensure that the inflatable bulb of the catheter is beyond the internal cervical os.
- Inflate the bulb with 30–50 mL of water, depending on the size of the balloon.

- Coil the rest of the catheter and place it into the vagina.
- Leave the catheter in place for at least 12 hours, or until contractions begin.
- Monitor the woman, the fetus, contractions and progress of labour (**page P-18**).
- Deflate the bulb before removing the catheter.

Note: Oxytocin infusion can be started with a balloon catheter in place or after it has been removed.

The combination of balloon catheter plus oxytocin is recommended as an alternative method of induction of labour when prostaglandins (including misoprostol) are not available or are contraindicated.

OXYTOCIN

If prostaglandins are not available, intravenous oxytocin alone should be used for induction of labour.

Use oxytocin with great caution, as fetal distress can occur from hyperstimulation and, rarely, uterine rupture can occur. Multiparous women are at higher risk for uterine rupture.

Carefully observe women receiving oxytocin. Women receiving oxytocin should never be left alone.

The effective dose of oxytocin varies greatly among women. Cautiously administer oxytocin in IV fluids (dextrose or normal saline), gradually increasing the rate of infusion until good labour is established (three contractions in 10 minutes, each lasting more than 40 seconds). The uterus should relax between contractions.

- Check and record the woman's pulse, blood pressure and contractions, and the fetal heart rate.
- Review for indications.

Be sure induction is indicated, as failed induction is usually followed by caesarean birth.

- Obtain oral informed consent from the woman before proceeding.
- Ensure that the woman is lying on her left side.
- Monitor and record the following every 30 minutes:
 - Rate of infusion of oxytocin (see below) (**note**: changes in arm position may alter the flow rate).
 - Duration and frequency of contractions: If there are **more than five contractions in 10 minutes, or if any contraction lasts longer than 60 seconds**, stop the infusion and manage as hyperstimulation (**page P-30**).
 - Maternal pulse: If the **maternal pulse is rapid** (110 or more) and weak, perform a rapid evaluation of the general condition of the woman including vital signs (pulse, blood pressure, respiration, temperature) (**page C-1**).
 - Fetal heart rate: Listen immediately after a contraction. If the **fetal heart rate is abnormal** (less than 100 or more than 180 beats per minute), stop the infusion and manage for **fetal distress** (**page S-109**).
- Infuse oxytocin as follows:
 - Infuse 2.5 units in 500 mL of dextrose (or normal saline) at 2.5 mIU per minute (i.e. 0.5 mL per minute or 10 drops per minute if the giving set has a drop factor of 20 drops/mL) (**Table P-8, page P-26 and Table P-9, page P-27**).
 - Increase the infusion rate by 2.5 mIU per minute (i.e. 0.5 mL per minute or 10 drops per minute if the giving set has a drop factor of 20 drops/mL) every 30 minutes until a good contraction pattern is established (three contractions in 10 minutes, each lasting more than 40 seconds).
- If **any contraction lasts longer than 60 seconds, or if there are more than five contractions in 10 minutes**, stop the infusion and manage as hyperstimulation (**page P-30**).
- Once a **good contraction pattern is established** (three contractions in 10 minutes, each lasting more than 40 seconds), maintain the rate; continue to monitor the woman's pulse, blood pressure and contractions, and the fetal heart rate:
 - If the **fetal heart rate** is abnormal (less than 100 or more than 180 beats per minute), stop the infusion and manage for fetal distress (**page S-109**).

- If there are **more than five contractions in 10 minutes, or if any contraction lasts longer than 60 seconds**, stop the infusion and manage as hyperstimulation (**page P-30**).
- If a **good contraction pattern has not been established with the infusion rate at 15 mIU** (i.e. 3 mL per minute or 60 drops per minute with a giving set that has a drop factor of 20 drops/mL):
 - Increase the oxytocin concentration to five units in 500 mL of dextrose (or normal saline) (i.e. 10 mIU per mL) and adjust the infusion rate to 15 mIU per minute (1.5 mL per minute or 30 drops per minute if the giving set has a drop factor of 20 drops/mL).
 - Increase the infusion rate by 5 mIU (i.e. 0.5 mL per minute or 10 drops per minute if the giving set has a drop factor of 20 drops/mL) every 30 minutes until a good contraction pattern is established or the maximum rate of 30 mIU per minute (i.e. 3 mL per minute or 60 drops per minute if the giving set has a drop factor of 20 drops/mL) is reached.

Do not use oxytocin 10 units in 500 mL (i.e. 20 mIU/mL) in multigravidae and women with a previous caesarean birth.

- If a good contraction pattern still has not been established using the higher concentration of oxytocin:
 - In **multigravidae** and in **women with previous caesarean scars**, induction has failed; perform a caesarean (**page P-53**).
 - In a **primigravida**:
 - Infuse oxytocin at a higher concentration (10 units in 500 mL) according to the protocol in **Table P-9, page P-27**.
 - If **good contractions are not established at the maximum dose**, perform a caesarean (**page P-53**).

TABLE P-8. Oxytocin infusion rates for induction of labour

Time since Induction (hours)	Oxytocin Concentration	Drip Rate: Drops per Minute	Approximate Dose (mIU/minute)	Volume Infused (mL)	Total Volume Infused (mL)
0.00	2.5 units in 500 mL dextrose or normal saline (5 mIU/mL)	10	3	0	0
0.50	Same	20	5	15	15
1.00	Same	30	8	30	45
1.50	Same	40	10	45	90
2.00	Same	50	13	60	150
2.50	Same	60	15	75	225
3.00	5 units in 500 mL dextrose or normal saline (10 mIU/mL)	30	15	90	315
3.50	Same	40	20	45	360
4.00	Same	50	25	60	420
4.50	Same	60	30	75	495
5.00	10 units in 500 mL dextrose or normal saline (20 mIU/mL)	30	30	90	585
5.50	Same	40	40	45	630
6.00	Same	50	50	60	690
6.50	Same	60	60	75	765
7.00	Same	60	60	90	855

Note: Drip rates are calculated using a drop factor of 20 drops per mL.

Increase the rate of oxytocin infusion only to the point where a good contraction pattern (three contractions in 10 minutes, each lasting more than 40 seconds) is established; then maintain the infusion at that rate but continue to monitor the woman and fetus and respond immediately if there are signs of hyperstimulation or fetal distress.

TABLE P-9. Rapid escalation for primigravida only: oxytocin infusion rates for induction of labour

Time since Induction (hours)	Oxytocin Concentration	Drip Rate: Drops per Minute	Approximate Dose (mIU/minute)	Volume Infused (mL)	Total Volume Infused (mL)
0.00	2.5 units in 500 mL dextrose or normal saline (5 mIU/mL)	15	4	0	0
0.50	Same	30	8	23	23
1.00	Same	45	11	45	68
1.50	Same	60	15	68	135
2.00	5 units in 500 mL dextrose or normal saline (10 mIU/mL)	30	15	90	225
2.50	Same	45	23	45	270
3.00	Same	60	30	68	338
3.50	10 units in 500 mL dextrose or normal saline (20 mIU/mL)	30	30	90	428
4.00	Same	45	45	45	473
4.50	Same	60	60	68	540
5.00	Same	60	60	90	630

Note: Drip rates are calculated using a drop factor of 20 drops per mL.

AUGMENTATION OF LABOUR

This procedure is used to shorten labour to prevent complications related to undue prolongation and to avert caesarean birth.

INDICATIONS

- Review for indications:
 - Findings are suggestive of unsatisfactory progress or delay of labour (**page C-97**).
 - False labour has been ruled out.
 - There are no signs of cephalopelvic disproportion or obstruction.
 - Inadequate contractions are the most likely cause of unsatisfactory progress of labour.

Note: Use of augmentation prior to confirmation of delay of labour is not recommended.

- The following practices are **not** recommended:
 - active management of labour for prevention of delay in labour;
 - the use of early amniotomy (artificial rupture of membranes) with early oxytocin augmentation for prevention of delay in labour;
 - the use of oxytocin for prevention of delay in labour in women receiving epidural analgesia;
 - the use of amniotomy alone for prevention of delay in labour;
 - the use of antispasmodic agents for prevention of delay in labour;
 - pain relief for preventing delay and reducing the use of augmentation in labour;
 - the use of intravenous fluids with the aim of shortening the duration of labour (could cause maternal fluid overload); and
 - administration of enema for reducing the use of labour augmentation.

The use of oral misoprostol for labour augmentation is not recommended.

AUGMENTATION OF LABOUR WITH OXYTOCIN

- Diagnose the stage and phase of labour (**page C-77**).
- Review for indications.
- Obtain oral informed consent from the woman before proceeding.
- Infuse oxytocin as described for induction of labour (**page P-23**).
Note: Do not use rapid escalation for augmentation of labour.
- Consider performing an amniotomy (**page P-29**) together with administering oxytocin for treatment of confirmed delay in labour. Do **not** perform amniotomy as a sole intervention for augmentation of labour, especially in settings with high HIV prevalence.

ARTIFICIAL RUPTURE OF MEMBRANES/AMNIOTOMY

- Rupture of membranes, whether spontaneous or artificial, often sets off the following chain of events:
 - Amniotic fluid is expelled.
 - Uterine volume is decreased.
 - Prostaglandins are produced, stimulating labour.
 - Uterine contractions begin (if the woman is not in labour) or become stronger (if she is already in labour).

Amniotomy alone is not recommended either for induction of labour or for the treatment of delay in labour.

- Review for indications:
 - If **membranes are intact**, amniotomy can be considered for augmentation in combination with oxytocin infusion.

Note: In areas where HIV and/or hepatitis are highly prevalent, it is prudent to leave the membranes intact for as long as possible to reduce perinatal transmission.

- Obtain oral informed consent from the woman before proceeding.
- Listen to and note the fetal heart rate.
- Ask the woman to lie on her back, displacing the uterus by performing a left lateral tilt (e.g. rolled blanket under right hip), with her legs bent, feet together and knees apart.

- Wearing sterile gloves, use one hand to assess the cervix and note the consistency, position and effacement, and dilatation (**Table P-6, page P-19**).
- Use the other hand to insert an amniotic hook or a Kocher clamp into the vagina.
- Guide the hook or clamp towards the membranes along the fingers in the vagina.
- Place two fingers against the membranes and gently rupture the membranes with the instrument in the other hand. Allow the amniotic fluid to drain slowly around the fingers.
- **Note:** Rupture membranes between contractions to prevent splashing of amniotic fluid.
- Note the colour of the fluid (clear, meconium-stained, blood-stained, greenish, purulent, foul smelling). If **thick meconium is present**, suspect fetal distress (**page S-109**).
- After amniotomy, listen to the fetal heart rate during and after a contraction. If the **fetal heart rate is abnormal** (less than 100 or more than 180 beats per minute), suspect fetal distress (**page S-109**).

UTERINE HYPERSTIMULATION DURING INDUCTION AND AUGMENTATION OF LABOUR

If **hyperstimulation occurs** (any contraction lasts longer than 60 seconds) or if there are **more than five contractions in 10 minutes**:

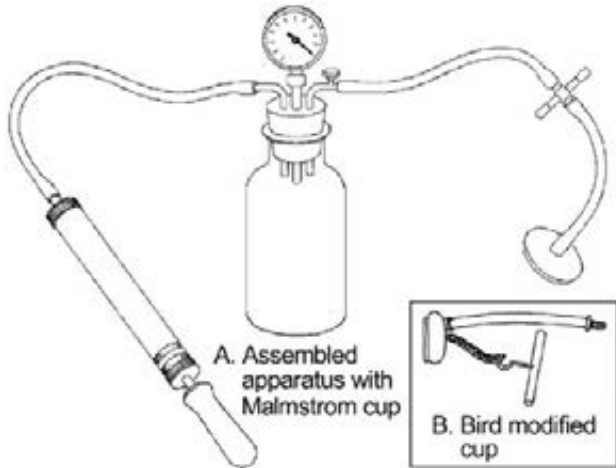
- Stop the infusion.
- Remain with the woman until normal uterine activity is achieved.
- Position the woman on her left side (left lateral position).
- Assess the fetal heart rate:
 - If the **fetal heart rate is normal** (between 100 and 180 beats per minute), observe for improvement in uterine activity and monitor the fetal heart rate.
 - If the **fetal heart rate is abnormal** (less than 100 or more than 180 beats per minute), manage for fetal distress (**page S-109**) and relax the uterus using betamimetics: terbutaline 250 mcg IV slowly over five minutes OR salbutamol 10 mg in 1 L IV fluids (normal saline or Ringer's lactate) at 10 drops per minute.

Note: Betamimetics should not be used in women with cardiac disease. If the woman has cardiac disease or betamimetics are not available, non-betamimetics (e.g. nifedipine 20 mg orally) may be used.

- Observe for improvement in uterine activity, and monitor the fetal heart rate:
 - If **normal activity is not established within 20 minutes and betamimetics have not been administered**, relax the uterus using betamimetics (see above).
 - If the **fetal heart rate becomes reassuring or normal and normal uterine activity is established** for a period of at least 30 minutes, cautiously recommence oxytocin infusion.

Figure P-6 shows the essential components of the obstetric vacuum.

FIGURE P-6. Obstetric vacuum

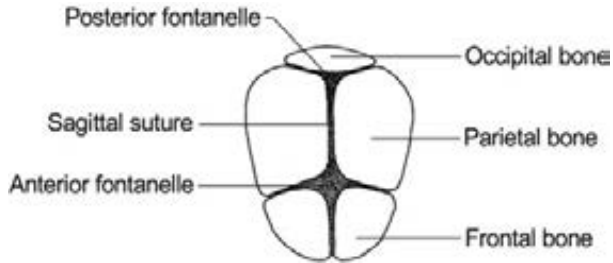


- Review and apply basic principles for procedures when conducting an obstetric vacuum–assisted birth (**page C-25**).
- Review for conditions:
 - vertex presentation;
 - term fetus;
 - cervix fully dilated;
 - fetal head at least at 0 station or no more than 2/5 palpable above symphysis pubis.
- Check all connections and test the vacuum on a gloved hand.

Routine antibiotic prophylaxis is **not** recommended for women undergoing an obstetric vacuum–assisted birth.

- Provide emotional support and encouragement. If necessary, use a pudendal block (**page P-3**).
- Wearing sterile gloves, assess the position of the fetal head by feeling the sagittal suture line and the fontanelles.
- Identify the posterior fontanelle (**Fig. P-7, page P-34**).

FIGURE P-7. Landmarks of the fetal skull



- Locate the flexion point, 3 cm anterior to the posterior fontanelle (Figs. P-8 and P-9).

FIGURE P-8. Locating the flexion point (F)

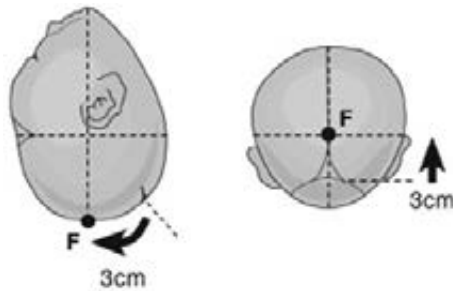
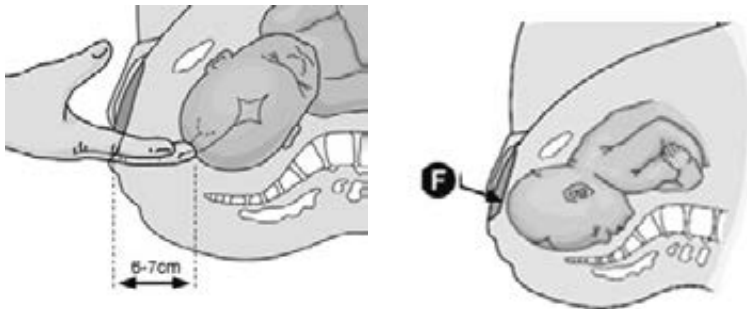


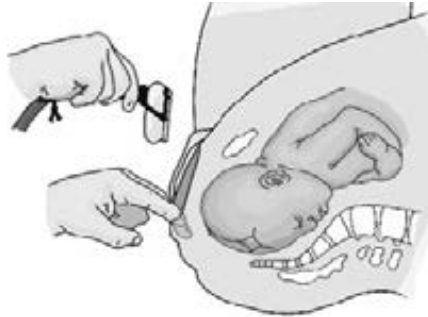
FIGURE P-9. Locating the flexion point (F), 3 cm anterior to the posterior fontanelle, and calculating cup insertion distance



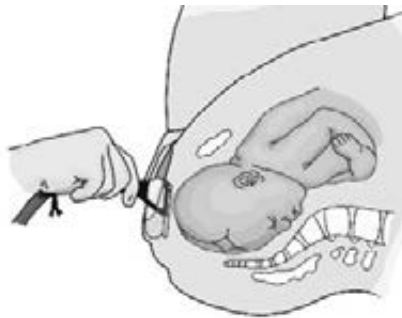
- Apply the largest cup that will fit, with the centre of the cup over the flexion point. The edge of the cup should be placed about 1 cm anterior to the posterior fontanelle. This placement will promote flexion, descent and autorotation with traction (**Fig. P-10**).

