ANTENATAL AND POSTNATAL CARE

A MANUAL

FOR HEALTHCARE PROVIDERS

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Introduction

Maternal and perinatal mortality is still unacceptably high in many low- and middle-income settings. An estimated 287,000 women died in 2020 due to complications during pregnancy and childbirth. In addition, there were 2.4 million newborn deaths three quarters of which occur in the first week of life, and, an estimated 1.9 million stillbirths[1]. Neonatal deaths account for almost half of all deaths in children under five years of age. Most of these deaths could have been prevented if effective care had been available and of good quality.

The burden of pregnancy related morbidity is largely unknown but likely to be significant. For every maternal death, an estimated 20 to 30 women experience significant morbidity requiring healthcare. Preliminary studies show that during and after pregnancy, 3 out of 4 women have clinical symptoms, abnormalities on clinical examination and/or laboratory investigation, 1 in 2 women have anaemia, 1 in 3 social morbidity and 1 in 4 mental health problems[2].

Since 2000, there have been reductions in both maternal and neonatal mortality, largely because of interventions that have been put in place around the time of birth. This has resulted in an increased uptake of skilled birth attendance or facility delivery from 56% globally in 1990 to 82.6% estimated in 2019. Effective interventions during the time of childbirth and the period immediately after birth are particularly critical to reduce maternal deaths, stillbirths and early neonatal deaths. Ensuring that health needs are identified and met during and after pregnancy is equally important.

The scope of the international health targets has been expanded, moving from a focus on preventing death to formulating targets for and emphasising the importance of health and well-being. The United Nations Global Sustainable Development Goal, (SDG), for health is to '**Ensure healthy lives and promote well-being for all at all ages'**. Similarly, the Global Strategy for Maternal Newborn and Child Health emphasises that all women have the right to the highest attainable standard of health and well-being including the physical, mental and social aspects of health.

Of the 50 essential interventions for reproductive, maternal, newborn and child health for which there is evidence of effectiveness and which can be expected to have a significant impact on maternal, newborn and child survival; more than half are expected to be implemented as part of a **continuum of care during and after pregnancy**[3]. It is important to ensure that the management of malaria, HIV/AIDS and tuberculosis (TB) in the antenatal and postnatal periods are **integrated** into the provision of 'routine' obstetric care. In addition, it is important that care is **differentiated,** i.e. meeting the specific identified health needs of each mother and her baby.

Globally, in 2022, 88% of women were estimated to have attended for antenatal care on at least one occasion during pregnancy and 69% attend four times or more. In reality, in many cases this constitutes a series of 'missed opportunities'. Only 63% of women and babies globally receive postnatal care.

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[1] WHO (2023) Trends in maternal mortality 2000 to 2020: estimates by WHO, UNICEF, UNFPA, World Bank Group and UNDESA/Population Division. Accessed on line at https://www.who.int/publications/i/item/97892400687

[2] Based on a study conducted by CMNH in 2015 among 11,454 women in Kenya, Malawi, Pakistan and India.

[3] WHO, Aga Khan University (2011) Essential Interventions, Commodities and Guidelines for Reproductive, Maternal, Newborn and Child Health: A global review of the key interventions related to Reproductive, Maternal, Newborn and Child Health (RMNCH). Geneva, Switzerland PMNCH.

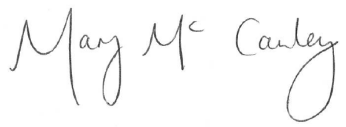
During antenatal care, many of the conditions that may lead to complications of childbirth, maternal mortality, stillbirth and neonatal death can be prevented, identified and managed. Antenatal care links the woman and her family with the formal health system, with the potential to improve health during pregnancy for both the mother and her unborn baby, and increasing the probability of the mother receiving skilled birth attendance, essential newborn care and postnatal care.

Many maternal deaths occur in the postnatal period and care in the period following birth is critical not only for survival, but, also for the future health and development of both the mother and her baby. An important challenge in the postpartum period is the provision of support for family planning to address a largely unmet need for contraception that can prevent unintended, untimely and unwanted pregnancies.

This manual is structured around the leading causes of ill-health in the mother during and after pregnancy and in the newborn baby. It sets out how antenatal and postnatal care can be organised such that it is comprehensive, integrated and differentiated. Mothers and babies will then receive the care they need, when they need it, and, in a way that is user-friendly, ensuring that both the mother and baby survive and thrive during and after pregnancy.

The guidance in this manual is based upon the latest available scientific evidence. Given that evidence-based medicine is the standard on which to base clinical practice, the manual will be updated as new information becomes available.

This manual is meant for use by all those healthcare providers – nurses, midwives, clinical officers, medical assistants and doctors – working in low- and middle – income countries in sometimes very difficult situations, striving to provide good quality of care. We sincerely applaud them and their work and hope they will find this manual useful.



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Chapter 1: Quality of antenatal and postnatal care

In this chapter, you will find information about:

- Quality of care
- Respectful maternity care
- The rights-based approach to health
- Communication skills
- How and when to obtain informed consent
- The importance of male involvement and companionship

The quality of care

Internationally, there has been much progress made with regard to increasing the coverage of maternal and newborn health interventions over the past two decades. However, further improvement in maternal and newborn health outcomes will depend on the ability of healthcare leaders and providers to address the gap between availability and quality of care. Improving the quality of facility-based healthcare services and prioritising quality improvement as an integral component of scaling-up of effective, evidence-based interventions is crucial if health outcomes for women and babies are to improve.

There are various definitions of quality of care, all of which are applicable to antenatal and postnatal care.

Definitions of quality of care

- Quality of care is defined as the extent to which health services provided to individuals and populations improve desired health outcomes. In order to achieve this, health care needs to be safe, effective, timely, efficient, equitable, and people-centred.
- Quality of care is the degree to which maternal health services for individuals and populations increase the likelihood of timely and appropriate treatment for the purpose of achieving desired outcomes that are both consistent with current professional knowledge and uphold basic reproductive rights.

Multi-disciplinary teamwork with midwives, nurses, clinical officers and doctors is essential to provide good quality evidence-based care. Sometimes healthcare providers may provide care which is not proven to be effective (i.e. non-evidence-based) simply because “that is the way it has always been done”. Therefore, it is important that all healthcare providers are knowledgeable and keep up-to-date regarding which aspects of care are evidence-based and beneficial and, conversely, which aspects of care are in fact of no evidenced benefit or even detrimental to either the woman or her baby.

Components of good quality care

- Care is provided in line with current available best evidence (evidence-based care).
- Health care that is competent, supportive, responsive and sensitive to the values and context of each woman's culture.
- Each woman is warmly welcomed and called by her name.
- Care is provided on the basis of need rather than social status or the ability to pay either formally or informally.
- Special attention is given to ascertaining and providing for each woman's specific needs and wishes.
- Each woman's physical, social and mental health needs are taken into account.
- Each woman is treated with compassion, kindness, and patience.
- Women are given information in plain language and play an active role in the decision-making process for the care they receive.
- Privacy and confidentiality is maintained at all times.
- Women are given the opportunity to ask questions, and to have their concerns addressed.
- The woman's partner of choice is consulted, involved and informed of decisions, interventions and needs as they arise, provided the woman gives permission.
- A mother and her newborn are enabled to remain together from birth and throughout their stay in or visit to a healthcare facility.

Respectful maternity care

The World Health Organization describes respectful maternity care (RMC) as "the care organised for and provided to all women in a manner that maintains their dignity, privacy and confidentiality, ensures freedom from harm and mistreatment, and enables informed choice and continuous support during labour and childbirth". The components of respectful care mentioned in the definition above focus on the interpersonal relationships in the woman-provider dyad. Nonetheless, they have their roots in a robust health system, and respectful care cannot be fully realised in the absence of a well-functioning health system.

Providing respectful maternity care is an essential component of quality improvement. This includes care that is woman-centred, empowering, supportive, evidence-based, enabling open communication and full expression of trust and commitment between a woman and her healthcare provider. Respectful maternity care highlights that women have a right to receive the highest quality of care possible, in a way that addresses their physical, psychological and social needs. Treating women with dignity and respect means that the healthcare provider has a caring attitude, listens to women, respects their wishes and demonstrates empathy.

- **Respect:** This relates to holding someone in high regard. The healthcare provider can start to show respect by introducing her/himself by name and greeting the woman warmly by her name, but then the other aspects of respectful care should follow on from this, for example, the provision of full and understandable information concerning the health condition and the recommended management.
- **Empathy:** Showing empathy for someone means understanding their situation, thinking how you would feel if you were in a similar situation and being able to share their feelings. The healthcare provider can show empathy by active listening to understand a woman's specific health concerns.
- **Dignity:** Showing dignity means that a woman is valued and care is given in a way that supports and promotes, and does not undermine, a woman's self-respect. The healthcare provider can demonstrate dignified care by ensuring privacy and confidentiality at all times and respecting the needs imposed by the woman's culture.

To provide respectful maternity care, healthcare providers need to have the right attitude, beliefs and values. An attitude is a way of thinking or feeling about something, and may be favourable or unfavourable. A belief is a thought that we hold deeply and trust and, because of this, this can cause automatic reactions in us. People do not often question beliefs as they hold them to be true. Attitudes and values are shaped in part by our beliefs, but we may not always be aware of this unless we stop to think about it. Everyone has a right to their own beliefs but, when caring for women, healthcare providers should explore and understand how these affect the care they give (both positively and negatively), in order to ensure that their personal beliefs do not result in compromising care.

These are some of the reasons that may explain why disrespect and abuse during antenatal and postnatal care occurs and a review of these may help healthcare providers work out ways to resolve the issues. Sometimes there are factors in the health system itself or in the community that act as barriers to being able to provide good quality care. Healthcare providers and managers can usually influence these factors to help facilitate improvement and overcome these barriers.

Table 1.1: Barriers and enabling factors for delivery of respectful maternity care

	Barriers	**Enabling factors**
Health system factors	Inadequate infrastructure	Reorganisation of available space, raise funds for seating
	Shortage of equipment and supplies	Regularly check stock and report any shortages to management regularly and early
	Poor supervision and management of healthcare facilities	Start a system of mentorship
	Poor resource management of existing staff	Make a clear rota and schedule for clinics
	Entrenched hierarchies and power dynamics	Flat hierqarchy based upon mutual respect
	Inadequate communication linkages between healthcare facility managers, providers and community members	Organise quality of care meetings
Community level factors	Gender imbalances in communities where the man is the sole decision maker	Ensure discussions with the community include both men and women
	Lack of knowledge about the importance of maternity care	Community education
	Financial barriers including the need to pay for transport to access care	Mobilise community resources
	Limited opportunities for communities to seek redress if women are unhappy with services received	Encourage the community and women to give feedback about the quality of care they have received, both positive or negative experiences
	Traditional beliefs, practices, customs and taboos making it difficult to discuss issues around childbirth	Respect tradition and deliver care in ways that are culturally appropriate

The rights-based approach to sexual and reproductive health

This definition of reproductive health highlights the importance of a rights-based approach to health care. Reproductive health is the complete physical, mental and social well-being in all things related to the reproductive system, including a satisfying sex life, the ability to have children and freedom to decide if when and how often to have children.

Reproductive rights include the right to:

Decide on the number and spacing of children in a family

- Be educated regarding the means to choose the contraception method of their choice
- Have the highest possible standards of reproductive health
- Have access to a skilled birth attendant
- Make personal decisions about reproduction free from discrimination, coercion and violence

Not treating a woman with respect and dignity when providing health care is a violation of her rights as a human being.