FIGURE P-10. Applying the cup

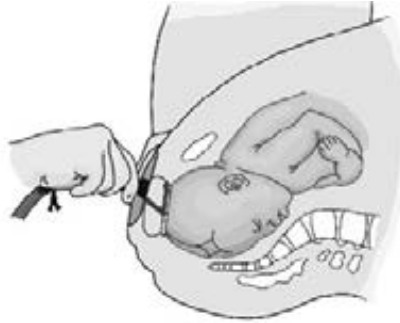
A. Holding the cup, retracting the perineum



B. Inserting the cup through the introitus



C. Manoeuvring the cup towards and over the flexion point



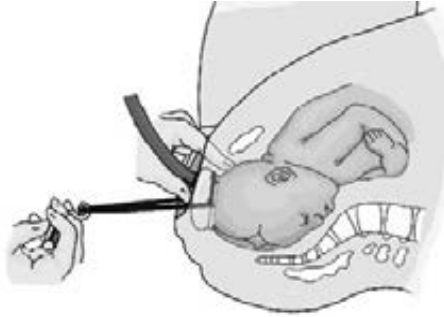
- Consider episiotomy if the perineum interferes with the axis of traction.
- Check the application. Ensure that there is no maternal soft tissue (cervix or vagina) within the rim of the cup.
- With the pump, create a vacuum of 0.2 kg/cm² negative pressure and check the application.
- Increase the vacuum to 0.8 kg/cm² and check the application.
- After maximum negative pressure, start traction in the line of the pelvic axis and perpendicular to the cup. If the **fetal head is tilted to one side or not flexed well**, traction should be directed in a line that will try to correct the tilt or deflexion of the head (i.e. to one side or the other, not necessarily in the midline).
- Apply traction at the onset of each contraction and maintain it throughout the contraction. Apply traction in a line perpendicular to the plane of the cup rim (**Fig. P-11, page P-37**). Place a finger on the scalp next to the cup during traction to assess potential slippage and descent of the vertex.

In between contractions, do not apply traction.

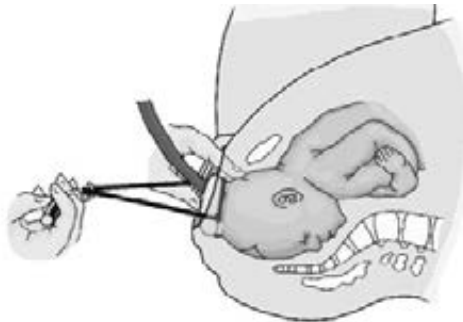
- Encourage the woman to assist descent with expulsive efforts.
- Deliver the head slowly and protect the perineum.

FIGURE P-11. Applying traction and delivering the head

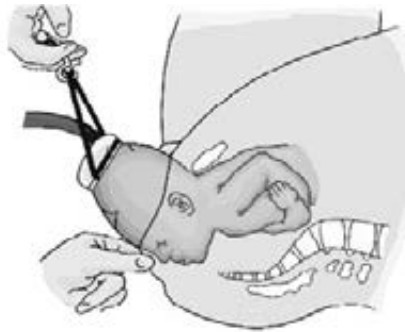
A. Applying traction



B. Axis for traction changes according to the pelvic curve



C. Delivering the head (hand protects perineum while completing delivery of the head)



- Between contractions check:
 - fetal heart rate
 - application of the cup.
- **Removal of cup.** As soon as the head is crowned or after delivery of the head, release the vacuum, remove the cup, and complete delivery of the baby.

TIPS

- Never use the cup to actively rotate the baby's head. Rotation of the baby's head will occur with traction.
- The first pulls help to find the proper direction for pulling.
- Do not continue to pull between contractions and expulsive efforts.
- With progress, and in the absence of fetal distress, continue the "guiding" pulls for a maximum of 30 minutes.

POST-PROCEDURE CARE

- Perform active management of the third stage of labour.
- Ensure that the uterus is well contracted and that blood loss is not excessive.
- Check for genital tract trauma and repair any lacerations or tears that may have occurred.
- Repair episiotomy.

- Monitor the woman's uterine tone, vaginal bleeding, pulse, temperature and blood pressure every 15 minutes for the first two hours, every 30 minutes for the third hour after birth, and then hourly for three hours.
- Ensure that the baby is dry and warm, that the cord is securely tied, and that the baby is put to the mother's breast as soon as possible.
- Examine the baby's scalp and note any injuries. Explain to the parents the reason for the large swelling "chignon" and assure them that it will disappear within a few hours and will not damage the baby's head.
- Allow the woman and the baby to rest comfortably where their recovery can be monitored.

POST-PROCEDURE TASKS

- Remove gloves and discard them in a leakproof container.
- Wash hands and forearms thoroughly with soap and water and dry them with a clean, dry cloth (or air-dry hands).
- Decontaminate and clean equipment according to recommended practices.
- Assemble the equipment and check the vacuum.
- High-level disinfect or sterilize the equipment.
- Document the following information:
 - indication for vacuum birth;
 - date and time of the procedure;
 - name of the clinician performing the procedure and the names of personnel who assisted;
 - length of the procedure and the number of pulls;
 - position of the fetal head prior to application of the cup (occipito-anterior, occipito-lateral, occipito-posterior);
 - birth position (occipito-anterior or occipito-posterior);
 - condition of the baby at birth, colour, whether breathing and any resuscitation needed as well as position of "chignon" and any bruising;
 - details of the third stage of labour;

- details of any medications used;
- maternal condition following the procedure;
- any complications affecting the mother or baby.

FAILURE

- Vacuum-assisted birth has failed if:
 - the fetal head does not advance with each pull;
 - there is no descent of the baby's head after three pulls with no descent;
 - the cup slips off the head twice at the proper direction of pull with maximum negative pressure.
- Every application should be considered as a test of the obstetric vacuum. Do not persist if there is no descent after three pulls.

COMPLICATIONS

Complications usually result from not observing the conditions of application or from continuing efforts beyond the time limits stated above.

FETAL COMPLICATIONS

- Localized scalp oedema (caput succedaneum or chignon) under the vacuum cup is harmless and disappears in a few hours.
- Cephalohaematoma requires observation and usually will clear in three to four weeks.
- Scalp abrasions (common and harmless) and lacerations may occur. Clean and examine lacerations to determine if sutures are necessary. Necrosis is extremely rare.
- Intracranial bleeding is extremely rare and requires immediate intensive neonatal care.

MATERNAL COMPLICATIONS

- Tears of the genital tract may occur. Examine the woman carefully and repair any tears to the cervix (**page P-95**) or vagina (**page P-97**) or repair episiotomy (**page P-87**).

- Review and apply general care principles (**page C-25**).
- Review for conditions:
 - vertex presentation or face presentation with chin-anterior or entrapped after-coming head in breech vaginal birth (**page P-49**);
 - cervix fully dilated;
 - fetal head at +2 or +3 station or 0/5 palpable above the symphysis pubis.

At a minimum, the sagittal suture should be in the midline and straight, guaranteeing an occiput anterior or occiput posterior position.

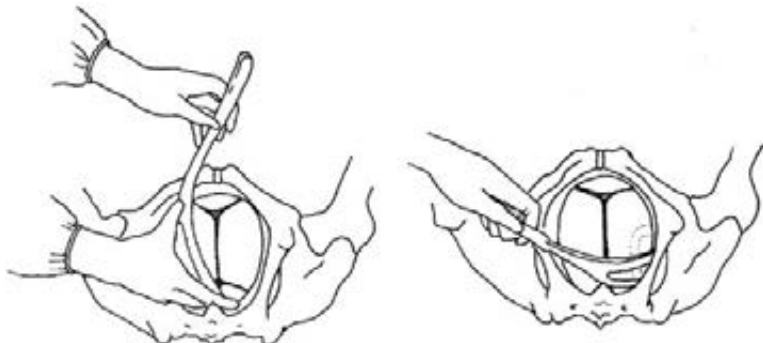
- Provide emotional support and encouragement (**page C-9**). If necessary, use a pudendal block (**page P-3**).
- Assemble the forceps before application. Ensure that the parts fit together and lock well.

Routine antibiotic prophylaxis is **not** recommended for women undergoing forceps-assisted birth.

- Lubricate the blades of the forceps.
- Wearing sterile gloves, insert two fingers of the right hand into the vagina on the side of the fetal head. Slide the left blade gently between the head and fingers to rest on the side of the head (**Fig. P-12**).

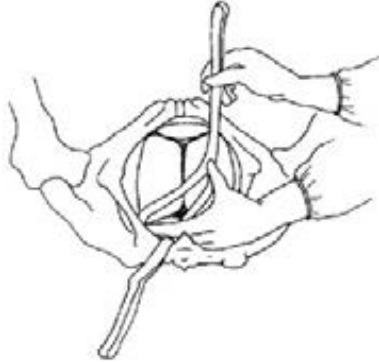
A biparietal, bimalar application is the only safe application.

FIGURE P-12. Applying the left blade of the forceps



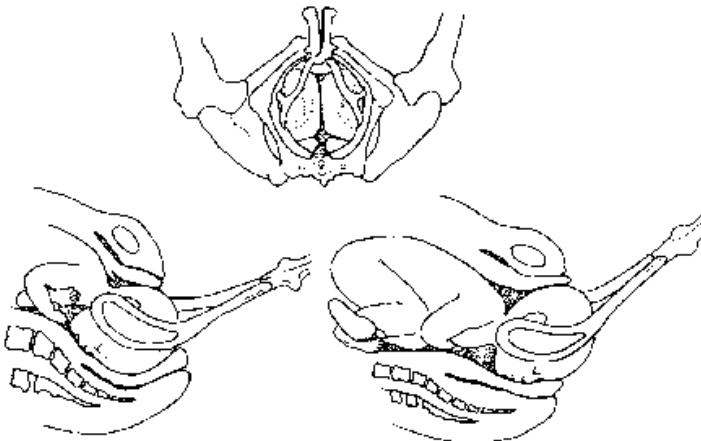
- Repeat the same manoeuvre on the other side, using the left hand and the right blade of the forceps (**Fig. P-13**).

FIGURE P-13. Applying the right blade of the forceps



- Depress the handles and lock the forceps.
- Difficulty in locking usually indicates that the application is incorrect. In this case, remove the blades and recheck the position of the head. Reapply only if rotation is confirmed.
- After locking, apply steady traction inferiorly and posteriorly with each contraction (**Fig. P-14**).

FIGURE P-14. Locking and applying traction



- Between contractions check:
 - fetal heart rate
 - application of forceps.
- When the head crowns, make an episiotomy, if necessary (**page P-85**).
- Lift the head slowly out of the vagina between contractions.

The head should descend with each pull. Only two or three pulls should be necessary.

FAILURE

- Forceps have failed if:
 - the fetal head does not advance with each pull;
 - there is no descent of the baby's head after three pulls.
- Every application should be considered a test of use of the forceps. Do not persist if the head does not descend after three pulls.
- If **forceps fails**, perform a caesarean (**page P-53**).

COMPLICATIONS

FETAL COMPLICATIONS

- Injury to facial nerves requires observation. This injury usually resolves spontaneously.
- Lacerations of the face and scalp may occur. Clean and examine lacerations to determine if sutures are necessary.
- Fractures of the face and skull require observation.

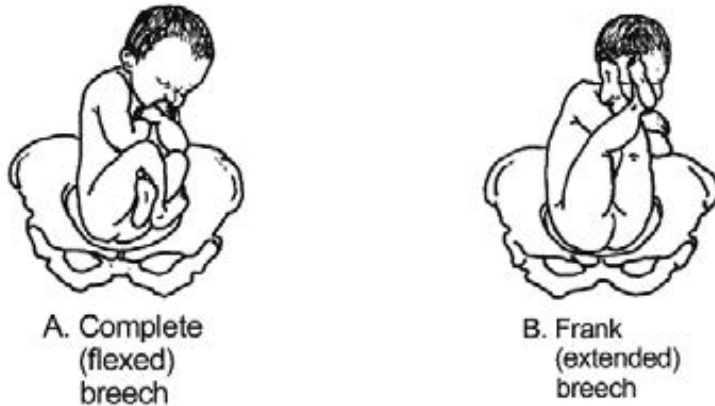
MATERNAL COMPLICATIONS

- Tears of the genital tract may occur. Examine the woman carefully and repair any tears to the cervix (**page P-95**) or vagina (**page P-97**) or repair episiotomy (**page P-87**).
- Uterine rupture may occur and requires immediate treatment (**page P-113**).

- Review for indications. Ensure that all conditions for safe vaginal breech birth are met.
- Review general care principles (**page C-25**) and start an IV infusion (**page C-34**).
- Provide emotional support and encouragement. If necessary, use a pudendal block (**page P-3**).
- Perform all manoeuvres gently and without undue force.

COMPLETE OR FRANK BREECH

FIGURE P-15. Breech presentation



BIRTH OF THE BUTTOCKS AND LEGS

- Once the buttocks have entered the vagina and the cervix is fully dilated, tell the woman she can bear down with the contractions.
- In the presence of physical obstruction due to lesions or scar tissue in the perineum, a decision to perform an episiotomy may be made (**page P-85**).
- Let the buttocks deliver until the lower back and then the shoulder blades are seen.
- Gently hold the buttocks in one hand, but do not pull.
- If the **legs do not deliver spontaneously**, deliver one leg at a time:
 - Push behind the knee to bend the leg.

- Grasp the ankle and deliver the foot and leg.
- Repeat for the other leg.

Do not pull the baby while the legs are being delivered.

- Hold the baby by the hips, as shown in **Fig. P-16**. Do not hold the baby by the flanks or abdomen as this may cause kidney or liver damage.

FIGURE P-16. Hold the baby at the hips, but do not pull



BIRTH OF THE ARMS

ARMS ARE FELT ON CHEST

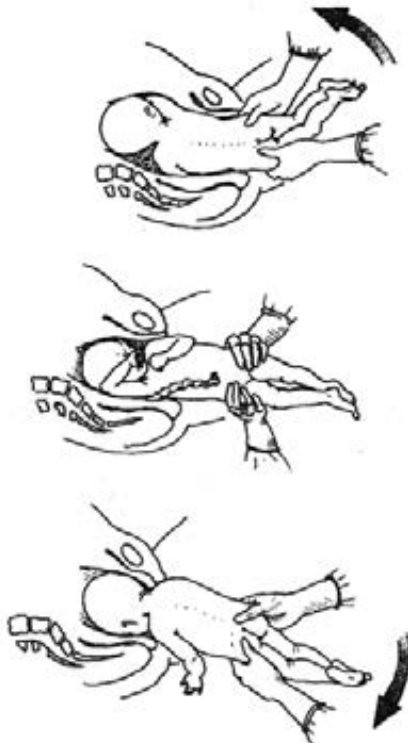
- Allow the arms to disengage spontaneously one by one. Only assist if necessary.
- After spontaneous delivery of the first arm, lift the buttocks towards the mother's abdomen to enable the second arm to deliver spontaneously.
- If the **arm does not spontaneously deliver**, place one or two fingers in the elbow and bend the arm, bringing the hand down over the baby's face.

ARMS ARE STRETCHED ABOVE THE HEAD OR FOLDED AROUND THE NECK

Use the Lovset's manoeuvre (**Fig. P-17**):

- Hold the baby by the hips and turn half a circle, keeping the back uppermost and applying downward traction at the same time, so that the arm that was posterior becomes anterior and can be delivered under the pubic arch.
- Assist delivery of the arm by placing one or two fingers on the upper part of the arm. Draw the arm down over the chest as the elbow is flexed, with the hand sweeping over the face.
- To deliver the second arm, turn the baby back half a circle, keeping the back uppermost and applying downward traction, and deliver the second arm in the same way under the pubic arch.

FIGURE P-17. Lovset's manoeuvre



BABY'S BODY CANNOT BE TURNED

If **the baby's body cannot be turned** to deliver the arm that is anterior first, deliver the shoulder that is posterior (**Fig. P-18**):

- Hold and lift the baby up by the ankles.
- Move the baby's chest towards the woman's inner leg. The shoulder that is posterior should deliver.
- Deliver the arm and hand.
- Lay the baby back down by the ankles. The shoulder that is anterior should now deliver.
- Deliver the arm and hand.

FIGURE P-18. Delivery of the shoulder that is posterior

**BIRTH OF THE HEAD**

Deliver the head by the Mauriceau-Smellie-Veit manoeuvre (**Fig. P-19, page P-49**) as follows:

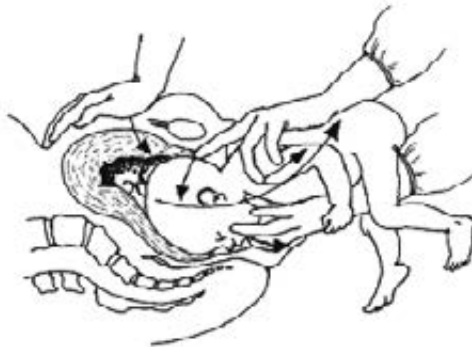
- Lay the baby face down with the length of its body over your hand and arm.
- Place the first and third fingers of this hand on the baby's cheekbones and place the second finger in the baby's mouth to pull the jaw down and flex the head.

- Use the other hand to grasp the baby's shoulders.
- With fingers of the first hand, gently flex the baby's head towards the chest while continuing to pull on the jaw to bring the baby's head down until the hairline is visible.
- Pull gently to deliver the head.

Note: Ask an assistant to push above the woman's pubic bone as the head delivers. This helps to keep the baby's head flexed.

- Raise the baby, still astride the arm, until the mouth and nose are free.

FIGURE P-19. The Mauriceau-Smellie-Veit manoeuvre



ENTRAPPED (STUCK) HEAD

- Catheterize the bladder.
- Have an assistant available to hold the baby while applying Piper or long forceps.
- Be sure the cervix is fully dilated.
- Wrap the baby's body in a cloth or towel and hold the baby up.
- Place the left blade of the forceps.
- Place the right blade and lock handles.
- Use the forceps to flex and deliver the baby's head.
- If **unable to use forceps**, apply firm pressure above the mother's pubic bone to flex the baby's head and push it through the pelvis.

FOOTLING BREECH

- A footling breech baby (**Fig. P-20**) will usually require caesarean birth (**page P-53**).

FIGURE P-20. Single footling breech presentation, with one leg extended at hip and knee



- Limit vaginal birth of a footling breech baby to:
 - advanced labour with a fully dilated cervix;
 - a preterm baby not likely to survive after birth;
 - delivery of additional baby(s) in multiple gestation.
- To deliver the baby vaginally:
 - Grasp the baby's ankles with one hand.
 - If **only one foot presents**, insert a hand into the vagina and gently pull the other foot down.
 - Gently pull the baby downwards by the ankles.
 - Deliver the baby until the back and shoulder blades are seen.
 - Proceed with delivery of the arms (**page P-46**).

COMPLETING THE BIRTH OF THE BABY

- Give a single dose of prophylactic antibiotics after birth of the baby (**page C-50**):
 - ampicillin 2 g IV;

- OR cefazolin 1 g IV.

POST-PROCEDURE CARE

- Suction the baby's mouth and nose.
- Clamp and cut the cord.
- Give a uterotonic drug (oxytocin 10 units IM is the uterotonic drug of choice) within one minute of birth, and continue active management of the third stage (**page C-102**).
- Examine the woman carefully and repair any tears to the cervix (**page P-95**) or vagina (**page P-97**) or repair episiotomy (**page P-87**).

- Review for indications. Ensure that vaginal birth is not possible.
- Check for fetal life by listening to the fetal heart rate, and examine for fetal presentation.
 - If the **fetus is dead**:
 - Perform a craniotomy (**page P-65**).
 - If the **provider is not proficient in craniotomy**, perform a caesarean (**page P-53**).
- Review general care principles (**page C-25**) and operative care principles (**page C-65**), and start an IV infusion (**page C-34**).
- If an intra-caesarean insertion of an IUD or a post-caesarean tubal ligation is planned, ensure that the woman is still eligible and has provided informed consent.
- Use spinal anaesthesia (**page P-11**), local infiltration with lidocaine (**page P-7**), ketamine (**page P-13**) or general anaesthesia:
 - Local anaesthesia is a safe alternative to general, ketamine or spinal anaesthesia when these anaesthetics (or persons trained in their use) are not available.
 - When using a local anaesthesia for caesarean, the provider must counsel the woman and reassure her throughout the procedure. The provider must keep in mind that the woman is awake and alert, and must use instruments and handle tissue as gently as possible.

Note: In the case of heart failure, use local infiltration anaesthesia with conscious sedation. Avoid spinal anaesthesia.

- Give a single dose of prophylactic antibiotics (**page C-49**) 15–60 minutes prior to skin incision:
 - ampicillin 2 g IV;
 - OR cefazolin 1 g IV.
- Determine if a **high vertical incision** (**page P-62**) is indicated. Indications include the following:
 - an inaccessible lower segment due to dense adhesions from previous caesarean;
 - transverse lie (with baby's back down) for which a lower uterine segment incision cannot be safely performed;
 - fetal malformations (e.g. conjoined twins);

- large fibroids over the lower segment;
- a highly vascular lower segment due to placenta praevia;
- carcinoma of the cervix.
- If the **baby's head is deep down in the pelvis**, as in obstructed labour, prepare the vagina for a caesarean birth (**page C-53**).
- Have the operating table tilted to the left, or place a pillow or folded linen under the woman's right lower back, to decrease supine hypotension syndrome.
- Cleanse the vagina with povidone-iodine immediately before the caesarean to prevent post-caesarean endometritis.
- Prepare the skin with an antiseptic agent (e.g. chlorhexidine, povidone-iodine) prior to incision to prevent surgical site infections.

Note: The choice of an antiseptic agent and its method of application for skin preparation before caesarean should be based primarily on the clinician's experience with that particular antiseptic agent and method of application and the antiseptic agent's cost and local availability.

OPENING THE ABDOMEN

- Make a midline vertical incision below the umbilicus to the pubic hair, through the skin and to the level of the fascia (**Fig. P-21**).

Note: If the **caesarean is performed under local anaesthesia**, make a midline incision that is about 4 cm longer than the incision made when general anaesthesia is used. A **Pfannenstiel's incision should not be used**, as it takes longer, retraction is poorer and it requires more local anaesthetic.

FIGURE P-21. Site of abdominal incision



- Make a 2–3 cm vertical incision in the fascia.
- Hold the fascial edge with forceps and lengthen the incision up and down using scissors.
- Use fingers or scissors to separate the rectus muscles (abdominal wall muscles).
- Use fingers to make an opening in the peritoneum near the umbilicus. Use scissors to lengthen the incision up and down in order to see the entire uterus. Carefully, to prevent bladder injury, use scissors to separate layers and open the lower part of the peritoneum.
- Place a bladder retractor over the pubic bone.
- Use forceps to pick up the loose peritoneum covering the anterior surface of the lower uterine segment, and incise with scissors.
- Extend the incision by placing the scissors between the uterus and the loose serosa and cutting about 3 cm on each side in a transverse fashion.
- Use two fingers to push the bladder downwards off of the lower uterine segment. Replace the bladder retractor over the pubic bone and bladder.

OPENING THE UTERUS

- Use a scalpel to make a 3 cm transverse incision in the lower segment of the uterus. It should be about 1 cm below the level where the vesico-uterine serosa was incised to bring the bladder down.
- Widen the incision by placing a finger at each edge and gently pulling upwards and laterally at the same time (**Fig. P-22, page P-56**).
- If the **lower uterine segment is thick and narrow**, extend the incision in a crescent shape, using scissors instead of fingers to avoid extension of the uterine vessels.

It is important to make the uterine incision big enough to deliver the head and body of the baby without tearing the incision.

FIGURE P-22. Enlarging the uterine incision**BIRTH OF THE BABY AND DELIVERY OF THE PLACENTA**

- To deliver the baby, place one hand inside the uterine cavity between the uterus and the baby's head.
- With the fingers, grasp and flex the head.
- Gently lift the baby's head through the incision (**Fig. P-23, page P-57**), taking care not to extend the incision down towards the cervix.
- With the other hand, gently press on the abdomen over the top of the uterus to help deliver the head.
- If the **baby's head is deep down in the pelvis or vagina**, ask an assistant (wearing sterile gloves) to reach into the vagina and push the baby's head up through the vagina. Then lift and deliver the head (**Fig. P-24, page P-57**).

FIGURE P-23. Delivering the baby's head



FIGURE P-24. Delivering the deeply engaged head



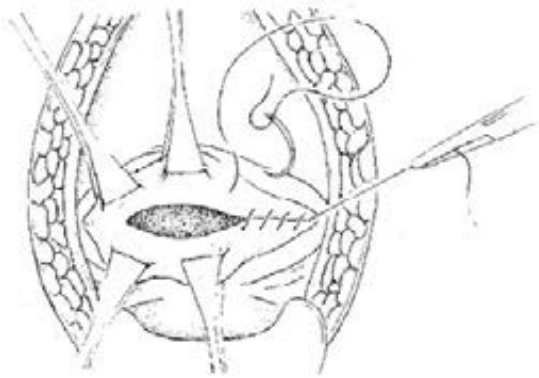
- Suction the baby's mouth and nose when the head is delivered.
- Deliver the shoulders and body.
- Give oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at 60 drops per minute for two hours.

- Clamp and cut the umbilical cord.
- Hand the baby to the assistant for initial care (**page C-107**).
- Keep gentle traction on the cord and massage (rub) the uterus through the abdomen.
- Deliver the placenta and membranes. Use ring forceps to ensure that all membranes are removed.
- If the **woman is medically eligible, has been appropriately counselled and has chosen postpartum insertion of an IUD**, proceed to intracaesarean insertion of the IUD.

CLOSING THE UTERINE INCISION

Note: If a **Couvellaire uterus** (swollen and discoloured by blood) is seen during caesarean, close it in the normal manner. Observe for bleeding and assess uterine tone. Be prepared to manage coagulopathy (**page S-24**) or atonic uterus (**page S-32**).

- Grasp the corners of the uterine incision with clamps.
- Grasp the edges of the incision with clamps. Make sure the uterus is separate from the bladder.
- Look carefully for any extensions of the uterine incision.
- Repair the incision and any extensions with a continuous locking stitch of 0 chromic catgut (or polyglycolic) suture (**Fig. P-25, page P-59**).
- If there is any **further bleeding from the incision site**, close with figure-of-eight sutures. There is no need for a routine second layer of sutures in the uterine incision.

FIGURE P-25. Closing the uterine incision

CLOSING THE ABDOMEN

- Look carefully at the uterine incision before closing the abdomen. Make sure there is no bleeding and the uterus is firm. Use a sponge to remove any clots inside the abdomen.
- Examine carefully for injuries to the bladder and repair any found (**page P-115**).
- Close the fascia with continuous 0 chromic catgut (or polyglycolic) suture.

Note: There is no need to close the bladder peritoneum or the abdominal peritoneum.

- If there are **signs of infection**, pack the subcutaneous tissue with gauze and place loose 0 catgut (or polyglycolic) sutures. Close the skin with a delayed closure after the infection has cleared.
- If there are **no signs of infection**, close the skin with vertical mattress sutures of 3-0 nylon (or silk) and apply a sterile dressing.
- Gently push on the abdomen over the uterus to remove clots from the uterus and vagina.

PROBLEMS DURING SURGERY

BLEEDING IS NOT CONTROLLED

- Massage the uterus.
- If the **uterus is atonic**, continue to infuse oxytocin and give ergometrine 0.2 mg IM and prostaglandins, if available. These drugs can be given together or sequentially (**Table S-11, page S-32**).
- Transfuse as necessary (**page C-37**).
- Have an assistant press fingers over the aorta to reduce the bleeding until the source of bleeding can be found and stopped.
- If **bleeding is not controlled**, perform uterine and utero-ovarian artery ligation (**page P-117**) or hysterectomy (**page P-121**).

BABY IS BREECH

- If the **baby is breech**, grasp a foot and deliver it through the incision.
- Complete the delivery as in a vaginal breech birth (**page P-45**):
 - Deliver the legs and the body up to the shoulders; then deliver the arms.
 - Flex (bend) the head using the Mauriceau-Smellie-Veit manoeuvre (**page P-49**).

BABY IS TRANSVERSE

THE BABY'S BACK IS UP

- If the **baby's back is up** (near the top of the uterus), reach into the uterus and find the baby's ankles.
- Grasp the ankles and pull gently through the incision to deliver the legs and complete the delivery as for a breech birth (**page P-45**).

THE BABY'S BACK IS DOWN

- If the **baby's back is down**, a high vertical uterine incision is the preferred incision (**page P-62**).

- After the incision is made, reach into the uterus and find the feet. Pull them through the incision and complete the delivery as for a breech birth (**page P-45**).
- To repair the vertical incision, you will need several layers of suture (**page P-62**).

PLACENTA PRAEVIA

- If a **low anterior placenta** is encountered, incise through it and deliver the baby.
- After birth of the baby, if the **placenta cannot be detached manually**, the diagnosis is placenta accreta, a common finding at the site of a previous caesarean scar. Perform a hysterectomy (**page P-121**).
- Women with placenta praevia are at high risk of postpartum haemorrhage. If there is **bleeding from the placental site**, under-run the bleeding sites with chromic catgut (or polyglycolic) sutures.
- Watch for bleeding in the immediate postpartum period and take appropriate action (**page S-29**).

POST-PROCEDURE CARE

- Review postoperative care principles (**page C-71**).
- If **bleeding occurs**:
 - Massage the uterus to expel blood and blood clots. The presence of blood clots will inhibit effective uterine contractions.
 - Give oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at 60 drops per minute, ergometrine 0.2 mg IM and prostaglandins (**Table S-11, page S-32**). These drugs can be given together or sequentially.
- If there are **signs of infection** or if the **woman currently has a fever**, give a combination of antibiotics for 24–48 hours after complete resolution of clinical signs and symptoms (fever, uterine tenderness, purulent lochia, leucocytosis) (**page C-49**):
 - clindamycin phosphate 600 mg IV every eight hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
- Give appropriate analgesic drugs (**page C-64**).

HIGH VERTICAL (“CLASSICAL”) INCISION

- Open the abdomen through a midline incision skirting the umbilicus. Approximately one-third of the incision should be above the umbilicus and two-thirds below.
- Use a scalpel to make the incision:
 - Check the position of the round ligaments and ensure that the incision is in the midline (the uterus may have twisted to one side).
 - Make the uterine incision in the midline over the fundus of the uterus.
 - The incision should be approximately 12–15 cm in length, and the lower limit should not extend to the utero-vesical fold of the peritoneum.
- Ask an assistant (wearing sterile gloves) to apply pressure on the cut edges to control the bleeding.
- Cut down to the level of the membranes and then extend the incision using scissors.
- After rupturing the membranes, grasp the baby’s foot and deliver the baby.
- Deliver the placenta and membranes.
- Grasp the edges of the incision with Allis or Green Armytage forceps.
- Close the incision using at least three layers of sutures:
 - Close the first layer closest to the cavity, but avoid the decidua, with a continuous 0 chromic catgut (or polyglycolic) suture.
 - Close the second layer of uterine muscle using interrupted 1 chromic catgut (or polyglycolic) sutures.
 - Close the superficial fibres and the serosa using a continuous 0 chromic catgut (or polyglycolic) suture with an atraumatic needle.
- Close the abdomen as for lower segment caesarean (**page P-59**).

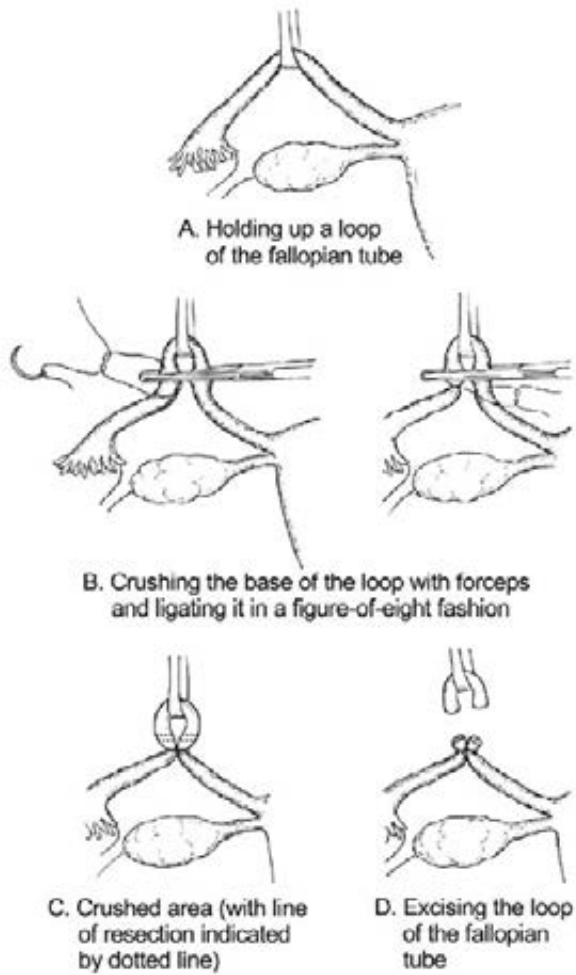
The woman should not labour with future pregnancies.

TUBAL LIGATION AT CAESAREAN

Tubal ligation can be performed immediately after caesarean if the woman requested the procedure **before** labour began (during prenatal visits). Adequate counselling and informed decision-making and consent must precede voluntary sterilization procedures; these are often not possible during labour and childbirth.