Examples of abuse of human rights in maternal health are:

- **Physical abuse**: a woman is slapped during childbirth by the healthcare provider.
- **Non-consensual care**: care is provided without the woman's permission and/or agreement, for example performing routine episiotomy, especially without analgesia.
- **Non-confidential care**: test results for a woman are shared with or overheard by others without her permission.
- **Discrimination**: women who are illiterate or otherwise disadvantaged are not treated with the same regard as other women.
- **Abandonment or withholding of care**: a woman whose care needs are not met by the healthcare provider for example analgesia is not offered during and after childbirth.

Table 1.2: The rights-based approach to sexual and reproductive health

	Examples of rights	**Example of disrespect and abuse**	**Example of how rights can be met**
1	Freedom from harm and ill treatment	Physical or verbal abuse	Ensure a policy of no physical or verbal abuse is implemented
2	Right to information, informed consent and refusal of care	Non-consensual care	A clear explanation is given to women about the care they need and why. They are not penalised if they refuse the care offered to them
3	Respect for choices and preferences for care, including having a companion during maternity care	No companion allowed in the examination room during antenatal or postnatal care	Healthcare providers allow the companion of the woman's choice to be with the woman at all times
4	Confidentiality, privacy	Non-confidential care	Healthcare provider speaks with the woman on her own and out of earshot of others
5	Equality, equitable care, freedom from discrimination	Discrimination based upon specific characteristics of the woman	All women are treated equally regardless of those characteristics
6	Right to timely health care and to the highest standard of care available	Abandonment or denial of care or poor quality of care	Good organisation of antenatal and postnatal care to reduce waiting time Evidence-based, timely care is provided safely
7	Liberty, autonomy, self-determination and freedom from coercion	Detention in a healthcare facility against a woman's wishes	Explanations given regularly as to why a woman needs to stay in a healthcare facility Process for self-discharge against medical advice in place

Communication skills

Good communication skills, both verbal and non-verbal, are essential for all healthcare providers. Any interaction between healthcare providers and a woman and her family is an opportunity to build rapport and demonstrate respectful care. The experience of the visit and consultation is likely to affect how the women and her family perceive the care they receive and this will influence their decision to continue engagement with the healthcare facility.

Effective communication includes:

- Having the ability to listen to the woman and her family
- Being able to clearly explain what the care is, what investigations and management are being offered and the meaning of any results of the test in words that the woman will understand
- Using the local language that a woman understands, including the use of an interpreter if necessary
- Demonstrating empathy for the women and her family
- Being non-judgemental

Ways to improve communication:

- Allow some time for introductions explaining who you are and what care you recommend
- Sit at the same level as the woman when you are talking with her when taking a history
- Sit beside a woman rather than behind a table or desk during consultation
- Use language that is not medicalised and can be clearly understood by the woman and her chosen companion
- Ask open ended questions starting with e.g. “why, how or what?”
- Provide a private space for the discussion to happen

Informed consent

Giving consent in maternal health for treatment is based upon the principle that a woman must give their permission before, an investigation, medical procedure or an examination and medical treatment is carried out. Consent can only be given after a clear explanation is given by a healthcare provider and understood by the woman.

Consent must be:

- **Voluntary**: The decision must be made by a woman without influence or coercion from healthcare providers, friends or family.
- **Informed**: A woman must be given correct information about what the treatment or examination involves, including the benefits and risks, reasonable alternatives and what will happen if the treatment or examination goes ahead, all in plain language.

In principal, a woman must be capable of giving consent, which means they can understand the information that has been given to them and can use it to make an informed choice. Consent can be verbal, such as when taking a blood sample or written such as recommended in the case of a surgical intervention such as Caesarean section.

To be valid, consent should include an explanation of the procedure recommended, the reason for this recommendation, the risks and benefits of the procedure, and any alternatives, with likely outcomes.

Different forms of consent

Lack of consent: Obtaining voluntary and informed consent can be difficult if a woman may have an impaired state of mind or be unconscious, such as after an eclamptic fit. In such cases the health worker may need to make a decision to act in the patient's best interests. In some cultures consent may be sought from the next of kin in this circumstance, but this is not an acceptable alternative in all settings.

Refusal of care: Even if refusing treatment might cause harm or death, a woman's decision should be respected within the laws of the country. This can be very difficult, for example, when a woman with a very low haemoglobin level refuses a blood transfusion for religious reasons. In these cases, a woman can be asked to sign a form or statement which declares that she understands the risks of going against medical advice and still wishes to decline treatment, accepting responsibility for any risks to her own health. If a woman is pregnant and a refusal of care (e.g. the need for a Caesarean section) will result in harm to the unborn baby then a legal judgement may have to be made as to whether the treatment can go ahead.

Age: In the case of a woman who is under the legal age of consent then she may still be able to give consent if she can demonstrate to the healthcare provider that she fully understands what she is consenting to. If this is not the case, then parents or guardians may have to give consent. Laws regarding consent vary from country to country. In most countries, the age of consent is either 16 or 18 years of age.

In practical terms, it may not be possible to obtain written consent in emergency situations, for example, a massive obstetric haemorrhage and in these cases a healthcare provider can proceed with verbal consent prior to treatment.

Husband/Partner involvement and companionship

In some settings, pregnancy is considered a subject/topic for women, leaving husbands/partners ill-equipped with sufficient information and knowledge on specific aspects of maternal and newborn health. There is therefore, a need to empower husbands/partners through the provision of information and services. Provided the woman gives consent, It is useful to involve the woman's husband or partner and family so that they are well informed about the care that the woman needs. This will enable them to anticipate any problems and support the woman during and after pregnancy and childbirth.

Advantages of involving the husband/partner and family include:

- Increased information regarding the pregnancy, childbirth and postnatal processes
- Increased awareness of possible danger signs during the pregnancy
- Development of a birth plan including availability of finances and planning for transport to the healthcare facility
- Increased understanding of the specific needs of the mother and baby when returning to the family home
- Increase in general community and public awareness of issues around maternal and newborn care

Support from a husband, partner, another family member or friend is important during pregnancy, labour, birth and the postpartum period. Women can be encouraged to bring their husband or alternative companion of their choice during antenatal care, delivery and postnatal care to ensure the woman's health needs are understood. Men are more supportive to their wives and partners when they understand what is happening during and after pregnancy. Husband/partner involvement and participation is associated with improved maternal health outcomes.

In the absence of a husband or partner, or if the woman chooses not to involve them, women can be encouraged to bring another family member or friend with them. A companion can provide important support to a woman. Companionship during labour leads to a better birth experience for the woman. However, note that the wishes of the woman should be respected even if the woman chooses not to have any companion, regardless of whether she discloses the reason for her choice.

References

1. World Health Organization *Who recommendations: intrapartum care for a positive childbirth experience*. World Health Organization, 2018

Chapter 2: Organisation of Antenatal and Postnatal Care

In this chapter, you will find information about:

- The different models of antenatal and postnatal care
- Preparing the healthcare facility for antenatal and postnatal care
- Essential equipment and supplies for antenatal and postnatal care
- Infection prevention and control
- Ensuring a clean, safe working environment
- Community involvement in antenatal and postnatal care

Models of antenatal and postnatal care

Antenatal care

The traditional antenatal care model

The traditional antenatal care model was developed in the 1900s. The aim was to provide between 16-18 visits during pregnancy for women. Using an 'at risk' identification approach, women were classified as either high- or low-risk patients. The aim of this type of antenatal care was to try and predict complications that might occur and prevent and manage these.

When taking a women's history, a healthcare provider can identify risk factors that may lead to complications during pregnancy, labour, birth or in the postnatal period. Risk factors will depend on the woman's age; her past obstetric history including whether she has experienced previous miscarriage, stillbirth or preterm birth, or if she has current co-existing conditions such as malaria, HIV, TB, anaemia or diabetes. However, many complications during and after pregnancy can also be unpredictable and unexpected, and arise in women with no apparent risks.

The focused antenatal care model

In 2001, the World Health Organization recommended a model of antenatal care called focused antenatal care to replace the traditional antenatal care model. This used a goal-orientated approach that focused on the quality of the visits rather than the number of visits. The number of recommended visits was reduced from sixteen to four. This approach aimed to provide individualised care and promote the health of mothers and their babies through targeted assessments.

These targeted assessments include the following:

- Identify and treat illnesses
- Detect obstetric complications early that could affect the outcome of pregnancy
- Provide preventive and care management (e.g. screening for and management of hypertension and pre-eclampsia, detection and treatment of anaemia, identification of women with multiple pregnancy)
- Provide prophylaxis and treatment for anaemia
- Screen and treat for infections including HIV, tuberculosis (TB), malaria
- To prevent neonatal tetanus in the baby by vaccination of women during pregnancy

Individualised care for the woman aims to help maintain the normal progress of pregnancy through advice and guidance, and includes:

- Birth preparedness, planning a birth plan along with husband/partner and family
- Education regarding nutrition, immunisation, personal hygiene, immediate and exclusive breastfeeding, essential newborn care and family planning
- Counselling on danger signs so that the woman can recognize them and seek immediate help from a health professional

Most low and middle-income countries implemented the model of focussed antenatal care.

In 2016, new guidelines from the World Health Organization were released which recommended that the number of antenatal visits be increased from four to eight. There is evidence that this increased number of antenatal visits is associated with improved perinatal outcomes, greater maternal satisfaction and a greater proportion of women seeking health facility birth and postnatal care. The implementation of this recommendation remains a challenge in settings with limited health system capacity to deliver antenatal care.

Postnatal care

Timing and number of postnatal visits

In 2016, new guidelines from the World Health Organization recommend that:

- If birth is in a healthcare facility, mothers and newborns should receive postnatal care in the facility for at least 24 hours after birth
- If birth is at home, the first postnatal care visit from a healthcare provider should be as early as possible within 24 hours of birth
- At least three additional postnatal visits are recommended for all mothers and newborns
  - ☐ Day 3 (within 48-72 hours)
  - ☐ Day 7-14 after birth
  - ☐ 6 weeks after birth

Home visits in the first week after birth are recommended for care of the mother and newborn. In some settings, these home visits can be supported by the community health workers. This may allow more time for health education and help ensure that recommendations made during antenatal and postnatal visits are well understood and implemented. In general, however, community health workers may not have the capacity to deliver the full content of evidence-based antenatal and postnatal care packages and will need support from healthcare providers.

Maternity waiting homes

If a healthcare facility is far from a woman's home, it may be beneficial for the woman to have access to a maternity waiting home. Maternity waiting homes are residential facilities located near to or within a healthcare facility, where women can await the onset of labour and childbirth with easy access to skilled attendance at birth and avoid the uncertainties of emergency transportation, particularly at night.

Preparing the healthcare facility for antenatal and postnatal clinics

Group or individualised antenatal and postnatal

Individualised antenatal care is when each woman has an allocated one-to-one appointment. In general, this means she will spend less time in the healthcare facility and there are shorter waiting times. However, there is less group interaction between women attending for care.

Group antenatal care is when care is provided to a group of women. Often, this means women are first registered one-by-one, the blood pressure is measured for each woman and other investigations may be done. After this, each woman may see a healthcare provider for abdominal palpation in turn. This allows for group interaction but it can be less time efficient and care is often fragmented, i.e. she sees several different healthcare providers each time.

Women may attend for antenatal care by themselves, with their husband/partner, family member or friends. Waiting times in clinics may be long and although it is important that this is resolved, some of this time may be used to provide health education to women, to answer any questions women may have and establish communication, confidence and trust in the health system. Being part of a group may empower women to ask more questions and woman may find it helpful to share their experiences with other women.

Preparing the antenatal and postnatal clinic area

Ideally, the location in the healthcare facility where the antenatal and postnatal clinics take place should be welcoming and appropriate for providing both individual care (history taking, counselling, physical examination and provision of care) and collective support (health education, birth preparedness activities). As well as consultation areas, there should also be a waiting area with seats for women and their husbands/partners and a separate toilet. The exact layout of the antenatal and postnatal clinic will vary depending on the level of care it provides: primary, secondary or tertiary care level. In smaller healthcare facilities, space may be limited, there may be only one room and so the room may have multiple uses. In this case, areas can be screened off for performing examinations and to maintain privacy. However, be aware that screens are not sound-proof and there is a risk of confidentiality becoming compromised. A suggested layout is presented in Appendix 1.

Cleanliness, comfort and order of the clinic area

- Area is clean and free from clutter
- Enough space (examination room/area and waiting rooms/area identified)
- Well maintained building
- Essential equipment is available and ready for use
- Separate containers for clinical waste (for contaminated materials) and non-clinical waste available chlorine solution (0.5%) and cleaning materials to clean working surfaces
- Broom for sweeping

Furniture

- Examination couch or bed and steps to get onto the couch or bed
- Seating for the women and her companion(s)
- A table or desk and chair for the healthcare provider to write
- A table or trolley for supplies
- Screens for privacy
- Cupboard which can be locked for patient files, registers, drugs, consumables, supplies, etc.
- A dedicated area with a table and chairs where blood and urine testing can be done

Water supply

- Clean running water available from a tap, pump or poured from a basin or container for handwashing and drinking water for women

Light source

- Reliable source of light plus specific source of light to undertake pelvic examination, e.g. head torch, standing lamp (depending on power supply available)

Staffing

- The correct number and cadre of staff for the clinic and number of women expected

If no separate waiting room is available, then an area or shelter where women can wait protected from the sun or rain should be provided. Clean water is essential for any antenatal and postnatal clinic. If there is intermittent electricity supply, then good natural lighting is important. Maintaining privacy and confidentiality during the consultation and examination is very important. If there are a limited number of rooms, then screens should be used.

Essential equipment and supplies

When planning for the clinic for antenatal and postnatal care, a full set of equipment and supplies needs to be available. It is important to check this and organise the clinic area and room before the clinic starts.

- General supplies, e.g. furniture, stationery, gloves and aprons
- Medical equipment, e.g. blood pressure machine, speculum, stethoscope, Pinards
- Equipment needed for taking blood and urine samples, equipment and supplies needed for Hb estimation malaria, syphilis, HIV testing, and urine testing
- Essential drugs, e.g. anti-hypertensives, antibiotics

Further suggestions for supplies for each of the above are provided in Table 2.1. These will vary depending on the specific needs of the country and healthcare facility.

Table 2.1: Essential equipment and supplies needed for the antenatal and postnatal clinic area

Examination area	**Drugs and supplies**	**Fixed assets**	**Test kits, reagents and consumables**
Height scale and weighing scales	iron and folic acid tablets	Wheelchair	Cuvettes and cleaner for Hemocue
Running water and soap or bucket of clean water	Tetanus toxoid injection	Hemocue machine (or another method of measuring Hb)	Batteries and control for Hemocue and doppler
Stainless steel tray, gallipot	Long-lasting insecticide-treated bed nets	Glucometer	HIV/Syphilis duo test
Handheld doppler or pinard stethoscope	Malaria prophylaxis (IPT) and treatment	GeneXpert IV machine (for diagnosing TB)	GeneXpert cartridge
Measuring tape	Antiretrovirals	Steriliser	Malaria RDT kit
Antenatal wheel to calculate estimated date of delivery	Analgesia	Ultrasound scanning machine	Urine dipsticks, Urinary pregnancy tests
Blood pressure machine	Antibiotics	Fridge or cool box	Normal gloves and sterile gloves
Stethoscope	Antihypertensives		Tourniquet
Thermometer	**Office Stationery**		Syringes and needles
Metallic speculum	Antenatal care card or mother and baby booklet		Alcohol swabs
Patella tendon hammer	Registers and record books Information pamphlets, chart and wall posters		Urine and sputum containers

Infection prevention and control

Infection prevention and control is important to prevent nosocomial infections from occurring, i.e. those aquired within the facility, including transfer of infection from one patient to another or from staff to patients and vice versa. Following the basic principles of infection prevention and control will help to protect both healthcare providers and women and their babies who access and receive care at the healthcare facility.

Handwashing

Good handwashing technique is the cornerstone of infection prevention and control. All healthcare providers should know how and when to wash their hands correctly. Ideally, hands should be washed with clean running water and liquid or clean soap (bars of soap may be reservoirs for microorganisms if left lying around for long periods of time). If running water from a tap is not available, then use a jug to pour water over hands. Hands should be dried with disposable paper towels or a clean cloth. Cloths that are used more than once can be a reservoir for microorganisms. Cloths and towels should be washed and dried regularly before re-use. Hands should be washed before and after examining a woman, taking blood and testing urine.

It is important for all healthcare providers to practice good hand hygiene. Each healthcare provider has a responsibility to help reduce the risk of infection in their work place and this can be done most effectively by washing hands correctly and following the correct handwashing procedures (see Appendix 2). Alcohol hand rubs may also be used but they are not effective on hands that are visibly soiled; hands may still need to be washed prior to using alcohol hand rubs. Alcohol hand rub, where available, is useful as an alternative to handwashing between examining each woman.

Use of personal protective equipment

Personal protective equipment is equipment that is worn to help maintain health and safety and reduce the risk of infection. This includes gloves, aprons, masks and eye shields. Protective clothing is used to protect both the healthcare provider and woman from cross infection with microorganisms.

Gloves: Handwashing is still needed before and after putting on gloves. Any cuts or abrasions should be covered with a waterproof plaster. Gloves should always be disposable and never reused.

Table 2.2: Instructions for glove use

No gloves needed	Non-sterile gloves used	Sterile gloves used
Clinical observations: taking pulse, temperature, blood pressure Abdominal palpation	Giving an injection Vaginal examination	Changing wound dressing, e.g. after Caesarean section Removing stitches, e.g. after Caesarean section Inserting an intrauterine contraceptive device

Aprons, face masks and goggles: In situations where there is a greater risk of contact with potentially infected/contaminated body fluids, then aprons, face masks and goggles may need to be worn, in accordance with local protocols. The apron should cover all the front of the healthcare provider. Ideally, disposable aprons are used. Where there are no disposable aprons available, use plastic or washable aprons which can be chemically cleaned with chlorine. Masks are usually disposable and goggles can be disinfected.

Prevention of spread of airbourne infection

Masks of FFP2 or FFP3 grade (N95 or N99) have been shown to protect both the wearer and those near to them from infection spread by means of aerosols and droplets, such as Sars-Cov2. Water resistant medical masks provide some protection to others but less to the wearer themselves due largely to looseness of fit. High grade masks should ideally be fit tested to check for leaks. Rooms should be well ventilated with either natural ventilation or the use of High Efficiency Particulate Air (HEPA) filters and beds should have at least 2.4m separation from the middle of one bed to another. in areas with COVID-19 community transmission, WHO advises that health workers and caregivers working in clinical areas should continuously wear a medical mask during all routine activities throughout the entire shift.

Handling of sharps

Needles, finger prick scalpels and other sharp clinical waste need to be disposed of correctly to reduce the risk of injury to the woman and to the healthcare provider. The risk of infection depends on: if the instrument has been used, if it contains blood, how much infected material has entered the blood stream and how infective the material is.

To safely manage sharps:

- Always dispose of sharps in a rigid container that has a secure lid and is labelled appropriately
- Never overfill a sharps container
- Always assume discarded needles are infectious
- Never re-sheath a needle, even if it has not been used
- Be alert to the possibility of needles being present before handling waste, e.g. when sweeping the floor and emptying bins

If a needle-stick or sharp injury does occur:

- Encourage the wound to bleed, ideally holding it under running water
- Wash the wound using running water and soap, but do not scrub it
- Dry and cover the wound
- Seek immediate medical advice regarding the need for immunisation for hepatitis B; post exposure prophylaxis to reduce the risk of HIV infection; treatment for general wound infections

Ensuring a clean, safe working environment

! Ensure guidelines are in place for cleaning all areas of the clinic.

Cleaning the healthcare facility

It is important to routinely clean surfaces and to ensure that the healthcare facility environment is visibly clean and free from dust and soil.

Disinfection

Disinfection with chlorine is the most widely accepted and appropriate way of removing microbes. Sources of chlorine include bleaching powder, liquid bleach and chlorine tablets.

Cleaning schedule

A healthcare facility generally has three types of areas each with a specific cleaning routine.

- Sweeping: Offices, non-patient areas at least once a day.
- Wet mopping: Waiting area, consulting room and area, general wards (non-infectious diseases), pharmacy at least once a day.
- Cleaning with a disinfectant (0.2% chlorine solution): All areas that have come into contact with patients e.g. beds, seating, examination, cubicles, and weighing scales.
- Toilets should be cleared whenever they are dirty but at least twice a day with a disinfectant used on all exposed surfaces and a brush to remove visible soiling (A 2% active chlorine solution).
- All horizontal surfaces are cleaned at least once a day and wherever they are soiled.
- Any areas contaminated with blood or other body fluids are cleaned and disinfected immediately (use chlorine solution 1%).
- Wet mopping with hot water and detergent is recommended rather than sweeping and cleaning of floors and other surfaces that are not in contact with hands.
- A 0.2% chlorine solution (or other suitable disinfectant) in cold or hot water should be used for surfaces that come in contact with people (hands) and for medical instruments.

Management of clinical waste

Clinical waste is any waste consisting wholly or partly of human tissue, blood or other body fluids, excretions, drugs or other pharmaceutical products, swabs or dressings, syringes, needs or other sharp instruments, which unless rendered safe, may be hazardous to any person coming into contact with it.

Correct disposal of clinical waste is important to stop cross contamination. Everyone who handles clinical waste is at risk of infection until it is safely disposed of. Some waste such as hand towels or wipes used to remove ultrasound gel may not be high risk but other products such as gloves, wound dressings or containers which have held blood will be very high risk. Clinical waste should be placed in a waterproof bag which is securely tied. Sometimes these are colour coded so that it is easy to identify if the waste in the bag is high or low risk. If no coloured bags are available, use colour coded buckets, which are clearly labelled. Separate the clinical waste and non-clinical waste, this should be done from the point the waste is generated, during collection, transport and final disposal.

Disposal of waste materials

Waste may be burnt or buried if no incinerator is available. Ensure any burial pit is placed well away from any water supply which could then become contaminated and covered when not in use.

Table 2.3: Examples of colour coding of containers or bags for disposal of clinical waste

YELLOW BAGS	RED BAGS	BLUE BAGS	BLACK BAGS
Infectious waste: ■ Bandages ■ Gauze cotton or any other objects in contact with body fluids ■ Human body parts e.g. placenta	Plastic waste such as: ■ Catheters ■ Injection syringes ■ Tubing	■ All types of glass and broken glass articles ■ Outdated and discarded medicines	Sharps container: ■ Needles without syringes ■ Blades, sharps and all metal objects

There are four main categories of healthcare waste:

- **Sharps** (needles, scalpels) which may be infectious of not
  - ☐ Sharps should be placed in sharps container and regularly disposed of (before they are full). Dispose of sharps in a sharps pit (buried drums in small facility, concrete-lined pit in other settings).
- **Non-sharps, infectious waste** (anatomical waster, pathological waste, dressings, used syringes, used single-user gloves)
  - ☐ Dispose of in yellow or red bags or buckets with lids, collect and empty twice daily. Bury in a pit filled with a sealed cover and ventilation pipe for onsite treatment in small healthcare settings or high temperature incineration onsite or offsite.
- **Non-sharps non-infectious waste** (paper, packaging)
  - ☐ Dispose of in black waste containers which should be collected, emptied, cleaned and replaced once a day. Bury in a pit or incinerated with ashes and residues buried in a pit.
- **Hazardous waste** (expired drugs, laboratory reagents, radioactive waste, insecticides
  - ☐ Collect in appropriately labelled containers place in a secure location. There are several kinds of waste and each requires specific disposal methods.