- Review for patient consent.
- Grasp the least vascular, middle portion of the fallopian tube with a Babcock or Allis forceps.
- Hold up a loop of tube 2.5 cm in length (**Fig. P-26 A, page P-64**).
- Crush the base of the loop with artery forceps and ligate it with 0 plain catgut suture (**Fig. P-26 B, page P-64**).
- Excise the loop (a segment 1 cm in length) from between the crushed areas (**Fig. P-26 C–D, page P-64**).
- Repeat the procedure on the other side.

FIGURE P-26. Tubal ligation



In certain cases of obstructed labour with fetal death, reduction in the size of the fetal head by craniotomy makes vaginal birth possible and avoids the risks associated with caesarean. Craniocentesis can be used to reduce the size of a hydrocephalic head to make birth possible.

- Provide emotional support and encouragement. If necessary, give diazepam IV slowly or use a pudendal block (**page P-3**).

CRANIOTOMY (SKULL PERFORATION)

- Review for indications. Verify that fetal death has occurred: If the **fetal heart cannot be heard**, ask several other persons to listen or use a Doppler stethoscope, if available.
- Review general care principles (**page C-25**) and apply antiseptic solution to the vagina (**page C-35**).
- Provide emotional and psychological support (**page C-9**) before, during and after the procedure.
- Perform an episiotomy, if required (**page P-85**).

CEPHALIC PRESENTATION

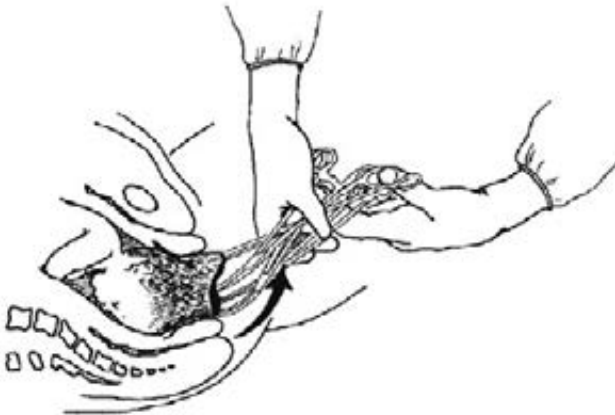
- Make a cruciate (cross-shaped) incision on the scalp (**Fig. P-27**).

FIGURE P-27. Cruciate incision on scalp



- Open the cranial vault at the lowest and most central bony point with a craniotome (or large pointed scissors or a heavy scalpel). In face presentation, perforate the orbits.
- Insert the craniotome into the fetal cranium and fragment the intracranial contents.
- Grasp the edges of the skull with several heavy-toothed forceps (e.g. Kocher) and apply traction in the axis of the birth canal (**Fig. P-28**).

FIGURE P-28. Applying scalp traction



- As the head descends, pressure from the bony pelvis will cause the skull to collapse, decreasing the cranial diameter.
- If the **head is not delivered easily**, perform a caesarean (**page P-53**).

BREECH PRESENTATION WITH ENTRAPPED HEAD

- Make an incision through the skin at the base of the neck.
- Insert a craniotome (or large pointed scissors or heavy scalpel) through the incision and tunnel subcutaneously to reach the occiput.
- Perforate the occiput and open the gap as widely as possible.
- Apply traction on the trunk to collapse the skull as the head descends.

POST-PROCEDURE CARE

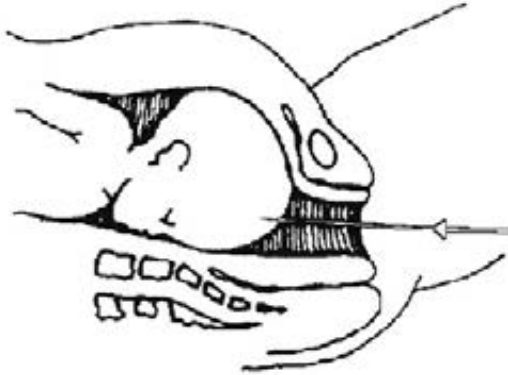
- After birth of the baby, examine the woman carefully and repair any tears to the cervix (**page P-95**) or vagina (**page P-97**), or repair episiotomy (**page P-87**).
- Leave a self-retaining catheter in place until it is confirmed that there is no bladder injury.
- Ensure adequate fluid intake and urinary output.
- Provide emotional and psychological support (**page C-9**).

CRANIOCENTESIS (SKULL PUNCTURE)

- Review for indications. Verify that fetal death has occurred: If the **fetal heart cannot be heard**, ask several other persons to listen or use a Doppler stethoscope, if available.
- Review general care principles (**page C-25**) and apply antiseptic solution to the vagina (**page C-35**).
- Provide emotional and psychological support (**page C-9**) before, during and after the procedure.
- Make an episiotomy, if required (**page P-85**).

FULLY DILATED CERVIX

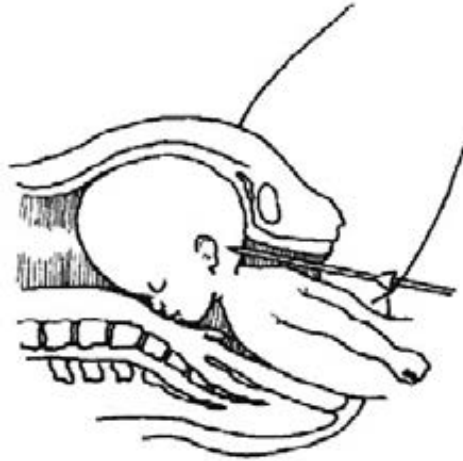
- Pass a large-bore spinal needle through the dilated cervix and through the sagittal suture line or fontanelles of the fetal skull (**Fig. P-29, page P-68**).
- Aspirate the cerebrospinal fluid until the fetal skull has collapsed, and allow vaginal birth to proceed.

FIGURE P-29. Craniocentesis with a dilated cervix**CLOSED CERVIX**

- Palpate for the location of the fetal head.
- Apply antiseptic solution to the suprapubic skin (**page C-35**).
- Pass a large-bore spinal needle through the abdominal and uterine walls and through the hydrocephalic skull.
- Aspirate the cerebrospinal fluid until the fetal skull has collapsed, and allow vaginal birth to proceed.

AFTER-COMING HEAD DURING BREECH BIRTH

- After the rest of the body has been delivered, insert a large-bore spinal needle through the dilated cervix and foramen magnum (**Fig. P-30, page P-69**).
- Aspirate the cerebrospinal fluid and deliver the after-coming head as in a breech birth (**page P-48**).

FIGURE P-30. Craniocentesis of the after-coming head**DURING CAESAREAN**

- After the uterine incision is made, pass a large-bore spinal needle through the hydrocephalic skull.
- Aspirate the cerebrospinal fluid until the fetal skull has collapsed.
- Deliver the baby and placenta as in caesarean (**page P-56**).

POST-PROCEDURE CARE

- After birth of the baby, examine the woman carefully and repair any tears to the cervix (**page P-95**) or vagina (**page P-97**), or repair episiotomy (**page P-87**).
- Leave a self-retaining catheter in place until it is confirmed that there is no bladder injury.
- Ensure adequate fluid intake and urinary output.
- Provide emotional and psychological support (**page C-9**).

The preferred method of evacuation of the uterus is manual vacuum aspiration (**page P-75**). Dilatation and curettage should be used only if manual vacuum aspiration is not available.

- Review for indications (**page P-75**).
- Review general care principles (**page C-25**).
- Provide emotional support and encouragement. Give morphine IM or IV before the procedure or use a paracervical block (**page P-1**).
- Administer oxytocin 10 units IM or ergometrine 0.2 mg IM before the procedure to make the myometrium firmer and reduce the risk of perforation.
- Perform a bimanual pelvic examination to assess the size and position of the uterus and the condition of the fornices.
- Insert a speculum or vaginal retractor into the vagina.
- Apply antiseptic solution to the vagina and cervix (especially the os) (**page C-35**).
- Check the cervix for tears or protruding products of conception. If **products of conception are present in the vagina or cervix**, remove them using ring or sponge forceps.

Note: With incomplete abortion, a ring or sponge forceps is preferable to grasp the cervix, as it is less likely than the tenaculum to tear the cervix with traction and does not require the use of lidocaine for placement.

- Gently grasp the anterior or posterior lip of the cervix with a vulsellum or single-toothed tenaculum (**Fig. P-31, page P-72**).
- If **using a tenaculum to grasp the cervix**, first inject 1 mL of 0.5% lidocaine solution into the anterior or posterior lip of the cervix that has been exposed by the speculum.
- Dilatation is needed only when the pregnancy has not passed at all or when some retained products of conception have remained in the uterus for several days:
 - Gently introduce the widest gauge cannula or curette.
 - Use graduated dilators only if the cannula or curette will not pass. Begin with the smallest dilator and end with the largest dilator that ensures adequate dilatation (usually 10–12 mm) (**Fig. P-32, page P-72**).
 - Take care not to tear the cervix or to create a false opening.

FIGURE P-31. Inserting a retractor and holding the anterior lip of the cervix

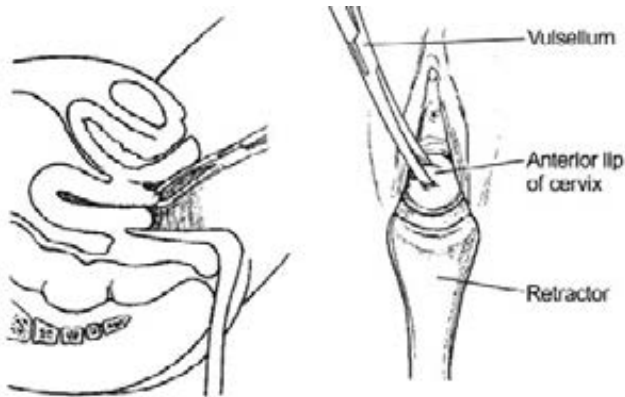
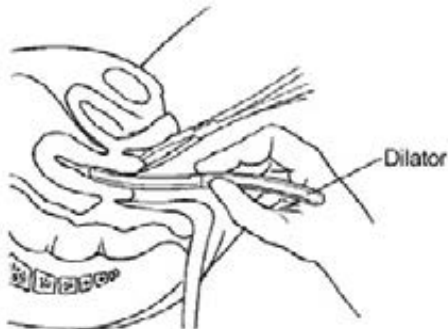


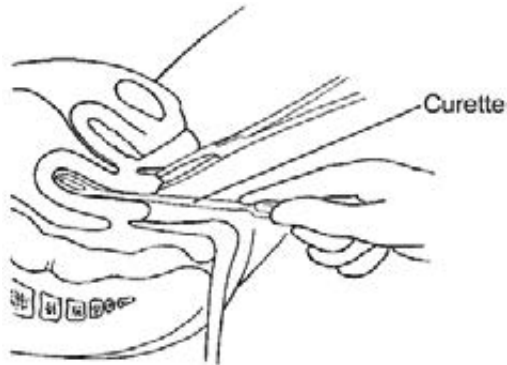
FIGURE P-32. Dilating the cervix



- Gently pass a uterine sound through the cervix to assess the length and direction of the uterus.

The uterus is very soft in pregnancy and can be easily injured during this procedure.

- Evacuate the contents of the uterus with ring forceps or a large curette (**Fig. P-33, page P-73**). Gently curette the walls of the uterus until a grating sensation is felt.

FIGURE P-33. Curetting the uterus

- Remove the speculum or retractors and perform a bimanual pelvic examination to check the size and firmness of the uterus.
- Examine the evacuated material (**page P-78**). Send material for histopathologic examination, if required.

POST-PROCEDURE CARE

- Give paracetamol 500 mg by mouth as needed.
- Encourage the woman to eat, drink and walk about as she wishes.
- Offer other health services, if possible, including tetanus prophylaxis, counselling and a family planning method (**page S-14**).
- Discharge uncomplicated cases in one to two hours.
- Advise women to watch for symptoms and signs requiring immediate attention:
 - prolonged cramping (more than a few days)
 - prolonged bleeding (more than two weeks)
 - bleeding more than normal menstrual bleeding
 - severe or increased pain
 - fever, chills or malaise
 - fainting.

- Review for indications for manual vacuum aspiration (inevitable abortion before 16 weeks, incomplete abortion, molar pregnancy or delayed postpartum haemorrhage due to retained placental fragments).
- Review general care principles (**page C-25**).
- Provide emotional support and encouragement, and give paracetamol 30 minutes before the procedure. Use a paracervical block if necessary (**page P-1**).
- Prepare the manual vacuum aspiration syringe:
 - Assemble the syringe.
 - Close the pinch valve.
 - Pull back on the plunger until the plunger arms lock.

Note: For molar pregnancy, when the uterine contents are likely to be copious, have three syringes ready for use.

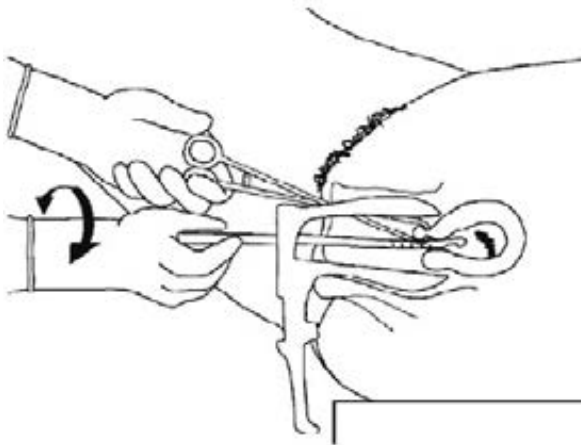
- Even if bleeding is slight, give oxytocin 10 units IM or ergometrine 0.2 mg IM before the procedure to make the myometrium firmer and reduce the risk of perforation.
- Perform a bimanual pelvic examination to assess the size and position of the uterus and the condition of the fornices.
- Insert a speculum or vaginal retractor into the vagina.
- Apply antiseptic solution to the vagina and cervix (especially the os) (**page C-35**).
- Check the cervix for tears or protruding products of conception. If **products of conception are present in the vagina or cervix**, remove them using ring or sponge forceps.

Note: With incomplete abortion, a ring or sponge forceps is preferable to grasp the cervix, as it is less likely than the tenaculum to tear the cervix with traction and does not require the use of lidocaine for placement.

- Gently grasp the anterior or posterior lip of the cervix with a vulsellum or single-toothed tenaculum.
- If **using a tenaculum to grasp the cervix**, first inject 1 mL of 0.5% lidocaine solution into the anterior or posterior lip of the cervix that has been exposed by the speculum.
- Dilatation is needed only when the pregnancy has not passed at all or when products of conception have remained in the uterus for several days:

- Gently introduce the widest gauge suction cannula.
- Use graduated dilators only if the cannula will not pass. Begin with the smallest dilator and end with the largest dilator that ensures adequate dilatation (usually 10–12 mm) (**Fig. P-32, page P-72**).
- Take care not to tear the cervix or to create a false opening.
- While gently applying traction to the cervix, insert the cannula through the cervix into the uterine cavity just past the internal os (**Fig. P-34**). (Rotating the cannula while gently applying pressure often helps the tip of the cannula pass through the cervical canal.)

FIGURE P-34. Inserting the cannula



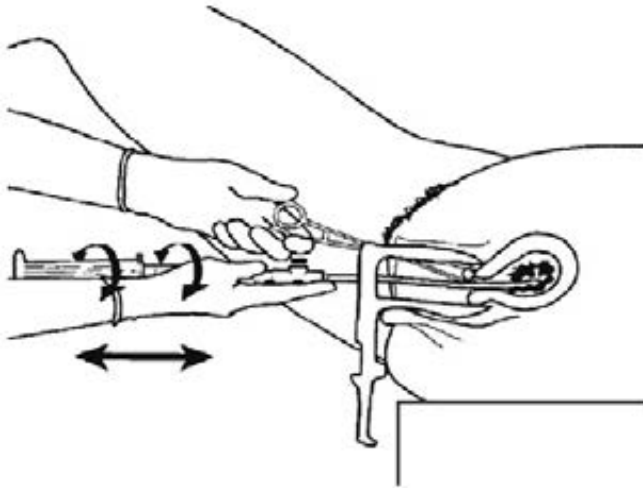
- Slowly push the cannula into the uterine cavity until it touches the fundus, but not more than 10 cm. Measure the depth of the uterus by dots visible on the cannula and then withdraw the cannula slightly.
- Attach the prepared manual vacuum aspiration syringe to the cannula by holding the vulsellum (or tenaculum) and the end of the cannula in one hand and the syringe in the other.
- Release the pinch valve(s) on the syringe to transfer the vacuum through the cannula to the uterine cavity.

- Evacuate remaining uterine contents by gently rotating the syringe from side to side (10 to 12 o'clock) and then moving the cannula gently and slowly back and forth within the uterine cavity (**Fig. P-35**).

Note: To avoid losing the vacuum, do not withdraw the cannula opening past the cervical os. If the **vacuum is lost** or if the **syringe is more than half full**, empty it and then re-establish the vacuum.

Note: Avoid grasping the syringe by the plunger arms while the vacuum is established and the cannula is in the uterus. If the plunger arms become unlocked, the plunger may accidentally slip back into the syringe, pushing material back into the uterus.

FIGURE P-35. Evacuating the contents of the uterus



- Check for signs of completion:
 - Red or pink foam but no more tissue is seen in the cannula.
 - A grating sensation is felt as the cannula passes over the surface of the evacuated uterus.
 - The uterus contracts around (grips) the cannula.
- Withdraw the cannula. Detach the syringe and place the cannula in decontamination solution.

- With the valve open, empty the contents of the MVA syringe into a strainer by pushing on the plunger.

Note: Place the empty syringe on a high-level disinfected or sterile tray or container until you are certain the procedure is complete.

- Remove the speculum or retractors and perform a bimanual examination to check the size and firmness of the uterus.
- Quickly inspect the tissue removed from the uterus to:
 - assess quantity and presence of products of conception;
 - ensure complete evacuation; and
 - check for a molar pregnancy (rare).
- If necessary, strain and rinse the tissue to remove excess blood clots, then place in a container of clean water, saline or weak acetic acid (vinegar) to examine. Tissue specimens may also be sent for histopathologic examination, if required.
- If **no products of conception** are seen:
 - All of the products of conception may have been passed before the MVA was performed (complete abortion).
 - The uterine cavity may appear to be empty but may not have been emptied completely. Repeat the evacuation.
 - The vaginal bleeding may be due to something other than an incomplete abortion (e.g. breakthrough bleeding, which is sometimes seen with hormonal contraceptives or uterine fibroids).
 - The uterus may be abnormal (e.g. cannula may have been inserted in the nonpregnant side of a double uterus).

Note: The absence of products of conception in a woman with symptoms of pregnancy raises the strong possibility of ectopic pregnancy (page S-15).

- Gently insert a speculum into the vagina and examine for bleeding. If the **uterus is still soft and not smaller**, or if there is **persistent, brisk bleeding**, repeat the evacuation.

POST-PROCEDURE CARE

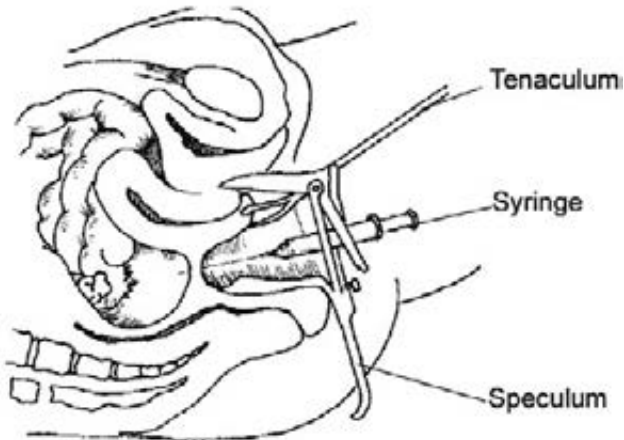
- Give the woman paracetamol 500 mg by mouth as needed.
- Encourage the woman to eat, drink and walk about as she wishes.

- Offer other health services, if possible, including tetanus prophylaxis, counselling and a family planning method (**page S-14**).
- Discharge women without complications in one to two hours.
- Advise women to watch for symptoms and signs requiring immediate attention:
 - prolonged cramping (more than a few days)
 - prolonged bleeding (more than two weeks)
 - bleeding more than normal menstrual bleeding
 - severe or increased pain
 - fever, chills or malaise
 - fainting.

CULDOCENTESIS

- Review for indications.
- Review general care principles (**page C-25**) and apply antiseptic solution to the vagina (especially the posterior fornix) (**page C-35**).
- Provide emotional support and encouragement. If necessary, use local infiltration with lidocaine (**page C-57**).
- Gently grasp the posterior lip of the cervix with a tenaculum and gently pull to elevate the cervix and expose the posterior vagina.
- Place a long needle (e.g. spinal needle) on a syringe and insert it through the posterior vagina, just below the posterior lip of the cervix (**Fig. P-36**).

FIGURE P-36. Diagnostic puncture of the cul-de-sac



- Pull back on the syringe to aspirate the cul-de-sac (the space behind the uterus).
 - If **non-clotting blood** is obtained, suspect ectopic pregnancy (**page S-15**).
 - If **clotting blood** is obtained, a vein or artery may have been aspirated. Remove the needle, reinsert it and aspirate again.

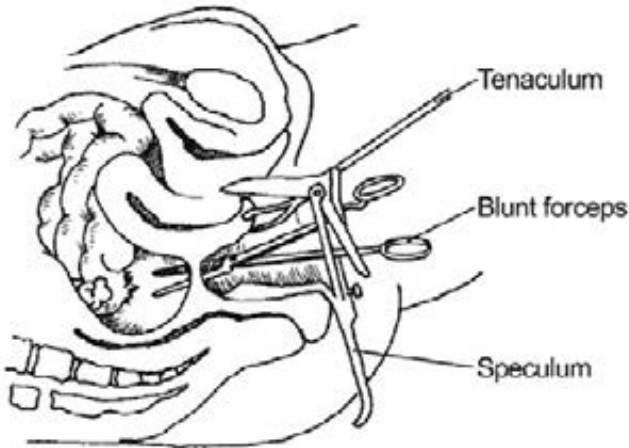
- If **clear or yellow fluid** is obtained, there is no blood in the peritoneum. The woman might, however, still have an unruptured ectopic pregnancy. Further observations and tests may be needed (**page S-16**).
- If **no fluid** is obtained, remove the needle, reinsert it and aspirate again. If no fluid is obtained, the woman might have an unruptured ectopic pregnancy (**page S-15**).
- If **pus is obtained**, keep the needle in place and proceed to colpotomy (see below).

COLPOTOMY

If **pus is obtained** on culdocentesis, keep the needle in place and make a stab incision at the site of the puncture:

- Remove the needle and insert blunt forceps or a finger through the incision to break loculi in the abscess cavity (**Fig. P-37**).

FIGURE P-37. Colpotomy for pelvic abscess



- Allow the pus to drain.
- Insert a high-level disinfected or sterile soft rubber corrugated drain through the incision.

Note: A drain can be prepared by cutting off the fingertips of a sterile examination glove.

- If required, use a stitch through the drain to anchor it in the vagina.
- Remove the drain when there is no more drainage of pus.
- If **no pus is obtained**, the abscess may be higher than the pouch of Douglas. A laparotomy will be required for peritoneal lavage (wash-out).

Episiotomy should not be performed routinely.

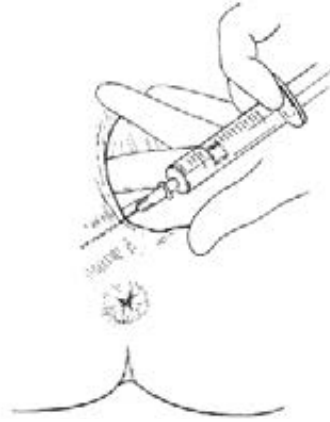
In the presence of physical obstruction due to lesions or scar tissue in the perineum, a decision to perform an episiotomy may be made.

- Review for indications.
- Review general care principles (**page C-25**) and apply antiseptic solution to the perineal area (**page C-35**).
- Provide emotional support and encouragement.
- Make sure there are no known allergies to lidocaine or related drugs. Use local infiltration with lidocaine (**page C-57**) or a pudendal block (**page P-3**).
- Infiltrate beneath the vaginal mucosa, beneath the skin of the perineum and deeply into the perineal muscle (**Fig. P-38, page P-86**), using about 10 mL 0.5% lidocaine solution (**page C-57**).

Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer convulsions and death if IV injection of lidocaine occurs.**

- At the conclusion of the set of injections, wait two minutes and then pinch the incision site with forceps. If the **woman feels the pinch**, wait two more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

FIGURE P-38. Infiltration of perineal tissue with local anaesthetic

- Wait to perform episiotomy until:
 - the perineum is thinned out; and
 - 3–4 cm of the baby's head is visible during a contraction.

Performing an episiotomy will cause bleeding. It should not, therefore, be done too early.

- Wearing sterile gloves, place two fingers between the baby's head and the perineum.
- Use scissors to cut the perineum about 3–4 cm in the mediolateral direction (**Fig. P-39, page P-87**).
- Use scissors to cut 2–3 cm up the middle of the posterior vagina.
- Control the baby's head and shoulders as they are born, ensuring that the shoulders have rotated to the midline to prevent an extension of the episiotomy.
- Carefully examine for extensions and other tears, and repair (**page P-88**).

FIGURE P-39. Making the incision while inserting two fingers to protect the baby's head



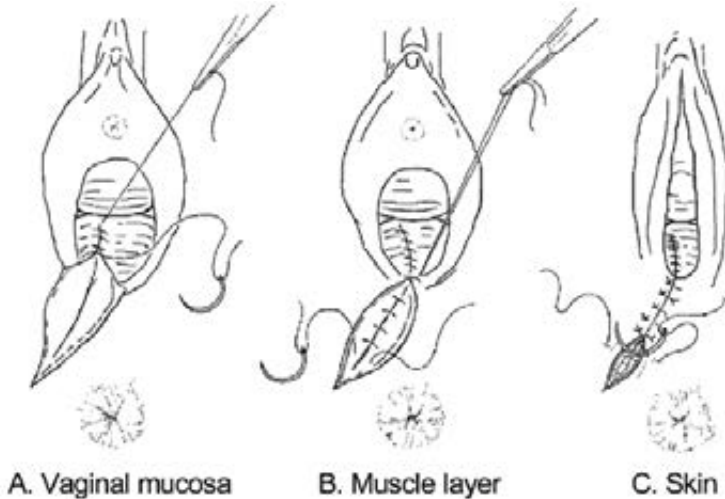
Note: It is important that absorbable sutures be used for closure. Polyglycolic sutures are preferred over chromic catgut for their tensile strength, non-allergenic properties, and lower probability of infectious complications and episiotomy breakdown. Chromic catgut is an acceptable alternative, but it is not ideal.

REPAIR OF EPISIOTOMY

- Apply antiseptic solution to the area around the episiotomy (**page C-35**).
- If the **episiotomy is extended** through the anal sphincter or rectal mucosa, manage as third or fourth degree tears (**page P-104**), including giving prophylactic antibiotics.
- Close the vaginal mucosa using continuous 2-0 suture (**Fig. P-40 A, page P-88**):
 - Start the repair about 1 cm above the apex (top) of the episiotomy. Continue the suture to the level of the vaginal opening.
 - At the opening of the vagina, bring together the cut edges of the vaginal opening.
 - Bring the needle under the vaginal opening and out through the incision, and tie.

- Close the perineal muscle using interrupted 2-0 sutures (**Fig. P-40 B**).
- Close the skin using interrupted (or subcuticular) 2-0 sutures (**Fig. P-40 C**).

FIGURE P-40. Repair of episiotomy



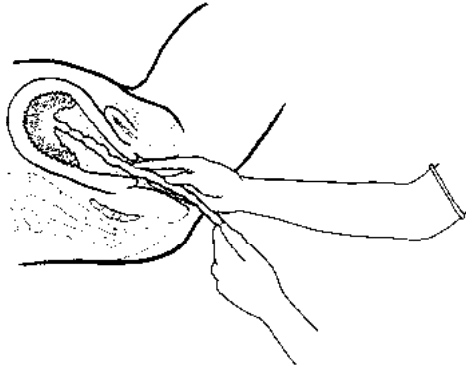
COMPLICATIONS

- If a **haematoma** occurs, open and drain it. If there are **no signs of infection** and **bleeding has stopped**, reclose the episiotomy.
- If there are **signs of infection**, open and drain the wound. Remove infected sutures and debride the wound:
 - If the **infection is mild**, antibiotics are not required.
 - If the **infection is severe but does not involve deep tissues**, give a combination of antibiotics (**page C-49**):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
 - If the **infection is deep, involves muscles and is causing necrosis** (necrotizing fasciitis), give a combination of antibiotics until necrotic tissue has been removed and the woman is fever-free for 48 hours (**page C-49**):

- ampicillin 2 g IV every six hours;
- PLUS gentamicin 5 mg/kg body weight IV every 24 hours.

Note: Necrotizing fasciitis requires wide surgical debridement. Perform delayed primary closure in two to four weeks (depending on resolution of the infection).

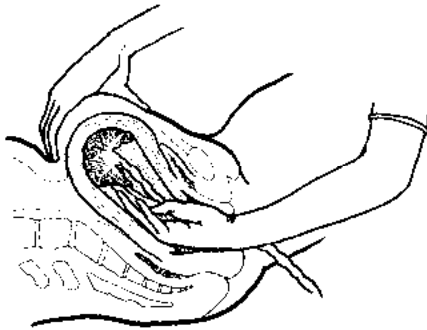
- Review for indications:
 - If **the placenta has not expelled within 30 minutes after the birth of the baby**, especially in cases of heavy bleeding, manual removal is recommended.
 - In the absence of haemorrhage, the woman can be observed for another 30 minutes before manual removal of the placenta is attempted.
 - A conservative approach is advised. However, if **the woman is bleeding heavily**, manual removal of the placenta should be attempted.
- Review general care principles (**page C-25**) and start an IV infusion (**page C-34**).
- Where feasible, ensure that the woman has a companion of her choice with her while she is being cared for.
- Provide emotional support and encouragement (**page C-9**) to the woman. Explain the procedure in simple terms. Obtain her verbal consent to perform the procedure.
- Give morphine and diazepam IV slowly (do not mix in the same syringe) or use ketamine (**page P-13**).
- In cases of haemorrhagic shock, avoid the administration of medications that could cause mental status changes in the woman (i.e. narcotic pain medication and sedatives).
- Give a single dose of prophylactic antibiotics (**page C-49**):
 - ampicillin 2 g IV
 - OR cefazolin 1 g IV.
- Catheterize the bladder or ensure that it is empty.
- Wash and dry hands. Put on sterile gloves (use long gloves if available).
- Hold the umbilical cord with a clamp. Pull the cord gently with one hand until it is parallel to the floor.
- Insert the other hand into the vagina and up into the uterus (**Fig. P-42, page P-92**).

FIGURE P-41. Introducing one hand into the vagina along cord

- Let go of the cord and move the hand up over the abdomen in order to support the fundus of the uterus and provide counter-traction during removal, to prevent inversion of the uterus (**Fig. P-42**).

Note: If **uterine inversion** occurs, reposition the uterus (**page P-109**).

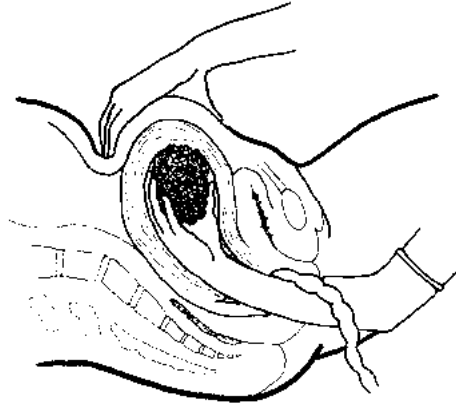
- Move the fingers of the hand in the uterus laterally until the edge of the placenta is located.
- If the **cord has been detached previously**, insert a hand into the uterine cavity. Explore the entire cavity until a line of cleavage is identified between the placenta and the uterine wall.

FIGURE P-42. Supporting the fundus while detaching the placenta

- Detach the placenta from the implantation site by keeping the fingers tightly together and using the edge of the hand to gradually make a space between the placenta and the uterine wall.

- Proceed slowly all around the placental bed until the whole placenta is detached from the uterine wall.
- When the placenta is completely separated:
 - Palpate the inside of the uterine cavity to ensure that all placental tissue has been removed.
 - Slowly withdraw the hand from the uterus, bringing the placenta with it.
 - Continue to provide counter-traction to the fundus by pushing it in the opposite direction of the hand that is being withdrawn (**Fig. P-43**).
- If the **placenta does not separate from the uterine surface** by gentle lateral movement of the fingertips at the line of cleavage, remove placental fragments (**page S-44**). If the **tissue is very adherent**, suspect placenta accreta and proceed to laparotomy and possible subtotal hysterectomy (**page P-122**).

FIGURE P-43. Withdrawing the hand from the uterus



- Give oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at 60 drops per minute.
- Ask an assistant to massage the fundus of the uterus to encourage a tonic uterine contraction.
- If there is **continued heavy bleeding**, give ergometrine 0.2 mg IM or prostaglandins (**Table S-11, page S-32**).

- Examine the uterine surface of the placenta to ensure that it is complete. If any **placental lobe or tissue is missing**, explore the uterine cavity to remove it.
- Examine the cervix, vagina and perineum carefully and repair any tears to the cervix (**page P-95**) or vagina and perineum (**page P-97**), or repair episiotomy (**page P-87**).