! In all cases, local protocols should be followed.

Involving the community and community engagement in antenatal and postnatal care

Community-based interventions and community engagement for maternal and newborn health promote the involvement of communities in planning, implementation, and monitoring of activities in order to increase their access to quality health services in a dependable and sustainable manner. These interventions strengthen the capacities of pregnant women, community members, leaders, traditional care givers and other community healthcare workers to avoid practices that cause maternal and newborn ill-health, recognise danger signs and take prompt decisions in seeking appropriate care.

Community leaders can work with health service providers to plan the antenatal and postnatal care services that their community needs, advocate for change and support women through their pregnancy and beyond. If it is not possible to work with the whole community, working with certain groups or key individuals in the community may still help to improve antenatal and postnatal care, for example:

- Community leaders: e.g. political, religious or informal
- Community groups: e.g. women's groups, youth groups, income generating groups
- Community health volunteers
- Community healthcare providers

Community healthcare volunteers and providers are particularly important in helping to ensure women access antenatal and postnatal care services. They are often well respected and well known within their community and are well respected by women. Community mobilisation refers to a larger scale movement to engage people's participation in achieving a specific goal through self-reliant efforts. This will include mobilisation of maternal and newborn health stakeholders, including men, policy-makers, training institutions, professional associations, non-governmental organisations, political and community and religious leaders, women's groups, business groups and industry, using social marketing and participatory methods. Advocacy is speaking up for, or acting on behalf of, yourself or another person. Advocacy at all levels is necessary to promote any community-based intervention.

Chapter 3: Antenatal Care – first visit

In this chapter, you will find information about how to:

- Describe the rationale and principles of antenatal care
- Conduct a full comprehensive assessment of a pregnant women
- Demonstrate a positive attitude in caring for antenatal women
- Provide screening for psychosocial components of health
- Advise pregnant women about their symptoms

Pregnancy and childbirth is a physiological process. However, some women may face life threatening conditions and complications during or after pregnancy. Antenatal care is a strategy to promote maternal and fetal wellbeing and it is recommended that this starts early in pregnancy. As part of the continuum of care, antenatal care can improve the well-being of the pregnant woman as she approaches birth, by evaluating her health (using history taking, examination and investigations) and the provision of comprehensive prophylactic and therapeutic interventions as required. Globally, the vast majority of women access antenatal care at least once. However, often they do not receive good quality care in a way that meets their physical, psychological and social health needs.

Good quality antenatal care should identify complications of pregnancy that can adversely affect the woman and unborn baby, for example, infections, pre-eclampsia and intrauterine growth restriction.

- Pre-existing medical conditions may become more severe during pregnancy with the possibility of associated maternal and newborn complications.
- Domestic violence may first occur during pregnancy or increase in frequency and severity. This is an underestimated global public health issue that is not always routinely addressed during antenatal care.
- Rates of depression and anxiety may be at least as high, if not higher, in late pregnancy as during the postnatal period. This is also an underestimated issue that is not always addressed appropriately in antenatal care.
- Health promotion, education and counselling.
- Good care during pregnancy optimises the health of the woman and the developing baby.
- Pregnancy is a crucial time to promote behaviours conducive to good health and also to learn parenting skills.
- Sharing information with the pregnant woman and her family enables the woman to make informed choices about pregnancy and birth.
- Antenatal care links the woman and her family with the formal health system. A positive antenatal care experience increases the chance of the woman using a skilled birth attendant at birth and/or accessing care in case of an emergency.
- Antenatal care provides the opportunity for clear plans to be developed in case of complications (emergency preparedness) and for the time of birth (birth preparedness).
- Antenatal care provides preventive measures e.g. folic acid, iron and other nutritional supplements.
- Antenatal care provides the opportunity to recognise and deal with minor pregnancy associated problems and refer to appropriate higher levels of care if problems arise.

Antenatal care at first visit

The earlier the first antenatal care visit the better, ideally in the first trimester (up to 12 weeks of gestation) although this may be challenging to achieve in some cultures when pregnancy is traditionally not disclosed until much later on. Antenatal care is often the first time a woman accesses health care. Information is shared between the healthcare provider and the pregnant woman with the aim of discussing, planning and implementing care for the duration of the pregnancy, during delivery and the postnatal period, in a way that meets her needs.

General approach

- Introduction using respectful maternity care principles, including encouraging the woman to ask questions or share her concerns
- History taking
- Establish expected date of delivery
- Screen for mental health disorders
- Screen for domestic violence and other social problems
- Clinical examination
- Investigations
- Provide treatment for any identified problems
- Health and nutrition education
- Immunisations, e.g. tetanus booster
- Start preventative treatment for e.g. malaria, and ensure woman has a long-lasting insecticide-treated bed net if in a malaria-region, anti-helminths (after first trimester)
- Timing and plan for the next visits

Introduction using respectful maternity care (see Chapter 1)

- All women have the right to the highest attainable standard of health and well-being including physical, mental and social components.
- Aim to provide the best quality and comprehensive care related to their gestation and available within your setting.
- Greet the woman in a friendly manner, offer her a seat, introduce yourself and ask the woman's name. All care must be non-judgemental.
- Ask the woman her reason for coming to the clinic and whether she would like her companion or other family member to be included in the discussion or whether she prefers to be seen alone.
- Always gain verbal informed consent (explain what you are doing and why and ask the woman's permission) before undertaking any examination, tests or procedures. Written consent is required for invasive procedures.
- Explain the results and implications of all examinations and investigations performed.
- Encourage the woman to ask any questions and share her concerns.
- Ensure the woman's privacy and confidentiality.

Symptoms and signs of pregnancy

- One or more missed periods (this may not be noticed in a woman who is still breastfeeding or has been using injectable contraceptives recently)
- Nausea and vomiting
- Swollen and tender breasts
- Awareness of fetal movement 'quickening' (around 16-18 weeks' gestation in multiparous women, 20-22 weeks' gestation in primigravida women)

Investigations to confirm pregnancy include

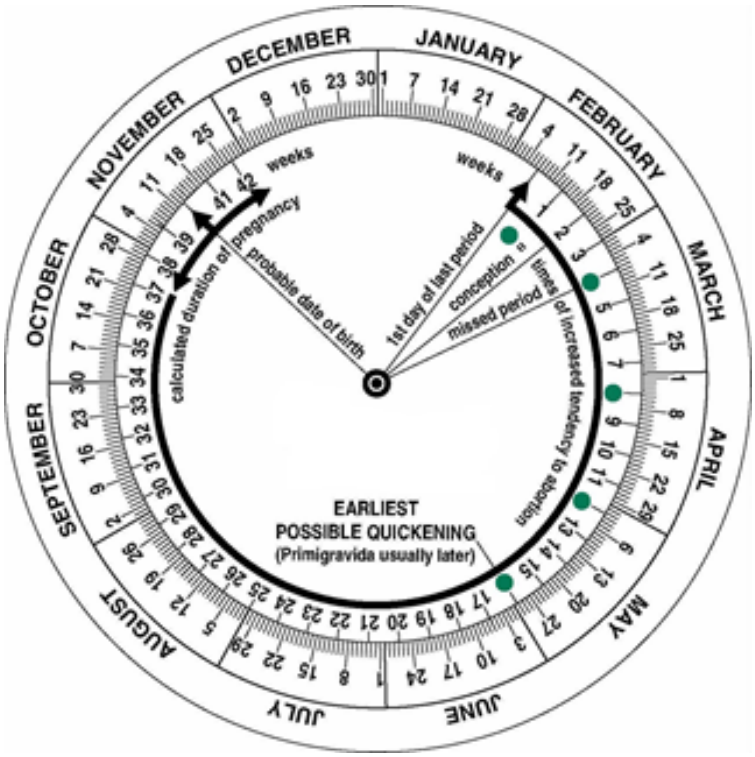
- Urine test: positive ßhCG pregnancy urine test
- Blood test: positive ß̣hCG level on serology testing
- Identification of fetal heartbeat
- Ultrasound scan

Establishing gestational age and estimated date of delivery

Using the date of the last menstrual period (LMP):

- Establish estimated gestation age
- Determine the estimated date of delivery (EDD) using the calendar method
- Calendar method: the date of the 1st day of the LMP + 7 days – 3 months = EDD
  For example: 10th April + 7 days = 17th April – 3 months = 17 January

A handheld pregnancy antenatal wheel can also be used to calculate estimated date delivery:



Ultrasound can be used to confirm the location of the pregnancy, to determine a single or multiple pregnancy, to determine the heart rate, to locate the placenta, to check for fetal anomalies and liquor volume, to observe fetal movements and to measure the fetus to establish gestational age and fetal weight.

In the first trimester, ultrasound scan can be used to date the pregnancy using crown rump length up to 12 weeks' gestation. Biparietal diameter is used to date the pregnancy if more than 12 weeks' gestation. If a growth assessment is required in the second or third trimester, a trained healthcare provider can use ultrasound to calculate an estimated fetal weight using biparietal diameter, head circumference, abdominal circumference, and femur length. In cases of concern where the growth of a developing baby needs to be monitored closely, serial growth scans should to be performed and interpreted by a specially trained healthcare provider. Note a pregnancy cannot be dated by an ultrasound scan performed later than 24 weeks because the variation in fetal size is too great thereafter. Appendix 3 provides a summary of further uses of ultrasound during and after pregnancy.

History taking – obstetric

Table 3.1: Systematic antenatal obstetric assessment

Overview	Booking visit
Personal sociodemographic information	Name, address, age, contact details, occupation, educational level, religion Relationship status (single, married, separated, divorced, widowed) Recent forms of contraception used History of any cervical screening Last menstrual period
Past obstetric history	Details of all previous pregnancies, birth weights, gestational age at delivery, any previous obstetric complications, mode of delivery, previous miscarriages or abortions **Complications in previous pregnancies:** ■ Antepartum haemorrhage ■ Pre-eclampsia or eclampsia ■ Postpartum haemorrhage ■ Previous blood transfusion ■ Complications of episiotomy or vaginal and perineal tears ■ Previous Caesarean section – document the reason to determine both recurrent (e.g. obstructed labour) and non-recurrent (e.g. breech presentation) causes **Fetal/newborn complications in previous pregnancies:** ■ Low birth weight baby (<2.5kg) ■ Preterm birth ■ Big baby (>4.5kg) ■ Congenital abnormalities ■ Stillbirth ■ Neonatal death
Past medical history	Cardiac disease Diabetes Hypertension Respiratory disease e.g. asthma HIV TB Epilepsy Thyroid disease Previous surgery
Drugs and allergies	Regular medications Any known allergies

History taking – general

When taking a general history, ask the woman about any current illnesses she may have. A logical and systematic way to do this is to ask questions by organ system. Table 3.2 below lists common questions you can ask.