PROBLEMS

- If the **placenta is retained due to a constriction ring**, or if **hours or days have passed since the woman gave birth**, it might not be possible to get the entire hand into the uterus. Extract the placenta in fragments using two fingers, ovum forceps or a wide curette (**page S-44**).

POST-PROCEDURE CARE

- Observe the woman closely until the effect of IV sedation has worn off.
- Monitor vital signs (pulse, blood pressure, respiration) every 15 minutes for two hours and then every 30 minutes for the next six hours or until stable.
- Palpate the uterine fundus to ensure that the uterus remains contracted.
- Check for excessive lochia.
- Continue infusion of IV fluids.
- Transfuse as necessary (**page C-37**).
- Document procedure and post-procedure care, including any medications given.
- Counsel the woman and ensure that she understands what the procedure was and why it was done.
- Provide postnatal care in the facility for at least 24 hours after childbirth.

- Review general care principles (**page C-25**) and apply antiseptic solution to the vagina and cervix (**page C-35**).
- Provide emotional support and encouragement. Anaesthesia is not required for most cervical tears. For tears that are high and extensive, give morphine and diazepam IV slowly (do not mix in the same syringe) or use ketamine (**page P-13**).
- Ask an assistant to gently provide fundal pressure to help push the cervix into view.
- Use vaginal retractors as necessary to expose the cervix.
- Gently grasp the cervix with ring or sponge forceps. Apply the forceps on both sides of the tear, and gently pull in various directions to see the entire cervix. There may be several tears.
- Close the cervical tears with continuous 0 chromic catgut (or polyglycolic) suture starting at the apex (upper edge of tear), which is often the source of bleeding (**Fig. P-44**).
- If a **long section of the rim of the cervix is tattered**, under-run it with continuous 0 chromic catgut (or polyglycolic) suture.
- If the **apex is difficult to reach and ligate**, grasp it with artery or ring forceps. Leave the forceps in place for four hours. Do not persist in attempts to ligate the bleeding points as such attempts may increase the bleeding. Then:
 - After four hours, open the forceps partially but do not remove.
 - After another four hours, remove the forceps completely.

Note: A laparotomy may be required to repair a cervical tear that has extended deep beyond the vaginal vault.

FIGURE P-44. Repair of a cervical tear



Because all women who give birth vaginally are at risk of genital tears, a routine inspection of the vagina, perineum and cervix should be conducted for all women immediately after vaginal birth. An unrepaired laceration can lead to haemorrhage, anaemia, abscess formation, wound breakdown, anal incontinence and rectovaginal fistula. These consequences of unrepaired or poorly repaired tears can affect patients not only physically but also psychologically.

EXAMINATION AND CLASSIFICATION OF TEARS

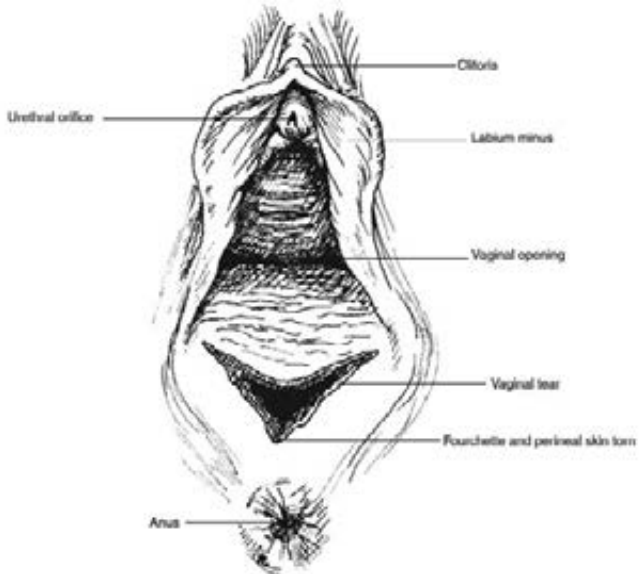
- Explain to the woman what you are about to do and obtain her verbal consent.
- Ensure good lighting.
- Ensure that the woman is in a suitable position to enable visualization of the entire genital tract.
- Visually assess the extent of perineal trauma to include the structures involved, the apex of the injury and any bleeding.
- Use instruments or gauze pads to assist with visualization to ensure that you see the apex of any tear or laceration.

Note: A woman can have significant vaginal tears without experiencing tears of the perineum.

- If the **tear is long and deep through the perineum**, inspect it to be sure that there is no third or fourth degree tear:
 - Place a gloved finger in the anus.
 - Gently lift the finger and identify the sphincter, or lack of it.
 - Feel for the tone or tightness of the sphincter.
 - Feel the surface of the rectum and look carefully for protrusion of the finger into the vagina, which shows a tear.
 - Change gloves after the rectal exam, carefully wash and dry hands, and put on a new pair of sterile gloves to repair any identified tears.
- If the **woman is bleeding and there is suspicion of a cervical tear**, ask an assistant to press down firmly on the woman's uterus. This will move the cervix lower in the vagina so that you can examine it more easily.

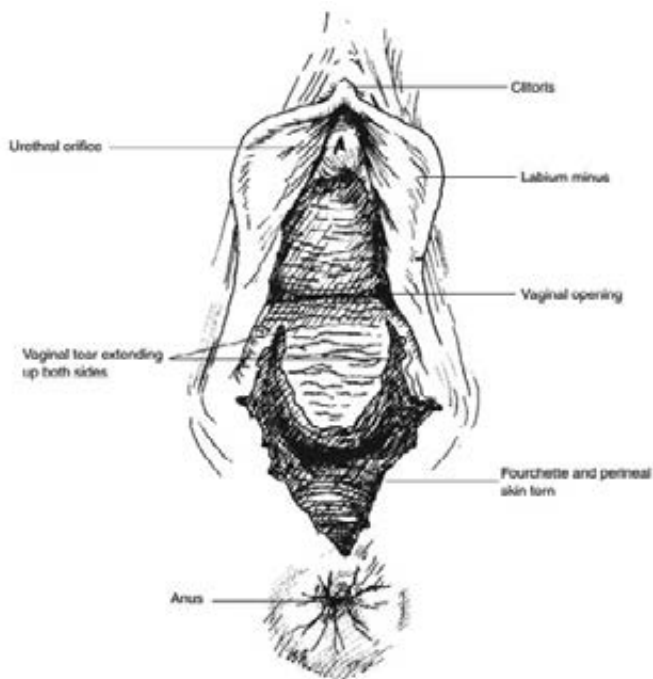
- Identify the type of trauma: There are four degrees of tears that can occur during a vaginal birth:
 - **First degree tears (Fig. P-45)** involve the vaginal mucosa and connective tissue.

FIGURE P-45. First degree tear (involves fourchette only; vaginal and perineal skin torn, muscles intact)



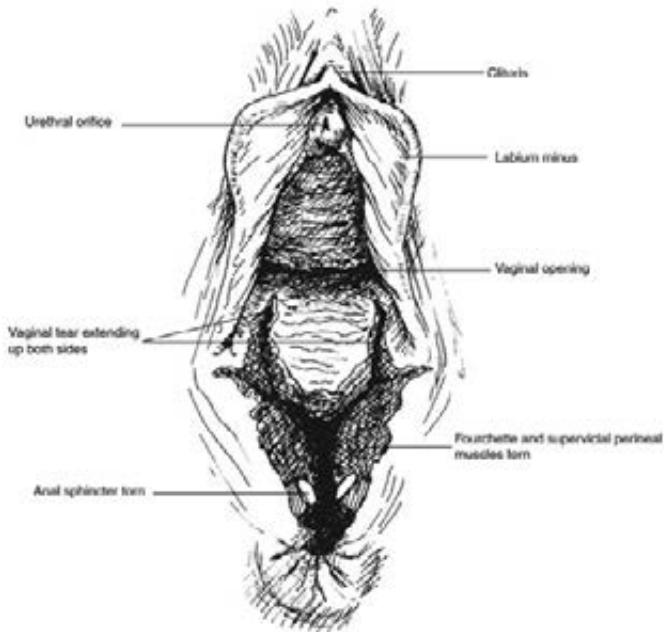
- **Second degree tears (Fig. P-46)** involve the vaginal mucosa, connective tissue and underlying muscles.

FIGURE P-46. Second degree tear (involves fourchette and superficial perineal muscles; vaginal tear often extends up both sides)



- **Third degree tears (Fig. P-47)** involve complete transection of the anal sphincter.

FIGURE P-47. Third degree tear (involves fourchette and superficial perineal muscles and anal sphincter)



- **Fourth degree tears** involve the rectal mucosa.

Note: It is important that absorbable sutures be used for closure. Polyglycolic sutures are preferred over chromic catgut for their tensile strength, non-allergenic properties and lower probability of infectious complications. Chromic catgut is an acceptable alternative, but it is not ideal.

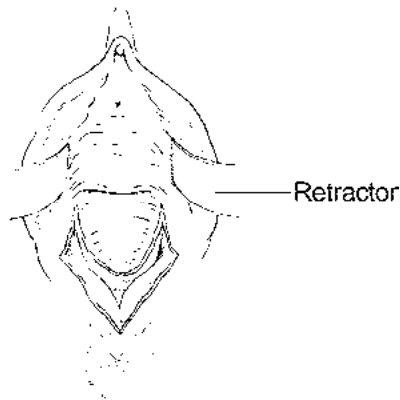
REPAIR OF FIRST AND SECOND DEGREE TEARS

Most first degree tears close spontaneously without sutures.

- Review general care principles (**page C-25**).

- Provide emotional support and encouragement. Make sure there are no known allergies to lidocaine or related drugs. Use local infiltration with lidocaine solution (**page C-57**). If necessary, use a pudendal block (**page P-3**).
- Ask an assistant to check the uterus at 15-minute intervals and ensure that it is contracted.
- Ensure good lighting.
- Ensure that the woman is in a suitable position to enable visualization of the entire genital tract.
- Expose the tear (**Fig. P-48**).

FIGURE P-48. Exposing a perineal tear



- Apply antiseptic solution to the area around the tear (**page C-35**).
- **Note:** If **more than 40 mL of lidocaine** solution will be needed for the repair, add adrenaline to the solution (**page C-57**).
- Infiltrate (**Fig. P-49, page P-102**) beneath the vaginal mucosa, beneath the skin of the perineum and deeply into the perineal muscle using about 10 mL 0.5% lidocaine solution (**page C-57**).

FIGURE P-49. Technique of infiltration of local anaesthetic before repair of a tear



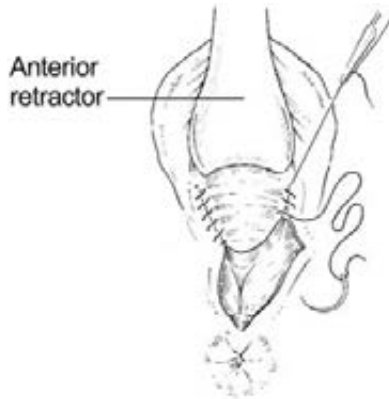
Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer convulsions and death if IV injection of lidocaine occurs.**

- At the conclusion of the set of injections, wait two minutes and then pinch the area with forceps. If the **woman feels the pinch**, wait two more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

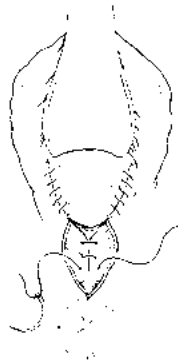
- Repair the vaginal mucosa using a continuous 2-0 suture (**Fig. P-50, page P-103**):
 - Start the repair about 1 cm above the apex (top) of the vaginal tear. Continue the suture to the level of the vaginal opening.
 - At the opening of the vagina, bring together the cut edges of the vaginal opening.
 - Bring the needle under the vaginal opening and out through the perineal tear and tie.

FIGURE P-50. Repairing the vaginal mucosa



- Repair the perineal muscles using interrupted 2-0 suture (**Fig. P-51**). If the **tear is deep**, place a second layer of the same stitch to close the space.

FIGURE P-51. Repairing the perineal muscles



- Repair the perineal skin using interrupted (or subcuticular) 2-0 sutures, starting at the vaginal opening (**Fig. P-52, page P-104**).
- If the tear **was deep**, perform a rectal examination. Make sure no stitches are in the rectum; if there are **stitches in the rectum**, undo the sutures and resuture the tear, taking care to avoid stitches in the rectum.

FIGURE P-52. Repairing the skin

It is not necessary to provide prophylactic antibiotics for cases of first and second degree tears.

REPAIR OF THIRD AND FOURTH DEGREE PERINEAL TEARS

Note: A woman may suffer loss of control over bowel movements and gas if a torn anal sphincter is not repaired correctly. If a **tear in the rectum is not repaired**, the woman can suffer from infection and rectovaginal fistula (passage of stool through the vagina).

Repair the tear in the operating room:

- Review general care principles (**page C-25**).
- Give a single dose of prophylactic antibiotics before beginning repair (**page C-49**):
 - ampicillin 500 mg by mouth.
- Provide emotional support and encouragement. Use a pudendal block (**page P-3**), ketamine (**page P-13**) or spinal anaesthesia (**page P-11**). Rarely, if all edges of the tear can be seen, the repair can be done using local infiltration with lidocaine (**Fig. P-49, page P-102**) and morphine and diazepam IV slowly (do not mix in the same syringe). Make sure there are no known allergies to lidocaine or related drugs.
- Ask an assistant to check the uterus at 15-minute intervals and ensure that it is contracted.
- Ensure good lighting.

- Ensure that the woman is in a suitable position to enable visualization of the entire genital tract.
- Apply antiseptic solution to the tear and remove any faecal material, if present (**page C-35**).
- Infiltrate beneath the vaginal mucosa, beneath the skin of the perineum and deeply into the perineal muscle, using about 10 mL 0.5% lidocaine solution (**Fig. P-49, page P-102**).

Note: Aspirate (pull back on the plunger) to be sure that no vessel has been penetrated. If **blood is returned in the syringe with aspiration**, remove the needle. Recheck the position carefully and try again. Never inject if blood is aspirated. **The woman can suffer convulsions and death if IV injection of lidocaine occurs.**

- At the conclusion of the set of injections, wait two minutes and then pinch the area with forceps. If the **woman feels the pinch**, wait two more minutes and then retest.

Anaesthetize early to provide sufficient time for effect.

- Repair the rectum using interrupted 3-0 or 4-0 sutures 0.5 cm apart to bring together the mucosa (**Fig. P-53, page P-106**).

Remember: Place the suture through the muscularis (not all the way through the mucosa):

- Cover the muscularis layer by bringing together the fascial layer with interrupted sutures.
- Apply antiseptic solution to the area frequently.

FIGURE P-53. Closing the muscle wall of the rectum

- If the **sphincter is torn**:
 - Grasp each end of the sphincter with an Allis clamp (the sphincter retracts when torn). The fascial sheath around the sphincter is strong and will not tear when pulled with the clamp (**Fig. P-54**).
 - Repair the sphincter with two or three interrupted stitches of 2-0 suture.

FIGURE P-54. Suturing the anal sphincter

- Apply antiseptic solution to the area again.

- Examine the anus with a gloved finger to ensure the correct repair of the rectum and sphincter. If there are **stitches in the rectum**, undo the sutures and resuture the tear, taking care to avoid stitches in the rectum.
- Remove gloves after the rectal exam, carefully wash and dry hands, and put on a new pair of sterile gloves to continue the repair.
- Repair the vaginal mucosa, perineal muscles and skin (**page P-103, P-104**).

POST-PROCEDURE CARE

- Advise the woman to clean the genital area, including the suture line, with clean water twice daily and always after defecation.
- Advise the woman on danger signs and when and where to seek care if they occur.
- Follow up closely for signs of wound infection (e.g. marked inflammation, excessive swelling, pus).
- Avoid giving enemas or rectal examinations for two weeks.
- Give stool softener by mouth for one week, if possible. Avoid bulk laxatives as these can cause wound dehiscence.
- No dietary restrictions are needed.

MANAGEMENT OF NEGLECTED CASES

A perineal tear can become contaminated with faecal material. If **closure is delayed more than 12 hours**, infection is likely. Delayed primary closure is indicated in such cases.

- For **first and second degree tears**, have the woman return in six days. If there are no signs of infection, proceed with delayed primary closure.
- For **third and fourth degree tears**:
 - Close the rectal mucosa with some supporting tissue and approximate the fascia of the anal sphincter with two or three sutures.
 - Close the muscle and vaginal mucosa and the perineal skin **six days later**.

COMPLICATIONS

- If a **haematoma is observed**, open and drain it. If there are **no signs of infection and the bleeding has stopped**, the wound can be reclosed.
- If there are **signs of infection**, open and drain the wound. Remove infected sutures and debride the wound:
 - If the **infection is mild**, antibiotics are not required.
 - If the **infection is severe but does not involve deep tissues**, give a combination of antibiotics (**page C-49**):
 - ampicillin 500 mg by mouth every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
 - If the **infection is deep, involves muscles and is causing necrosis** (necrotizing fasciitis), give a combination of antibiotics until the necrotic tissue has been removed and the woman is fever-free for 48 hours (**page C-49**):
 - ampicillin 2 g IV every six hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.