Table 3.2: Systematic antenatal general assessment

Organ system	Symptoms
Gastrointestinal	Nausea and Vomiting (If yes, are you vomiting with blood?) Frequency and severity of vomiting, ability to keep fluids down Diarrhoea (If yes, is it bloody?) Weight loss Abdominal pain Jaundice
Immunology	Fever, chills and rigours Lumps in the neck, groin or armpit
Haematology	Feeling dizzy/ faint or general tiredness Easily bruised
Cardio-pulmonary	Heart beating too fast (palpitations) Swollen fingers and hands, swollen legs Cough >2 weeks/<weeks, productive cough (sputum – yellow/blood) Shortness of breath at rest, chest pain, wheezing
Urinary	Increased frequency of passing urine Blood in the urine Leakage of urine with coughing, sneezing, laughing Leakage of urine all the time Pain during urination (dysuria)
Gynaecology	Abnormal vaginal discharge: malodourous or discoloured; vaginal bleeding (spontaneous or provoked), post-coital bleeding (after sex), genital ulceration or swelling
Dermatology	Skin rash Itchy skin Lumps Ulcers
Neurology	Seizures Visual disturbances Speech disturbances
Endocrine	Feeling cold Excessive thirst Awareness of polyuria (excessive urine)

Organ system	**Symptoms**
Breasts	Nipple soreness/abnormal swelling in breast Pain in the breast Skin changes over the breast
Musculoskeletal	Back pain; arthralgia/arthritis (joint pains), especially pelvic girdle discomfort; unilateral calf swelling, leg pain or redness
Ear, Nose, Throat and Mouth	Sore throat Ulcers in the mouth
Current medication	For example: ■ Antibiotics ■ Antimalarials ■ Antiretrovirals ■ Antihypertensive treatment ■ Haematinics for treatment of anaemia: iron, folate acid ■ Medication for diabetes and asthma ■ Analgesia
Psycho-social history	Screening tools for depression and domestic violence (see Chapter 14 and Appendices 4, 5 & 6)

Clinical examination

During antenatal care, all women are offered full examination and routine investigations. It is very important that this is done completely and comprehensively at the booking visit.

Table 3.3: Systematic antenatal clinical assessment

Clinical observations	Height (cm) Weight (kg) Calculate Body Mass Index* (kg/m^2) Blood pressure (mmHg), pulse, respiratory rate Temperature (°C) (See Table 3.4 for normal parameters)
General Head-to-Toe Examination	General affect – anxious, depressed, in pain, content Conjunctival pallor Sclera (white part of eye) – jaundice Goitre Skin (Lumps/rashes/ulcers) Mouth (bleeding gums/ulcers/thrush) Pitting lower back/ankle oedema Wasting or obesity Tremor
Examination of the heart	Heart sounds Heart murmur Heart arrhythmia
Examination of the chest	Breathing – bilateral air entry Wheezing, crackles Breasts for masses
Examination of the abdomen	Inspection: shape, size, type of scar and site, fetal movement Palpation: liver, fundal height, fundal palpation, tenderness, masses Auscultation: fetal heart rate
Examination of genitalia	Only examine the genitalia if a woman is experiencing abnormal vaginal discharge or if history of female genital mutilation

* Body mass index: this is the weight (measured) in kilograms divided by height (measured) in metres squared.

Table 3.4: Normal range of physiological observations

Physiological observations	Normal ranges
Blood pressure – systolic Blood pressure – diastolic	100 - 139mmHg 50 - 89
Respiratory rate	12 - 20 breaths per minute
Oxygen saturation	94 - 100%
Pulse	51 - 90 beats per minute
Temperature	36.1 - 37.5°C
Neurological	Alert, orientated to time, person, place

Investigations

Table 3.5: Systematic antenatal investigations

Specimen	Test
Blood	Haemoglobin (e.g. using Hemocue) Malaria test (Rapid Diagnostic Testing) in endemic areas Syphilis (Rapid Diagnostic Testing) HIV (Rapid Diagnostic Testing) ABO blood group and Rhesus factor Hepatitis B Random glucose level (as per local protocols)
Urine	Glucose Protein Ketones Red blood cells Leucocytes Nitrites
Sputum **(morning specimen)**	In case of a productive cough >2 weeks and/or a woman who is HIV positive, offer sputum testing for tuberculosis (see Chapter 8: HIV, TB and Malaria in pregnancy)

! Complete the clinic record and the woman's antenatal care card. Ask her to bring her antenatal care card (handheld notes, if available) to all appointments in the healthcare facility.

Nutrition in pregnancy

Globally, pregnant women face challenges relating both to under-nutrition and also obesity. Obesity has become an increasing problem even in some low resource settings and it carries risks of gestational diabetes, hypertensive disorders of pregnancy, fetal macrosomia and complications with birth.

In undernourished populations, balanced energy and protein dietary supplementation is recommended for pregnant women to reduce the risk of stillbirths and small for-gestational-age neonates. (WHO 2016).

Early in pregnancy, discuss with the woman her diet and eating habits to discover and address any issues arising. Pregnant women should be encouraged to take adequate nutrition, which is best achieved through consumption of a healthy balanced diet. Provide information on the benefits of a healthy diet and practical advice on how to eat healthily throughout pregnancy. This should be tailored to the woman's circumstances, making the best use of what is available in the area and affordable. Educate the woman on the importance of eating foods containing adequate energy, protein, vitamins and minerals such as green and orange vegetables, meat or fish, beans, nuts, wholegrains and fruit.

Women who are underweight at the start of pregnancy (i.e. BMI < 18.5) should attempt to gain between 12.5-18 kg throughout pregnancy as compared to 11.5-16 kg for women of a healthy BMI and 5-9 kg for women who have BMI >30.

Supplements

Iron and folic acid

Daily oral iron and folic acid supplementation with 30mg to 60mg of elemental iron and 400µg (0.4mg) folic acid is recommended for pregnant women to prevent maternal anaemia, puerperal sepsis, low birth weight, and preterm birth. Intermittent oral iron and folic acid supplementation with 120mg of elemental iron and 2800µg (2.8mg) of folic acid once weekly is recommended for pregnant women to improve maternal and neonatal outcomes if daily iron is not acceptable due to side effects, and in populations with an anaemia prevalence among pregnant women of less than 20%.

Calcium

If dietary calcium intake is low in the local population calcium supplementation is recommended to reduce the risk of pre-eclampsia. The recommended dose is 1.5 - 2g daily although lower doses may also be effective. Dividing the dose of calcium may improve acceptability, with the total dose divided into three doses, preferably taken at mealtimes. Negative interactions between iron and calcium supplements may occur. Therefore, the two nutrients should preferably be administered several hours apart rather than concomitantly.

Vitamin A

Vitamin A supplementation is only recommended for pregnant women in areas where vitamin A deficiency is a severe public health problem, to prevent night blindness. In populations where the prevalence of night blindness is 5% or higher in pregnant women should be advised to take vitamin A for a minimum of 12 weeks during pregnancy until delivery: 10,000 IU vitamin A (daily dose) OR 25,000 IU vitamin A (weekly dose) of oil-based preparation of retinyl palmitate or retinyl acetate.

Malnutrition in pregnancy is found especially amongst:

- Women from lower socio-economic groups
- Women who are widowed or single
- Women who have given birth to several babies, especially over a short period or if the last delivery was less than a year ago
- Women who are suffering from tuberculosis, HIV/AIDS and moderate-to-severe anaemia

If the woman is underweight and a supplementary feeding program is available in the health centre, provide food supplementation or arrange for appropriate referral.

Maternal micronutrient or other supplementation is not recommended by the WHO. Although routine Vitamin D supplementation is not recommended, for pregnant women with documented vitamin D deficiency, vitamin D supplements may be given at the current recommended nutrient intake (RNI) of 200 IU (5µg) per day.

For pregnant women with high daily caffeine intake (more than 300 mg per day), lowering daily caffeine intake during pregnancy is recommended to reduce the risk of pregnancy loss and low-birth-weight neonates.

Prevention of tetanus

Protect all women giving birth and their newborn babies against tetanus by ensuring women are immunised against tetanus.

Table 3.6: Tetanus toxoid immunisation schedule for pregnant women

Dose	When to give	Protection
TT1	As early as possible during the current pregnancy	0%
TT2	At least 4 weeks after giving TT1, or at least 2 weeks before delivery	1-3 years (80%)
TT3	At least 6 months after giving TT2, or during the next pregnancy	5 years (95%)
TT4	At least 1 year after giving TT3, or during the next pregnancy	10 years (99%)
TT5	At least 1 year after giving TT4 or during the next pregnancy	For all childbearing years (99%)

Antenatal screening for medical and psychosocial conditions

- Screening for hypertensive disorders of pregnancy (see Chapters 6 & 9)
- Screening for diabetes in pregnancy (see Chapter 6)
- Screening for tuberculosis (TB) during pregnancy (see Chapter 8)
- Screening for domestic violence (DV) (see Chapter 14 and Appendix 6)

Birth and emergency preparedness

Antenatal care provides the opportunity for women and their husbands/partners and family to start to make a birth preparedness and complication readiness plan. At the time of the first visit at the healthcare facility, it is important that all of these things are discussed and a clear plan is developed in case of complications (emergency preparedness) and for the time of birth (birth preparedness).

This plan may include:

- Agreeing which healthcare facility the woman will go to for the birth, preferably a well-staffed (midwife, doctor) and equipped facility, and what transport options are available. Decide if a Comprehensive facility (i.e. one where Caesarean section and/or blood transfusion is possible) is necessary on the basis of past medical and obstetric history.
- Ensuring that the woman and her family are aware and clear about any costs and money that may be required to pay for health care, and drugs that may be needed during the birth and or after delivery.
- Identification of the woman's blood group. In some locations, identify possible blood donors amongst family and friends.

Additional points

Practices that have been found not to be beneficial due to lack of evidence:

- Routine antenatal breast examination (only if clinically indicated)
- Routine antenatal pelvic examination (only if clinically indicated)
- Routine daily fetal movement counting. Instead inform the women: "If you notice your baby is moving less than usual or if you have noticed a change in the pattern of movements, it may be the first sign that your baby is unwell and therefore it is essential that you contact your healthcare provider immediately so that your baby's well-being can be assessed"

! **Remember to complete the clinic record and the woman's antenatal care card.**

! **Ask the woman to bring her antenatal care card (and full handheld notes, if available) to all appointments in a healthcare facility.**

Prevention and treatment of common conditions in pregnancy

HIV screening and treatment

In high-prevalence settings, provider-initiated testing and counselling (PITC) for HIV should be considered a routine component of the package of care for pregnant women in all antenatal care settings. In low-prevalence settings, PITC can be considered for pregnant women in antenatal care settings as a key component of the effort to eliminate mother-to-child transmission of HIV, and to integrate HIV testing with syphilis, viral or other key tests, as relevant to the setting, and to strengthen the underlying maternal and child health systems. Oral pre-exposure prophylaxis (PrEP) containing tenofovir disoproxil fumarate (TDF) should be offered as an additional prevention choice for pregnant women at substantial risk of HIV infection as part of combination prevention approaches.

Anaemia in pregnancy (see Chapter 6)

Interventions aimed at preventing iron deficiency in pregnancy include iron supplementation, fortification of staple foods with iron, health and nutrition education, control of parasitic infections, and improvements in sanitation. During pregnancy, women need additional iron to ensure they have sufficient iron stores to prevent iron deficiency. Therefore, in most low- and middle-income countries, iron supplements are used extensively by pregnant women to prevent and correct iron deficiency and anaemia during pregnancy.

If a woman is diagnosed with anaemia in the antenatal period (Hb <11.0mg/dl during antenatal care, give 120mg of elemental iron and 400ug (0.4mg) of folic acid daily until her Hb concentration rises to normal (Hb 11.0mg/dl or higher). Thereafter, she can continue with the standard daily antenatal iron and folic acid dose (or the intermittent regimen if daily iron is not acceptable due to side-effects) to prevent recurrence of anaemia.

Asymptomatic bacteriuria (ASB)

Midstream urine culture is the recommended method for diagnosing asymptomatic bacteriuria (ASB) in pregnancy. In settings where urine culture is not available, on-site midstream urine Gram-staining is recommended over the use of dipstick tests as the method for diagnosing ASB in pregnancy. A seven-day antibiotic regimen is recommended for all pregnant women with asymptomatic bacteriuria (ASB) to prevent persistent bacteriuria, preterm birth and low birth weight.

Malaria in pregnancy (see Chapter 8)

Intermittent preventive treatment with sulfadoxine-pyrimethamine is recommended for all pregnant women in areas where malaria is endemic. Treatment should start in the second trimester and doses should be given at least one month apart, with the objective of ensuring that a minimum of three doses are received.

- Give the woman 2 long-lasting insecticide-treated bed nets (one for herself and one for her family) at the booking visit
- Test for malaria at each visit in endemic areas

Hookworm in pregnancy

- Preventive chemotherapy (deworming), using single-dose albendazole (400mg) or mebendazole (500mg) is recommended as a public health intervention for pregnant women after the first trimester in areas where hookworm is endemic.
- Infected pregnant women in non-endemic areas should receive anthelminthic treatment in the second or third trimester on a case-by-case basis. A single dose of albendazole (400mg) or mebendazole (500mg) should be used.
- Local policies should be adhered to.

Rhesus D alloimmunisation

Definition: Rhesus D alloimmunisation is a condition that occurs when anti-rhesus antibodies in a pregnant woman's blood cross over to the fetus leading to destruction of its red blood cells. This leads to intrauterine anaemia or haemolytic disease of the newborn.

Screening and management

It is estimated that 15% of women are Rhesus D negative. If a Rhesus negative woman is exposed to Rhesus D (often via a previous pregnancy with a Rhesus D positive baby) or, less often, by blood transfusion, anti- Rhesus Antibodies are generated. The process is called sensitisation.

- Rhesus typing should be done as part of antenatal booking bloods to identify rhesus negative women. These women should then be offered further screening in pregnancy and immunoprophylaxis **with anti-D immunoglobulin.**
- Antenatal prophylaxis with anti-D immunoglobulin in non-sensitized Rh-negative pregnant women at 28 and 34 weeks of gestation to prevent RhD alloimmunisation is not routinely recommended by the WHO although policies vary between countries.

If a Rhesus negative woman gives birth to a Rhesus positive baby she can develop Rhesus antibodies that may cause haemolytic disease of the newborn in subsequent pregnancies. Administering anti-D immunoglobulin to a Rhesus negative women within 72 hours of giving birth to a Rhesus positive baby is an effective way of preventing Rhesus D alloimmunisation and haemolytic disease of the newborn in subsequent pregnancies.

Women who require specialist care

- Women who have had a previous obstetric fistula (vescio-vaginal or recto-vaginal) or obstetric anal sphincter injury
- Women who have undergone female genital mutilation

Chapter 4: Antenatal Care – subsequent visits

In this chapter, you will find information about:

- The schedule of antenatal care visits
- What to do during a subsequent antenatal visit
- Early detection and treatment of problems
- Prevention of complications using safe, simple and cost-effective interventions
- Health promotion using health messages and counselling

Antenatal Care visit schedules

The World Health Organization Antenatal Care Model (2016), recommends that antenatal care models have a minimum of eight visits to improve women's experience of care and improve neonatal outcomes. Some women may need to attend more often than others depending upon their risk factors and complications arising in pregnancy. In low-resource settings this may be difficult to achieve. However, it is important to ensure that all pregnant women attend as often as is necessary and that the care provided is of the highest standard.

Table 4.1: An overview of visits during pregnancy

Weeks of Pregnancy	Why see the woman?	What should be done?
12 weeks	This is usually the first visit ■ Assess woman's obstetric and general health needs, including psychosocial well-being ■ Plan for the pregnancy and birth ■ Answer any questions and address concerns	See Chapter 3 for more details ■ Confirmation of pregnancy ■ Dating/viability scan (if ultrasound is available) ■ Determine estimated delivery day ■ Full physical examination ■ Investigations including: blood pressure, urine test for protein and glucose, Haemoglobin, syphilis, HIV, malaria and tuberculosis ■ Discuss place of delivery ■ Arrange subsequent visit date and place

Weeks of Pregnancy	Why see the woman?	What should be done?
Between 18 and 32 weeks, visits approximately every 4 weeks		
18 - 22 weeks	■ Scan (if ultrasound is available) ■ Reassess woman's obstetric and medical history, including psychosocial well-being ■ Answer any questions and address concerns	A scan of the baby to determine: ■ Single or multiple pregnancy ■ The placental position ■ Any congenital abnormalities Expected date of delivery estimation And: ■ Discuss results of ultrasound scan ■ Check blood pressure and urine for protein ■ Measure symphysis fundal height and plot on growth chart ■ Check fetal heart rate
24 - 28 weeks	■ Reassess woman's obstetric and medical history, including psychosocial well-being ■ Answer any questions and address concerns	■ Check blood pressure and urine for protein ■ Measure symphysis fundal height and plot on growth chart ■ Check fetal heart rate
28 - 32 weeks	■ Reassess woman's obstetric and medical history, including psychosocial well-being ■ Check the lie and presentation of fetus ■ Answer any questions and address concerns	■ Check blood pressure and urine for protein ■ Measure symphysis fundal height and plot on growth chart ■ Check fetal heart rate and fetal lie ■ Administration of Anti-D if required ■ Screen for anaemia

Weeks of Pregnancy	Why see the woman?	What should be done?
Between 32 and 38 weeks, visits every 2 weeks		
32 - 38 weeks	■ Reassess woman's obstetric and medical history, including psychosocial well-being ■ Agree the time of Caesarean section, if elective Caesarean section is planned ■ Ensure a plan is in place for birth in an emergency ■ Answer any questions and address concerns	■ Check blood pressure and urine for protein ■ Measure symphysis fundal height and plot on growth chart ■ Check fetal heart rate, fetal lie ■ Check presentation and engagement of presenting part
Between 38 and 40 weeks, visits every week		
38	■ Reassess woman's obstetric and medical history, including psychosocial well-being ■ Answer any questions and address concerns	■ Check blood pressure and urine for protein ■ Measure symphysis fundal height ■ Confirm fetal lie and presentation and engagement, fetal heart rate
40	■ Reassess woman's obstetric and medical history, including psychosocial well-being ■ Discuss induction of labour at 41 weeks, explain benefits and risks ■ Answer any questions and address concerns	■ Check blood pressure and urine for protein ■ Measure symphysis fundal height ■ Confirm fetal lie and presentation, fetal heart rate ■ Review birth plan ■ Plan for repeat visit in one week if the woman has not yet given birth and induction declined ■ Offer a membrane sweep
41	■ Reassess woman's obstetric and medical history, including psychosocial well-being ■ Encourage urgent induction of labour, explain benefits and risks	■ Check blood pressure and urine for protein ■ Measure symphysis fundal height ■ Confirm fetal lie, presentation and engagement, check fetal heart rate ■ Offer a membrane sweep ■ Offer date for induction of labour as soon as possible

At each visit, introduce and welcome using respectful maternity care

- All women have the right to the highest attainable standard of health and well-being during pregnancy including with regard to the physical, mental and social components of health
- Aim to provide the best quality of care available within your setting
- Greet the woman by name, offer her a seat, introduce yourself
- Explain in detail what you will do during the visit and obtain the woman's consent
- Explain the results and implications of all examinations and investigations performed including when the results are normal
- Encourage the woman to ask any questions and always address concerns she raises
- Document all findings on the woman's antenatal record
- Ascertain the woman's reason for coming to the clinic if not a routine appointment and whether she wants a companion or other family member included in the discussion
- Ensure the woman's privacy and confidentiality throughout all discussions and examinations is maintained as needed

Taking the History

- General assessment: how is the woman feeling, discuss and screen for psychosocial issues, including nutrition, mental health concerns and domestic abuse (see Chapter 14).
- Does she have any complaints (symptoms) including minor complications of pregnancy?
- Ask if she is there for a scheduled visit or for a specific complaint or problem that has arisen.
- If the woman has come for a follow-up visit within a week of the previous visit, assess the problem or complications requiring follow-up as a matter of priority.
- Measure blood pressure and check urine for protein at each antenatal visit to screen for pre-eclampsia.

Conducting the Examination

Clinical observations (see Table 3.2 for normal parameters)

- Respiratory rate (beats per minute)
- Pulse rate (per minute)
- Blood pressure (mmHg)
- Temperature (°C)

General examination

- Conjunctival pallor
- Sclera – jaundice
- Mouth (bleeding gums/ulcers/thrush)
- Goitre
- Skin (Lumps/rashes/ulcers/excoriations)
- Peripheral oedema
- Breasts

Obstetric Examination

- Symphysis fundal height
- Fetal heart rate
- Lie of the fetus
- Presentation of the fetus
- Engagement of presenting part

NB: A vaginal or speculum examination is not indicated in the absence of symptoms, e.g. vaginal discharge. Clinical pelvic examination in the third trimester is not recommended because it is not predictive of labour outcome

Routine examination for fetal wellbeing

Antenatal care should detect abnormalities of fetal growth and determine fetal wellbeing. Methods used include abdominal palpation, symphysis fundal height measurements, auscultation of the fetal heart, ultrasound scanning and maternal observations of fetal movements (see Chapter 9).

Symphysis fundal height measurement

Measure and record symphysis fundal height at each antenatal appointment. Symphysis fundal height measurement assesses fetal growth by using a tape measure to measure the symphysis fundal height, in order to assess the size of the uterus and fetus. Between 28 -36 weeks of gestation, the symphysis fundal height measurement in centimetres usually corresponds to the number of weeks of gestation (± 3 weeks).

Methods for symphysis fundal height measurement

Procedure

- Explain the procedure to the woman and ensure she has an empty bladder. Ask the woman to lie back on a couch.
- Ensure privacy and confidentiality.
- Gently palpate the abdomen to identify the uterine fundus.
- When measuring symphysis fundal height, the tape measure should be in contact with the skin.
- Measure the distance from the highest point of uterine fundus to the upper rim of the symphysis pubis. Note the highest point may not be directly vertical.

Inform the woman of the result and its meaning and enter the correct measurement on the antenatal card. If available, plot on the symphysis fundal height graph or a customised growth chart, against the weeks of gestation.

If the symphysis fundal height measurement is less than expected, this could be because:

- The baby is not growing well – small for gestational age (SGA) or fetal growth restriction (FGR)
- There is not enough liquor – oligohydramnios (this often goes with growth restriction)
- The baby is in transverse lie

If the symphysis fundal height measurement is more than expected, this could be because:

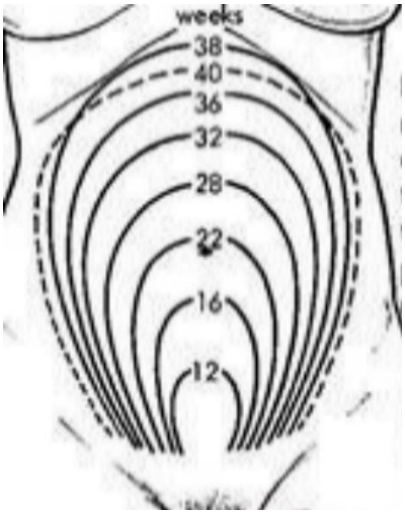
- There is more than one fetus – multiple pregnancy
- There is more than normal liquor – polyhydramnios
- The baby is bigger than normal – macrosomia
- Fibroid uterus

NB: The important thing with growth is to monitor the trend. Single measurements are unlikely to accurately determine a problem or lack of one. A series of measurements is usually necessary to determine growth restriction. However even serial measurements have a low sensitivity for detecting SGA/FGR fetuses.