Note: Necrotizing fasciitis requires wide surgical debridement. Perform delayed primary closure in two to four weeks (depending on resolution of the infection).

- Faecal incontinence may result from complete sphincter transection. Many women are able to maintain control of defaecation by using other perineal muscles. When incontinence persists, reconstructive surgery must be performed three months or more after childbirth.
- Rectovaginal fistula requires reconstructive surgery by a skilled provider trained in the repair technique. Refer the woman for evaluation and follow-up.

CORRECTING UTERINE INVERSION

P-109

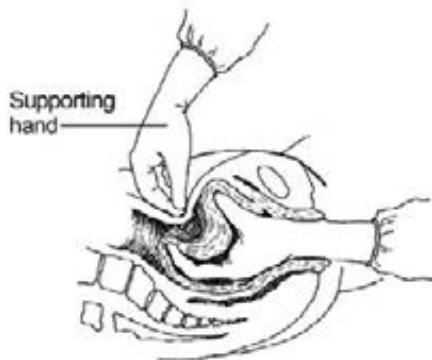
- Review for indications.
- Review general care principles (**page C-25**) and start an IV infusion (**page C-34**).
- Give morphine and diazepam IV slowly (do not mix in the same syringe). If necessary, use general anaesthesia.
- Thoroughly cleanse the inverted uterus using antiseptic solution.
- Apply compression to the inverted uterus with a moist, warm sterile towel until ready for the procedure.

MANUAL CORRECTION

- Wearing sterile gloves, grasp the inverted uterus and push it through the cervix in the direction of the umbilicus to its normal anatomic position, using the other hand to support the uterus (**Fig. P-55**). If the **placenta is still attached**, manually remove the placenta **after** correction.

It is important that the part of the uterus that came out last (the part closest to the cervix) goes in first.

FIGURE P-55. Manual replacement of the inverted uterus



- If **correction is not achieved**, proceed to hydrostatic correction (**page P-110**).

HYDROSTATIC CORRECTION

- Place the woman in deep Trendelenburg position (lower her head about 0.5 metres below the level of the perineum).
- Prepare a high-level disinfected or sterile douche system with a large nozzle, long tubing (2 metres) and a warm water reservoir (3–5 L).
Note: This can also be done using warmed normal saline and an ordinary IV administration set.
- Identify the posterior fornix. This is easily done in partial inversion when the inverted uterus is still in the vagina. In other cases, the posterior fornix is recognized by where the rugose vagina becomes the smooth vagina.
- Place the nozzle of the douche in the posterior fornix.
- At the same time, with the other hand hold the labia sealed over the nozzle and use the forearm to support the nozzle.
- Ask an assistant to start the douche with full pressure (raise the water reservoir to at least 2 metres). Water will distend the posterior fornix of the vagina gradually so that it stretches. This causes the circumference of the orifice to increase, relieves cervical constriction and results in correction of the inversion.

MANUAL CORRECTION UNDER GENERAL ANAESTHESIA

- If **hydrostatic correction is not successful**, try manual repositioning under general anaesthesia using halothane. Halothane is recommended because it relaxes the uterus.
- Grasp the inverted uterus and push it through the cervix in the direction of the umbilicus to its normal anatomic position, using the other hand to support the uterus (**Fig. P-55, page P-109**). If the **placenta is still attached**, manually remove the placenta **after** correction.

COMBINED ABDOMINAL-VAGINAL CORRECTION

Abdominal-vaginal correction under general anaesthesia may be required if the above measures fail.

- Review for indications.
- Review operative care principles (**page C-65**).

- Open the abdomen:
 - Make a midline vertical incision below the umbilicus to the pubic hair, through the skin and to the level of the fascia.
 - Make a 2–3 cm vertical incision in the fascia.
 - Hold the fascial edge with forceps and lengthen the incision up and down using scissors.
 - Use fingers or scissors to separate the rectus muscles (abdominal wall muscles).
 - Use fingers or scissors to make an opening in the peritoneum near the umbilicus. Use scissors to lengthen the incision up and down. Carefully, to prevent bladder injury, use scissors to separate layers and open the lower part of the peritoneum.
 - Place a bladder retractor over the pubic bone and place self-retaining abdominal retractors.
 - Dilate the constricting cervical ring digitally.
 - Place a tenaculum through the cervical ring and grasp the inverted fundus.
 - Apply gentle continuous traction to the fundus while an assistant attempts manual correction vaginally.
 - **If traction fails:**
 - Incise the constricting cervical ring vertically and posteriorly (where the incision is least likely to injure the bladder or uterine vessels).
 - Repeat digital dilatation, tenaculum and traction steps.
 - Close the constriction ring.
 - **If correction is successful,** close the abdomen:
 - Make sure there is no bleeding. Use a sponge to remove any clots inside the abdomen.
 - Close the fascia with continuous 0 chromic catgut (or polyglycolic) suture.
- Note:** There is no need to close the bladder peritoneum or the abdominal peritoneum.
- If there are **signs of infection**, pack the subcutaneous tissue with gauze and place loose 0 catgut (or polyglycolic) sutures. Close the skin with a delayed closure after the infection has cleared.

- If there are **no signs of infection**, close the skin with vertical mattress sutures of 3-0 nylon (or silk) and apply a sterile dressing.

POST-PROCEDURE CARE

- Once the inversion is corrected, infuse oxytocin 20 units in 500 mL IV fluids (normal saline or Ringer's lactate) at 10 drops per minute:
 - If **haemorrhage is suspected**, increase the infusion rate to 60 drops per minute.
 - If the **uterus does not contract after oxytocin**, give ergometrine 0.2 mg or prostaglandins (**Table S-11, page S-32**).
- Give a single dose of prophylactic antibiotics after correcting the inverted uterus (**page C-49**):
 - ampicillin 2 g IV
 - OR cefazolin 1 g IV.
- If **combined abdominal-vaginal correction** was used, see postoperative care principles (**page C-71**).
- If there are **signs of infection** or the **woman currently has fever**, give a combination of antibiotics until she is fever-free for 48 hours (**page C-49**):
 - clindamycin phosphate 600 mg IV every eight hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
- Give appropriate analgesic drugs (**page C-64**).

- Review for indications.
- Review general care principles (**page C-25**) and operative care principles (**page C-65**), and start an IV infusion (**page C-34**).
- Give a single dose of prophylactic antibiotics (**page C-50**):
 - ampicillin 2 g IV;
 - OR cefazolin 1 g IV.
- Open the abdomen:
 - Make a midline vertical incision below the umbilicus to the pubic hair, through the skin and to the level of the fascia.
 - Make a 2–3 cm vertical incision in the fascia.
 - Hold the fascial edge with forceps and lengthen the incision up and down using scissors.
 - Use fingers or scissors to separate the rectus muscles (abdominal wall muscles).
 - Use fingers to make an opening in the peritoneum near the umbilicus. Use scissors to lengthen the incision up and down in order to see the entire uterus. Carefully, to prevent bladder injury, use scissors to separate layers and open the lower part of the peritoneum.
 - Examine the abdomen and the uterus for the site of rupture and remove clots.
 - Place a bladder retractor over the pubic bone and place self-retaining abdominal retractors.
- Deliver the baby and placenta.
- Infuse oxytocin 20 units in 1 L IV fluids (normal saline or Ringer's lactate) at 60 drops per minute until the uterus contracts, and then reduce to 20 drops per minute.
- Lift the uterus out of the pelvis in order to note the extent of the injury.
- Examine both the front and the back of the uterus.
- Hold the bleeding edges of the uterus with Green Armytage forceps (or ring forceps).
- Separate the bladder from the lower uterine segment by sharp or blunt dissection. If the **bladder is scarred to the uterus**, use fine scissors.

RUPTURE THROUGH CERVIX AND VAGINA

- If the **uterus is torn through the cervix and vagina**, mobilize the bladder at least 2 cm below the tear.
- If possible, place a suture 2 cm above the lower end of the cervical tear and keep traction on the suture to bring the lower end of the tear into view as the repair continues.

RUPTURE Laterally THROUGH UTERINE ARTERY

- If the **rupture extends laterally to damage one or both uterine arteries**, ligate the injured artery.
- Identify the arteries and ureter prior to ligating the uterine vessels (**Fig. P-56, page P-118**).

RUPTURE WITH BROAD LIGAMENT HAEMATOMA

- If the **rupture has created a broad ligament haematoma** (**Fig. S-2, page S-25**), clamp, cut and tie off the round ligament.
- Open the anterior leaf of the broad ligament.
- Drain off the haematoma manually, if necessary.
- Inspect the area carefully for injury to the uterine artery or its branches. Ligate any bleeding vessels.

REPAIRING THE UTERINE TEAR

- Repair the tear with a continuous locking stitch of 0 chromic catgut (or polyglycolic) suture. If **bleeding is not controlled** or if the **rupture is through a previous classical or vertical incision**, place a second layer of suture.

Ensure that the ureter is identified and exposed to avoid including it in a stitch.

- If the **rupture is too extensive for repair**, proceed with hysterectomy (**page P-121**).
- Control bleeding by clamping with long artery forceps and ligating. If the **bleeding points are deep**, use figure-of-eight sutures.

- If the **woman has requested tubal ligation**, perform the procedure at this time (**page P-63**).
- Place an abdominal drain (**page C-70**).
- Close the abdomen:
 - Ensure that there is no bleeding. Remove clots using a sponge.
 - In all cases, check for injury to the bladder. If a **bladder injury is identified**, repair the injury (see below).
 - Close the fascia with continuous 0 chromic catgut (or polyglycolic) suture.

Note: There is no need to close the bladder peritoneum or the abdominal peritoneum.
 - If there **are signs of infection**, pack the subcutaneous tissue with gauze and place loose 0 catgut (or polyglycolic) sutures. Close the skin with a delayed closure after the infection has cleared.
 - If there are **no signs of infection**, close the skin with vertical mattress sutures of 3-0 nylon (or silk) and apply a sterile dressing.

REPAIR OF BLADDER INJURY

- Identify the extent of the injury by grasping each edge of the tear with a clamp and gently stretching. Determine if the injury is close to the bladder trigone (ureters and urethra).
- Dissect the bladder off the lower uterine segment with fine scissors or with a sponge on a clamp.
- Free a 2 cm circle of bladder tissue around the tear.
- Repair the tear in two layers with continuous 3-0 chromic catgut (or polyglycolic) suture:
 - Suture the bladder mucosa (thin inner layer) and bladder muscle (outer layer).
 - Invert (fold) the outer layer over the first layer of suture and place another layer of suture.
 - Ensure that sutures do not enter the trigone area.

- Test the repair for leaks:
 - Fill the bladder with sterile saline or water through a transurethral catheter.
 - If **leaks are present**, remove the suture, repair and test again.
- If it is **not certain that the repair is well away from the ureters and urethra**, complete the repair and refer the woman to a higher-level facility for an intravenous pyelogram.
- Keep the bladder catheter in place for at least seven days and until urine is clear. Continue IV fluids to ensure flushing of the bladder, and encourage the woman to drink fluids.

POST-PROCEDURE CARE

- Review postoperative care principles (**page C-71**).
- If there are **signs of infection** or the **woman currently has a fever**, give a combination of antibiotics until she is fever-free for 48 hours (**page C-49**):
 - clindamycin phosphate 600 mg IV every eight hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
- Give appropriate analgesic drugs (**page C-64**).
- If there are **no signs of infection**, remove the abdominal drain after 48 hours.
- Offer other health services, if possible (**page S-14**).
- If **tubal ligation was not performed**, offer family planning (**Table S-6, page S-15**). If the **woman wishes to have more children**, advise her to have elective caesarean births with future pregnancies.

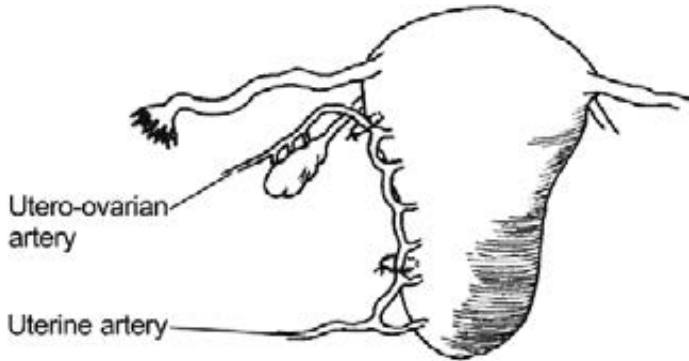
Because there is an increased risk of rupture with subsequent pregnancies, the option of permanent contraception needs to be discussed with the woman after the emergency is over. Permanent contraception should not be performed without informed consent from the woman.

LIGATION

- Review for indications.
- Review general care principles (**page C-25**) and operative care principles (**page C-65**), and start an IV infusion (**page C-34**).
- Give a single dose of prophylactic antibiotics (**page C-49**):
 - ampicillin 2 g IV;
 - OR cefazolin 1 g IV.
- Open the abdomen:
 - Make a midline vertical incision below the umbilicus to the pubic hair, through the skin and to the level of the fascia.
 - Make a 2–3 cm vertical incision in the fascia.
 - Hold the fascial edge with forceps and lengthen the incision up and down using scissors.
 - Use fingers or scissors to separate the rectus muscles (abdominal wall muscles).
 - Use fingers to make an opening in the peritoneum near the umbilicus. Use scissors to lengthen the incision up and down in order to see the entire uterus. Carefully, to prevent bladder injury, use scissors to separate layers and open the lower part of the peritoneum.
 - Place a bladder retractor over the pubic bone and place self-retaining abdominal retractors.
- Pull on the uterus to expose the lower part of the broad ligament.
- Feel for pulsations of the uterine artery near the junction of the uterus and cervix.
- Using 0 chromic catgut (or polyglycolic) suture on a large needle, pass the needle around the artery and through 2–3 cm of myometrium (uterine muscle) at the level where a transverse lower uterine segment incision would be made. Tie the suture securely.
- Place the sutures as close to the uterus as possible, as the ureter is generally only 1 cm lateral to the uterine artery.
 - Repeat on the other side.
 - If the **artery has been torn**, clamp and tie the bleeding ends.

- Ligate the utero-ovarian artery just below the point where the ovarian suspensory ligament joins the uterus (**Fig. P-56**).
- Repeat on the other side.
- Observe for continued bleeding or formation of haematoma.

FIGURE P-56. Sites for ligating uterine and utero-ovarian arteries



- Close the abdomen:
 - Ensure that there is no bleeding. Remove clots using a sponge.
 - Examine carefully for injuries to the bladder and repair any found (**page P-115**).
 - Close the fascia with continuous 0 chromic catgut (or polyglycolic) suture.

Note: There is no need to close the bladder peritoneum or the abdominal peritoneum.

- If there **are signs of infection**, pack the subcutaneous tissue with gauze and place loose 0 catgut (or polyglycolic) sutures. Close the skin with a delayed closure after the infection has cleared.
- If there are **no signs of infection**, close the skin with vertical mattress sutures of 3-0 nylon (or silk) and apply a sterile dressing.

POST-PROCEDURE CARE

- Review postoperative (**page C-71**) and general care principles (**page C-25**).
- Monitor urine output. If there is **blood in the urine** or the **woman has loin pain** (pain in the sides between the lower ribs and pelvis, and/or in the lower part of the back), refer the woman to a tertiary care centre, if possible, for treatment of an obstructed ureter.
- If there **are signs of infection** or the woman **currently has fever**, give a combination of antibiotics until she is fever-free for 48 hours (**page C-49**):
 - clindamycin phosphate 600 mg IV every eight hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
- Give appropriate analgesic drugs (**page C-64**).
- If there are **no signs of infection**, remove the abdominal drain after 48 hours.
- Offer other health services, if possible (**page S-14**).

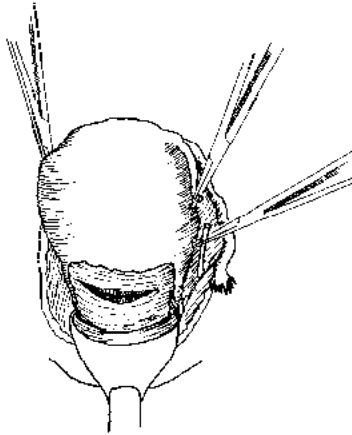
Postpartum hysterectomy can be **subtotal** (supracervical) unless the cervix and lower uterine segment are involved. **Total** hysterectomy may be necessary in the case of a tear of the lower segment that extends into the cervix or bleeding after placenta praevia.