A fetus is considered SGA when individual biometric measurements or a combination of measurements used to estimate fetal weight fall below set parameters and requires accurate assessment of gestational age. Commonly, the definition of SGA refers to a fetus with a predicted weight or an Abdominal Circumference measurement less than the 10th centile. SGA at birth is commonly diagnosed based on a birthweight below the 10thcentile and often birthweight charts are adjusted for the sex of the baby.

Fetal growth restriction implies a pathological restriction of the genetic growth potential. Some, but not all, growth restrictedfetuses/infants are SGA. The likelihood of FGR is higher in fetuses that are smaller. Growth restricted fetuses may manifest evidence of fetal compromise.

Figure 4.1: How to measure symphysis fundal height



Fetal heart rate, fetal lie and presentation

Ask the woman if she can feel fetal movements and if the movements are in a normal pattern for her. Note that some women are more aware of fetal movements than others so it is important to ask the woman if she is aware of a change. Check the fetal heart rate by auscultation of the fetal heart using a pinard stethoscope or a handheld doppler.

Fetal lie

The fetal lie should be longitudinal. Usually the fetal lie will stabilised around 34-36 weeks. If the fetus is transverse or oblique lie after 36 weeks, this may be a concern. It is important to check for any reason why the fetus would be in this position, for example, check the placental site by ultrasound scan to exclude placenta praevia. Unstable fetal lie is more likely in grand multiparous women.

Fetal presentation

The fetal presentation may change until the presenting part is fully engaged (usually around 37 weeks). The most frequent presentation is cephalic (head first) but breech presentation occurs in 3% of woman at term. Confirm suspected fetal malpresentation by an ultrasound assessment (see Chapter 9).

Ultrasound examination

One ultrasound scan before 24 weeks of gestation (early ultrasound) is recommended for pregnant women to estimate gestational age, and to detect fetal anomalies and multiple pregnancies. Appropriate gestational age estimation in women with uncertain dates may lead to more appropriate induction of labour for post-term pregnancy, and improve a woman's pregnancy experience.

Diagnostic ultrasound examination can be useful in a variety of specific circumstances were there are pregnancy complications or concerns about fetal growth. Ultrasound facilitates detection of problems such as intrauterine growth restriction, malpresentation, placenta praevia and, in addition, by allowing more accurate gestational age estimation, may lead to timely and appropriate management of pregnancy complications. Specialists can use ultrasound to monitor the growth and well-being of the developing baby (see Appendix 3).

Vaginal speculum examination

A vaginal speculum examination is conducted only if this is clinically indicated e.g. the woman complains of abnormal discharge or leakage of ammonitic fluid. In cases of bleeding in pregnancy a vaginal speculum examination is needed to confirm the presence and the severity of bleeding and to assess if the cervix is closed or open.

! Do not conduct a digital vaginal examination if a pregnant woman is bleeding unless placenta praevia has been ruled out.

Before conducing a vaginal speculum:

- Ensure informed consent
- Ensure privacy and confidentiality
- Use a chaperone

During a vaginal speculum examination check for:

- Vulval and vaginal skin changes (excoriation, ulcers or vulval varicosities)
- Leakage of urine (spontaneous or provoked)
- Abnormal vaginal discharge – normal discharge is colourless and odourless
- Amniotic fluid in cases of suspected rupture of membranes
- Abnormalities of the cervix (inflammation, ectropion)
- Female genital mutilation (type)

Health information and education

During antenatal care, the healthcare provider has the opportunity to discuss a variety of importance health topics with the woman. The healthcare provider can provide information that will help a woman to make informed decisions that will promote her well-being and that of her baby.

Important topics which women may have questions and/or concerns about during and after pregnancy include:

- The common problems and discomforts associated with pregnancy such as morning sickness, heartburn, constipation, lower back pain (see Chapter 5).
- The onset of and signs of labour including:
  - Regular, progressively painful contractions
  - Lower back pain
  - A 'show' – this sometimes happens before labour starts and is a mucus-like discharge often blood-stained
  - Rupture of membranes with drainage of amniotic fluid

Healthcare providers can use each antenatal visit to emphasis well-being during pregnancy, including nutrition and prevention of anaemia, vaccination, malaria prophylaxis and care of the newborn, including breastfeeding.

Birth and emergency preparedness

- Discuss birth plan: where the woman wants to deliver and how she will get transport organised
- Discuss with the woman what to do in case of emergencies – where to go for help
- Give her and her family information on the danger signs to watch out for:
  - Head: headaches, blurred vision or flashing lights, convulsions, loss of consciousness
  - Chest: difficulty breathing, chest pain, shortness of breath
  - Abdomen: general pain, severe vomiting, epigastric pain
  - Vagina: vaginal bleeding, loss of amniotic fluid, foul smelling discharge
  - Multisystem: high fever

! All women should be advised to attend a healthcare facility urgently if they experience any of the above danger signs.

At the end of each antenatal consultation, document all findings and discussions in the antenatal card and/or record. Ensure all women are aware of when next to attend for routine antenatal care and emphasise that women are welcome to seek care at any time if they have any concerns.

Chapter 5: Common discomforts during pregnancy

In this chapter, you will find information about:

- Common discomforts women experience during pregnancy
- Manage common discomforts
- Recognise when common discomforts become pathological and need additional treatment

A woman's body will go through many changes in pregnancy. Sometimes these changes can cause discomfort. This chapter describes the common discomforts in pregnancy and suggests what advice a healthcare provider can offer. It is also important that a healthcare provider recognises when symptoms become pathological and require additional treatment or referral. In this chapter, all common conditions that occur are described by each of the organ systems. These common problems can occur at any time during the pregnancy.

Gastrointestinal system

There are several common disorders of pregnancy related to the gastrointestinal system:

- Reflux/heartburn
- Nausea and vomiting
- Constipation
- Haemorrhoids

Heartburn

Heartburn is common in pregnancy and can occur in all trimesters, increasing in severity in later pregnancy. It is characterised by a burning feeling or pain in the stomach, or between the breasts, associated with acid reflux. Heartburn is exacerbated by the effect of progesterone relaxing smooth muscle in the gastro-oesophageal sphincter. It is more common as the pregnancy progresses as the growing uterus displaces the woman's stomach to a position higher than usual. Reduced gut motility and delayed gastric emptying also may contribute to heartburn in pregnancy. This is not dangerous and usually diminishes postnatally.

Symptoms of heartburn may resemble the epigastric pain that may be associated with pre-eclampsia. If a woman reports new epigastric pain after 20 weeks' gestation, exclude pre-eclampsia by checking the blood pressure and perform urinalysis, and check for symptoms of pre-eclampsia and perform a baseline set of blood tests.

Dietary advice and other modifications

- Avoid foods that irritate the stomach e.g. spicy or greasy foods, coffee
- Eat small frequent meals and more often rather than less frequent and large meals
- Avoid eating and drinking at the same time to reduce stomach volume
- Avoid eating late at night or within 3 hours of going to sleep
- When sleeping, or lying down, it helps to keep the head higher than the stomach (e.g. using pillows to prop up, or blocks under the top end of the bed

Treatment using antacids

- Simple antacids can be used intermittently.
- Liquid antacids are more effective than solid antacids.
- Avoid taking an antacid at the same time as iron tablets as gastric acid facilitates the absorption of iron. Take antacids at least one hour after iron tablets.
- Safe first line treatments such as calcium and magnesium-based antacids i.e. Gaviscon or magnesium trisilicate are considered safe in pregnancy.
- Ranitidine 150mg twice daily can effectively treat oesophageal reflux if first line treatment does not work.
- For severe symptoms, omeprazole can be prescribed after a medical review.

Nausea and vomiting

Many women experience nausea during the first trimester of pregnancy. Half of these women will experience vomiting. Nausea and vomiting are more common in multiple pregnancy, previous history in prior pregnancy and molar pregnancy.

Management of nausea

Educate women and reassure them that nausea and vomiting is common in early pregnancy and usually resolves spontaneously by 16-20 weeks and is not associated with poor pregnancy outcomes. Reassurance that this phase will naturally improve, often alleviates anxiety.

Encourage the woman to try any of these remedies:

- Before bed or during the night, eat a food that contains protein, such as beans, nuts or cheese
- Eat bananas, dry bread, or other grain food upon waking up in the morning
- Eat many small meals instead of two or three larger ones, and take small sips of liquid often
- Drink a cup of mint, cinnamon or ginger tea two or three times a day, before meals

Hyperemesis gravidarum

This is a condition defined by prolonged nausea and vomiting leading to dehydration, ketosis and electrolyte derangement, with an incidence of 0.5-3% (see Chapter 6).

Constipation

Constipation (difficulty in passing stool) is common in pregnancy as a result of the progesterone effect on gut motility. Constipation in pregnancy may be exacerbated by oral iron supplementation.

Management

To prevent or treat constipation, a pregnant woman can:

- Eat more fruits and vegetables
- Eat whole grains (brown rice and whole wheat, instead of white rice or white flour)
- Drink at least eight cups of water a day
- Walk, move and exercise every day
- Stimulants such as bisacodyl, senna and sodium docusate are more effective than bulk forming laxatives such as ispaghula husk (fybogel) in women who do not respond to dietary changes

Haemorrhoids

Haemorrhoids are swollen veins around the anus and often cause burning or itching. Sometimes they bleed when the woman passes stool, especially in association with constipation. Prolonged sitting or standing can exacerbate haemorrhoids. Women should be reassured that haemorrhoids will usually resolve after delivery.

Management

- Women should be advised that preventing constipation will help to ease the effect of haemorrhoids
- Standard topical haemorrhoid cream e.g.Anusol can be used if anal itching and pain persist
- Rarely thrombosed prolapsed haemorrhoids require surgical removal

Musculoskeletal and back pain

Back and joint pain

Back pain is very common in pregnancy. Relaxin is a hormone produced by the ovary and the placenta with important effects during pregnancy. In the third trimester, it relaxes the ligaments in the pelvis and joints. This can put a strain on the joints of the lower back and pelvis leading to backache. Excessive inward curvature of the spine (lordosis) may also cause back ache. Too much standing in one place, leaning forward, or hard physical work can also cause or worsen back pain.

Management

- Regular exercise in water, massage therapy, back care physiotherapy classes can alleviate backache
- Applying warmth to the lower back, e.g. massage, hot water bottle or warm clothes
- Simple pain relief tablets taken regularly, e.g. paracetamol are safe in pregnancy and effective
- Reduce heavy work, e.g. lifting, long periods of standing

Pelvic Gurdle Pain/Symphysis pubis dysfunction

Pelvic girdle pain, affecting approximately 1 in 5 pregnant women to some degree, is caused by the effect of pregnancy on the joints of the pelvic girdle, predominantly the symphysis pubis joint, but the sacro-iliac joints may also be affected resulting in discomfort and searing pain in the pelvic area, including pelvic pain radiating to the upper thighs and perineum and tenderness on palpation of the symphysis pubis joint. Symptoms are exacerbated with movement, e.g. walking, climbing stairs and lifting or carrying heavy objects and are relieved with rest. Symphysis pubis dysfunction is most common in the second and third trimesters. Symptoms can become very debilitating, resulting in some women needing to use crutches to mobilise.

Management

- Simple pain relief, pelvic support and reassurance may offer some relief.
- A pelvic girdle or a belt may be worn about the hips.

Headaches

Headaches are common in pregnancy and are usually benign. However, any headache during pregnancy must begin by ruling out secondary causes such as pre-eclampsia, especially if there is high blood pressure or swelling of the face or hands.

Healthcare providers should screen all women for hypertension if they present with a headache and refer to an appropriate healthcare provider for management if they have hypertension. See Chapter 6 for more information regarding screening and treatment.