- Review for indications.
- Review general care principles (**page C-25**) and operative care principles (**page C-65**), and start an IV infusion (**page C-34**).
- Give a single dose of prophylactic antibiotics (**page C-49**):
 - ampicillin 2 g IV;
 - OR cefazolin 1 g IV.
- If there is **uncontrollable haemorrhage following vaginal birth**, keep in mind that speed is essential. To open the abdomen:
 - Make a midline vertical incision below the umbilicus to the pubic hair, through the skin and to the level of the fascia.
 - Make a 2–3 cm vertical incision in the fascia.
 - Hold the fascial edge with forceps and lengthen the incision up and down using scissors.
 - Use fingers or scissors to separate the rectus muscles (abdominal wall muscles).
 - Use fingers to make an opening in the peritoneum near the umbilicus. Use scissors to lengthen the incision up and down in order to see the entire uterus. Carefully, to prevent bladder injury, use scissors to separate layers and open the lower part of the peritoneum.
 - Place a bladder retractor over the pubic bone and place self-retaining abdominal retractors.
- If the **birth was by caesarean**, clamp the sites of bleeding along the uterine incision:
 - In case of **massive bleeding**, have an assistant press fingers over the aorta in the lower abdomen. This will reduce intraperitoneal bleeding.
 - Extend the skin incision, if needed.

SUBTOTAL (SUPRACERVICAL) HYSTERECTOMY

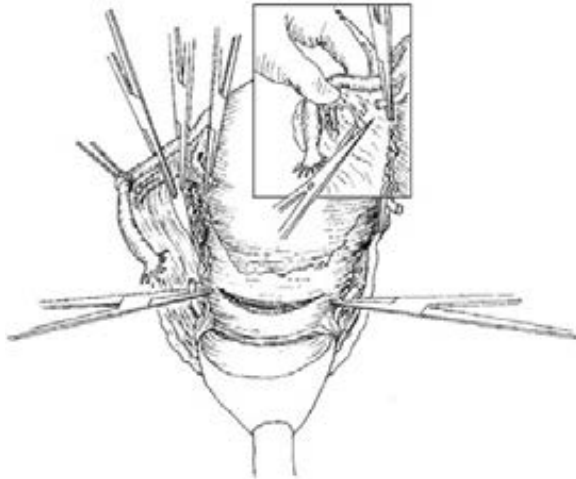
- Lift the uterus out of the abdomen and gently pull to maintain traction.
- Doubly clamp the round ligaments and cut with scissors (**Fig. P-57**). Clamp and cut the pedicles, but ligate after the uterine arteries are secured to save time.

FIGURE P-57. Dividing the round ligaments

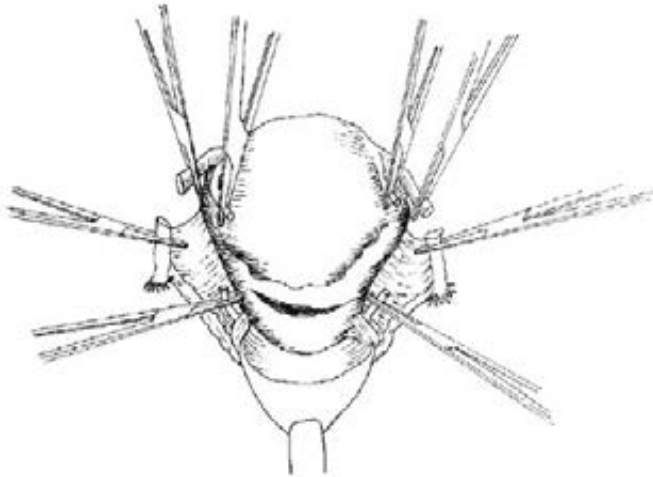


- From the edge of the cut round ligament, open the anterior leaf of the broad ligament. Incise to:
 - the point where the bladder peritoneum is reflected onto the lower uterine surface in the midline; or
 - the point where the peritoneal incision was made for the current or a previous caesarean.
- Use two fingers to push the posterior leaf of the broad ligament forward, just under the fallopian tube and ovary, near the uterine edge. Make a hole the size of a finger in the broad ligament, using scissors. Doubly clamp and cut the tube, the ovarian ligament and the broad ligament through the hole in the broad ligament (**Fig. P-58, page P-123**).

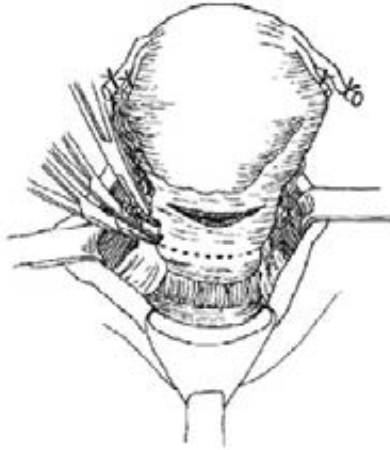
The ureters are close to the uterine vessels. The ureter must be identified and exposed to avoid injuring it during surgery or including it in a stitch.

FIGURE P-58. Dividing the tube and ovarian ligaments

- Divide the posterior leaf of the broad ligament downwards towards the uterosacral ligaments, using scissors.
- Grasp the edge of the bladder flap with forceps or a small clamp. Using fingers or scissors, dissect the bladder downwards off of the lower uterine segment. Direct the pressure downwards but inwards towards the cervix and the lower uterine segment.
- Reposition the bladder retractor and retract the bladder inferiorly.
- Locate the uterine artery and vein on each side of the uterus. Feel for the junction of the uterus and cervix.
- Doubly clamp across the uterine vessels at a 90 degree angle on each side of the cervix. Cut and doubly ligate with 0 chromic catgut (or polyglycolic) suture (**Fig. P-59, page P-124**).

FIGURE P-59. Dividing the uterine vessels

- Observe carefully for any further bleeding. If the **uterine arteries are ligated correctly**, bleeding should stop and the uterus should look pale.
- Return to the clamped pedicles of the round ligaments and tubo-ovarian ligaments and ligate them with 0 chromic catgut (or polyglycolic) suture.
- Amputate the uterus above the level where the uterine arteries are ligated, using scissors (**Fig. P-60, page P-125**).

FIGURE P-60. Line of amputation

- Close the cervical stump with interrupted 2-0 or 3-0 chromic catgut (or polyglycolic) sutures.
- Carefully inspect the cervical stump, leaves of the broad ligament and other pelvic floor structures for any bleeding.
- If **slight bleeding persists or a clotting disorder is suspected**, place a drain through the abdominal wall (**page C-70**). Do not place a drain through the cervical stump, as this can cause postoperative infection.
- Close the abdomen:
 - Ensure that there is no bleeding. Remove clots using a sponge.
 - In all cases, check for injury to the bladder. If a **bladder injury is identified**, repair the injury (**page P-115**).
 - Close the fascia with continuous 0 chromic catgut (or polyglycolic) suture.

Note: There is no need to close the bladder peritoneum or the abdominal peritoneum.

 - If there are **signs of infection**, pack the subcutaneous tissue with gauze and place loose 0 catgut (or polyglycolic) sutures. Close the skin with a delayed closure after the infection has cleared.
 - If there are **no signs of infection**, close the skin with vertical mattress sutures of 3-0 nylon (or silk) and apply a sterile dressing.

TOTAL HYSTERECTOMY

The following additional steps are required for total hysterectomy:

- Push the bladder down to free the top 2 cm of the vagina.
- Open the posterior leaf of the broad ligament.
- Clamp, ligate and cut the uterosacral ligaments.
- Clamp, ligate and cut the cardinal ligaments, which contain the descending branches of the uterine vessels. This is the critical step in the operation:
 - Grasp the ligament vertically with a large-toothed clamp (e.g. Kocher). Place the clamp 5 mm lateral to the cervix and cut the ligament close to the cervix, leaving a stump medial to the clamp for safety.
 - If the **cervix is long**, repeat the above step two or three times as needed.
 - The upper 2 cm of the vagina should now be free of attachments.
- Clamp and transect the vagina as near to the cervix as possible, clamping bleeding points as they appear.
- Place haemostatic angle sutures, to include round, cardinal and uterosacral ligaments.
- Place continuous sutures on the vaginal cuff to stop haemorrhage.
- Close the abdomen (as above) after placing a drain in the extraperitoneal space near the stump of the cervix (**page C-70**).

POST-PROCEDURE CARE

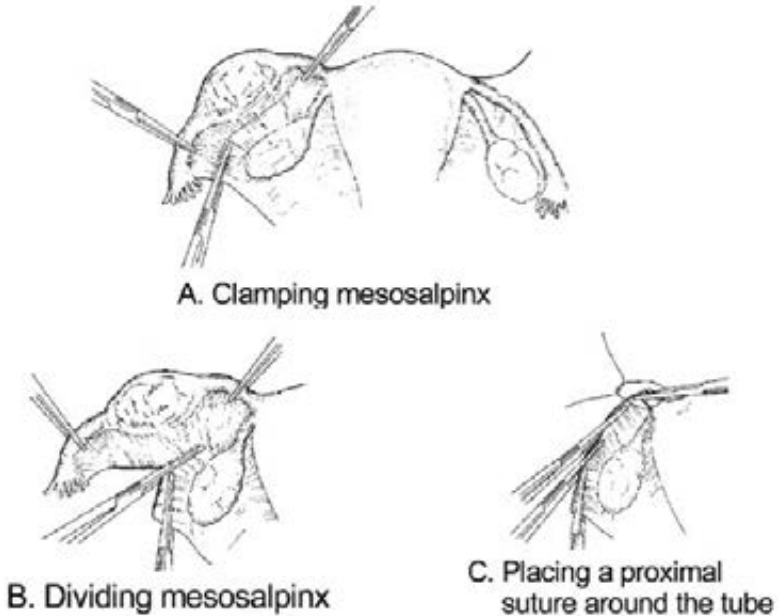
- Review postoperative care principles (**page C-71**).
- Monitor urine output. If there is **blood in the urine or the woman has loin pain** (pain in the sides between the lower ribs and pelvis and/or in the lower part of the back), refer the woman to a tertiary care centre, if possible, for treatment of an obstructed ureter.
- If there are **signs of infection** or the **woman currently has fever**, give a combination of antibiotics until she is fever-free for 48 hours (**page C-49**):
 - clindamycin phosphate 600 mg IV every eight hours;

- PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
- Give appropriate analgesic drugs (**page C-64**).
- If there are **no signs of infection**, remove the abdominal drain after 48 hours.
- Offer other health services, if possible (**page S-14**).

- Review for indications.
- Review general care principles (**page C-25**) and operative care principles (**page C-65**), and start an IV infusion (**page C-34**).
- Give a single dose of prophylactic antibiotics (**page C-49**):
 - ampicillin 2 g IV;
 - OR cefazolin 1 g IV.
- Open the abdomen:
 - Make a midline vertical incision below the umbilicus to the pubic hair, through the skin and to the level of the fascia.
 - Make a 2–3 cm vertical incision in the fascia.
 - Hold the fascial edge with forceps and lengthen the incision up and down using scissors.
 - Use fingers or scissors to separate the rectus muscles (abdominal wall muscles).
 - Use fingers to make an opening in the peritoneum near the umbilicus. Use scissors to lengthen the incision up and down in order to see the entire uterus. Carefully, to prevent bladder injury, use scissors to separate layers and open the lower part of the peritoneum.
 - Place a bladder retractor over the pubic bone and place self-retaining abdominal retractors.
- Identify and bring to view the fallopian tube with the ectopic gestation and its ovary.
- Apply traction forceps (e.g. Babcock) to increase exposure and clamp the mesosalpinx to stop haemorrhage.
- Aspirate blood from the lower abdomen and remove blood clots.
- Apply gauze moistened with warm saline to pack off the bowel and omentum from the operative field.
- Divide the mesosalpinx using a series of clamps (**Fig. P-61 A and B, page P-130**). Apply each clamp close to the tube to preserve ovarian vasculature.
- Transfix and tie the divided mesosalpinx with 2-0 chromic catgut (or polyglycolic) suture before releasing the clamps.

- Place a proximal suture around the tube at its isthmic end and excise the tube (**Fig. P-61 C**).

FIGURE P-61. Clamping, dividing and cutting the mesosalpinx



- Close the abdomen:
 - Ensure that there is no bleeding. Remove clots using a sponge.
 - Close the fascia with continuous 0 chromic catgut (or polyglycolic) suture.
 - If there are **signs of infection**, pack the subcutaneous tissue with gauze and place loose 0 catgut (or polyglycolic) sutures. Close the skin with a delayed closure after the infection has cleared.
 - If there are **no signs of infection**, close the skin with vertical mattress sutures of 3-0 nylon (or silk) and apply a sterile dressing.

SALPINGOSTOMY

Rarely, when there is little damage to the tube, the gestational sac can be removed and the tube conserved. This should be done only in cases where the conservation of fertility is very important to the woman, because she is at risk for another ectopic pregnancy.

- Open the abdomen and expose the appropriate ovary and fallopian tube (**page P-129**).
- Apply traction forceps (e.g. Babcock) on either side of the unruptured tubal pregnancy and lift to view.
- Use a scalpel to make a linear incision through the serosa on the side opposite the mesentery and along the axis of the tube, but do not cut the gestational sac.
- Use the scalpel handle to slide the gestational sac out of the tube.
- Ligate bleeding points.
- Return the ovary and fallopian tube to the pelvic cavity.
- Close the abdomen (**page P-130**).

POST-PROCEDURE CARE

- Review postoperative care principles (**page C-71**).
- If there **are signs of infection** or the **woman currently has a fever**, give a combination of antibiotics until she is fever-free for 48 hours (**page C-49**):
 - clindamycin phosphate 600 mg IV every eight hours;
 - PLUS gentamicin 5 mg/kg body weight IV every 24 hours.
- Give appropriate analgesic drugs (**page C-64**).
- Offer other health services, if possible (**page S-14**).
- If **salpingostomy was performed**, advise the woman of the risk for another ectopic pregnancy and offer family planning (**Table S-6, page S-15**).

APPENDIX

ESSENTIAL MEDICINES FOR MANAGING COMPLICATIONS IN PREGNANCY AND CHILDBIRTH

A-1

ANAESTHETICS

halothane
ketamine
lidocaine 2% or 1%

hydralazine
labetolol
nifedipine immediate-release

ANALGESICS

aspirin
ibuprofen
indomethacin
morphine
paracetamol

ANTIMALARIALS

amodiaquin
artemether
artesunate
chloroquine
clindamycin
dihydroartemisinin
doxycycline
halofantrine
lumefantrine
mefloquine
piperazine
primaquine
proguanil
quinidine
quinine dihydrochloride
quinine sulfate
sulfadoxine/pyrimethamine
tetracycline

ANTIBIOTICS

amoxicillin
ampicillin
benzathine penicillin
benzyl penicillin
cefazolin
ceftriaxone
clindamycin
cloxacillin
erythromycin
gentamicin
kanamycin
metronidazole
nitrofurantoin
penicillin G
procaine penicillin G
vancomycin

IV FLUIDS

dextrose 10%
glucose (5%, 10%, 50%)
normal saline
Ringer's lactate

ANTICONVULSANTS

diazepam
magnesium sulfate
phenytoin

MEDICINES USED IN EMERGENCIES

adrenaline
aminophylline
atropine sulfate
calcium gluconate
digoxin
diphenhydramine
ephedrine
furosemide

ANTIHYPERTENSIVES

alpha methyl dopa

naloxone
 nitroglycerine
 prednisone
 prednisolone
 promethazine

SEDATIVES

diazepam
 phenobarbitone

STEROIDS

betamethasone
 dexamethasone
 hydrocortisone
 prednisolone

TOCOLYTICS

nifedipine immediate-release
 salbutamol
 terbutaline

UTEROTONIC MEDICINES/ MEDICINES TO PREVENT AND TREAT POSTPARTUM HAEMORRHAGE

15-methyl prostaglandin F_{2α}
 ergometrine
 methylergometrine
 misoprostol
 oxytocin
 prostaglandin E₂
 tranexamic acid

OTHER

antitetanus serum
 bacillus Calmette-Guérin
 (BCG)

chlorhexidine
 co-trimoxazole
 ferrous fumarate
 ferrous sulfate
 folic acid
 heparin
 levonorgestrel
 magnesium trisilicate
 medroxyprogesterone
 povidone-iodine solution 2.5%
 silver nitrate solution 1%
 sodium citrate
 tetanus antitoxin
 tetanus toxoid
 tetracycline ointment 1%
 vitamin K

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Integrated Management Of Pregnancy And Childbirth

The Integrated Management of Pregnancy and Childbirth (IMPAC) is a strategy to improve access to and quality of maternal and neonatal health care. It comprises:

- **evidence-based norms and standards of care;**
 - **managerial tools to strengthen the capacity of the health care system;**
 - **a process to foster involvement of individuals, families and communities;**
- and**
- **an implementation strategy.**

IMPAC is designed to be adapted to local situations and to be implemented in countries by the government, in collaboration with UN and bilateral agencies, non-governmental organizations and other partners at the national level.

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For updates to this publication, please visit.
www.who.int/maternal_child_adolescent

ISBN 978-92-4-156549-3