If pre-eclampsia has been ruled out, give simple analgesia, and ensure the woman drinks sufficient water each day. Arrange follow-up for the woman.

Abdominal pain

Many women will experience mild abdominal pain due to the normal physiological changes during pregnancy. Medical complications such as appendicitis and cholecystitis can prove challenging to diagnose during pregnancy because early symptoms of these conditions can mimic normal pregnancy discomforts and organs are displaced from their normal locations as the gravid uterus increases in size. However significant causes of an acute abdomen will generally be accompanied by systemic signs and symptoms.

A detailed history and examination are essential to the diagnosis of the cause of abdominal pain in pregnancy.

- **Round Ligament Pain**: This normally presents as a sharp stabbing pain when women change positions, or it can also be an achy, dull, lingering pain. Round ligament pain is caused by stretching of the large ligaments that run from the uterus to the groin. As the uterus grows, these ligaments are stretched and create discomfort. This pain is generally reported in the second trimester, and considered to be harmless.
- **Braxton Hicks Contractions**: Many women report that Braxton Hicks feel like a tightening of the stomach muscles so that the stomach feels firm or hard. This is a normal change noted in later pregnancy. It is important to differentiate Braxton Hicks from true contractions. True

contractions will be closer together, last for a longer period of time, and are painful. True contractions will normally take a woman's breath away, so women should be advised that if they are able to carry on their normal activities, then the contractions are most likely to be Braxton Hicks.

- In addition to those listed above, there are several other common abdominal discomforts that can be experienced during pregnancy and are generally non-threatening. A woman's growing uterus, intestinal infections, kidney stones, degenerating fibroids, and food sensitivities are all causes of abdominal pain. Although many women who experience abdominal pain have healthy pregnancies, there are times when abdominal pain can pose a serious risk. A woman should be advised that if they have any of the following symptoms, they should contact a healthcare provider immediately.

Women should be advised to contact a healthcare provider immediately if any of the following symptoms accompany abdominal pain or discomfort:

- Severe or persistent pain
- Spotting or bleeding
- Fever
- Chills
- Vaginal discharge
- Light-headedness
- Discomfort while urinating
- Nausea and vomiting

Varicose veins

Varicose veins, found mostly in the legs, are very common in pregnancy. Varicose veins may develop in up to 40% of pregnant women. The increase in blood volume during pregnancy and effect of progesterone relaxing the muscular walls of the veins causes increased pressure on the veins. Varicose veins often improve three to four months following birth. Support such as compression stockings and elevation of the legs as much as possible will provide comfort to women.

Management

- Elevate the legs when at rest
- Water immersion or compresses may alleviate symptoms
- Avoid prolonged standing or immobility
- Avoid tight or restrictive clothing
- Regular exercise improves calf muscle pump. Encourage ankle flexion exercise for at least 30 minutes per day
- Compression stockings may relieve swelling and aching of legs but should be removed at night
- If resting for long periods, women are advised to lie on their left side which decreases pressure on the veins in the legs and feet (the inferior vena cava is on the right side, and left-sided position relieves it of the weight of the uterus)

Leg cramps

Many pregnant women get foot or leg cramps, sharp sudden pain and tightening of a muscle. These cramps especially come at night, or when women stretch and point their toes. To stop the cramp, flex the foot (point it upward) and then gently stroke the leg to help it relax. There is no proven remedy for these cramps.

Oedema

Swelling of the feet and ankles is very common in pregnancy due to the retention of fluids in the body's tissues. Under the force of gravity, the retained fluid tends to collect in the lower limbs. Advise the woman to sit with her feet raised as often as possible, to allow the fluid to be absorbed back into the circulatory system. Swelling of the feet is usually not harmful. However, if ankle oedema does not reduce at night and/or there is also noticeable swelling of the hands and face at any time, this can be associated with pre-eclampsia (see Chapter 9).

Management

Swelling in the feet may improve if the woman puts her feet up at least two or three times a day. Support tights may also be helpful if the climate is not too hot.

Carpal Tunnel Syndrome

Oedema of pregnancy may contribute to median nerve compression within the carpal tunnel in the hand. Symptoms are localised to the radial half of the hand and include numbness, burning sensation and tingling of the thumb, first and middle fingers that may impair sensory and motor hand function.

Management

- Wrist splints
- Analgesia, for example paracetamol
- Corticosteroid injections are sometimes used in severe cases under the care of a specialist

Itching (pruritis)

Pruritus in pregnancy may or may not be associated with primary skin lesions. When primary skin lesions are present, this usually indicates a dermatologic disorder. Secondary lesions, including excoriations, lichenification, and hyperpigmentation, are reactive skin changes resulting from scratching.

Pruritis may be due to a pre-existing skin condition such as eczema. There may be coincidental conditions which have occurred during the pregnancy such as scabies or vulvovaginal candidiasis. There are also some conditions specific to pregnancy, for example obstetric cholestasis.

The majority of itching in pregnancy is of benign origin, with the itching commencing in the second The itching is often localised to the abdomen, palms, soles or it is widespread. It rapidly resolves after delivery and treatment, if needed, is symptom-based.

Itching may also be due to obstetric cholestasis, a condition where the levels of bile acids in the blood are elevated. This condition should be excluded as it requires specific management and monitoring if present due to an association with stillbirth in some cases.

Management

- Bathe less frequently, if possible, as washing dries the skin. The axillae, genital area, and under the breasts can be washed daily, but other skin areas can be washed 2-3 times weekly.
- Use cool or lukewarm water (hot water can be drying).
- Avoid bubble bath, soap and perfumed products.
- Avoid vigorously drying the skin and pat it dry instead.
- A cool shower may offer immediate short-term relief from itching, but excessive showering should be avoided as this may dry the skin.
- Nails should be kept short to minimize any skin damage from scratching. Rubbing rather than scratching is advised if the urge to relieve the itch cannot be ignored.
- Clothing that does not irritate the skin (e.g. cotton or silk) should be worn, avoiding wool or synthetic fabrics.
- Spicy foods, alcohol and caffeine should be avoided as they may cause vasodilation, which can worsen itch.
- Antihistamine cream or medication may be used or other soothing ointments such as calamine may help.

Frequency of urination

Urinary frequency is a common complaint throughout pregnancy, especially in the first and third trimesters. This is because the growing uterus presses against the bladder in the first trimester until the uterus rises up from within the pelvis and again in late pregnancy as the fetal head engages.

Management

If the woman experiences sleep disturbance during the night due to the need to pass urine she can be advised to reduce fluid intake late in the evening, whilst ensuring that she drinks plenty during the day. Later in pregnancy some women find it helps to rock backwards and forwards when they are on the toilet. This lessens the pressure of the uterus on the bladder to assist proper emptying. If urinating hurts, itches, or burns, the woman may have a bladder infection. The diagnosis and management of urinary tract infections are discussed in Chapter 7.

Vaginal discharge

Pregnant women often have increased vaginal discharge, especially near the end of pregnancy. It may be clear or white. This is normal. However, the discharge can be a sign of an infection if it is yellow, grey, green, lumpy, or has a bad smell, or if the vagina itches or burns.

Management

Women should be advised of normal physiological vaginal discharge changes in pregnancy. If there are any concerns with regard to the quantity, colour or odour of the vaginal discharge, women should be assessed for a possible STI (see Chapter 7).

Mental and social health

Before, during and after pregnancy, women can experience a wide range of mental health problems. The impact these conditions have on the woman and her family are wide ranging, particularly if they are left untreated. Many people are familiar with postnatal depression but are less aware of the other mental health conditions that many women experience, ranging from antenatal depression, anxiety, post-traumatic stress disorder to postpartum psychosis (see Chapter 14).

Many women worry when they are pregnant, especially about the baby's health and about giving birth. A woman's concerns about other problems in her life may also become more intense when she is pregnant. Women with these feelings need emotional support, someone to listen to their worries and to encourage them to feel hopeful. They may also need help to solve the problems they are having in their lives, e.g. changes in relationships with husbands/partners and/or financial worries.

Chapter 6: Medical conditions during pregnancy

In this chapter, you will find information about:

- Gastrointestinal system (hyperemesis gravidarum)
- Cardio-pulmonary (hypertensive disorders, asthma, venous thrombotic disease, and cardiac disease)
- Endocrine system (diabetes, hyperthyroidism, hypothyroidism)
- Nervous system (epilepsy)
- Haematological system (anaemia, sickle cell and thalassaemia, Rhesus disease)

Hyperemesis gravidarum

Definition

Up to 90% of pregnant women suffer from nausea and vomiting of pregnancy to some extent but 0.3-3.6% of pregnant women are affected by Hyperemesis gravidarum (HG). This is defined as nausea and vomiting severe enough to cause an inability to eat and drink normally and which strongly limits normal daily activities. Recently it has been shown to be associated with hypersensitivity to Growth Differentiation Factor 15 (GDF-15).

In 90% of cases HG starts between 4-7 weeks gestation, peaks at 9 weeks and settles by 20 weeks, but in some cases the condition may persist throughout pregnancy.

In severe cases, hyperemesis leads to dehydration, ketosis, electrolyte imbalance and weight loss. However, assessing urinary ketones does not have a use in the management of NVP or HG and may be misleading.

If a woman is dehydrated, she should be admitted to a healthcare facility for intravenous rehydration and medication.

The condition can be scored for severity using a validated scoring system such as the PUQE-24 system displayed below

Investigations

- **Full blood count**: Haematocrit will confirm the severity of dehydration; white cell count to screen for infection
- **Urea and electrolytes**: Provide a baseline and guide for intravenous rehydration
- **Thyroid function tests**: Free T4 may be raised due to similarities between HCG and THS but the women is usually clinically euthyroid
- **Urine dipsticks and culture**: Assess for infection
- **Liver function test**: Prolonged vomiting can lead to deranged liver function tests, most commonly raised transaminases. These are often transient and reversible.
- **Ultrasound scan**, if available:
  - ☐ Confirm viable intrauterine pregnancy
  - ☐ Screen for multiple pregnancy
  - ☐ Screen for molar pregnancy

Treatment

- Intravenous fluids: Hartman's solution or 0.9% saline with either 20mmol or 40mmol of potassium chloride added depending on severity of hypokalaemia.
- Thiamine supplementation (either oral 100 mg tds or intravenous as part of vitamin B complex (Pabrinex®)) should be given to all women admitted with vomiting, or severely reduced dietary intake, especially before administration of dextrose or parenteral nutrition.
- Note that antiemetic treatment has been proven to be safe in pregnancy and should not be with-held from women who need treatment. Combinations may be tried when single medications are insufficient to achieve symptom control.
- Consider thromboprophylaxis, if available.

First line treatment:

- Doxylamine and Pyridoxine (vitamin B6) 20/20mg PO at night, increase to additional 10/10 mg in morning and 10/10mg at lunchtime if required
- Cyclizine 50 mg PO, IM or IV 8 hourly
- Prochlorperazine 5–10 mg 6–8 hourly PO (or 3 mg buccal); 12.5 mg 8 hourly IM/IV; 25 mg PR daily
- Promethazine 12.5–25 mg 4–8 hourly PO, IM or IV
- Chlorpromazine 10–25 mg 4–6 hourly PO, IM or IV

Second line treatment:

- Metoclopramide 5–10 mg 8 hourly PO, IV/IM/SC
- Domperidone 10 mg 8 hourly PO; 30 mg 12 hourly PR
- Ondansetron 4 mg 8 hourly or 8 mg 12 hourly PO; 8 mg over 15 minutes 12 hourly IV; 16 mg daily PR
  - ☐ Women taking ondansetron may require laxatives if constipation develops

Third line treatment:

- Hydrocortisone 100 mg twice daily IV and once clinical improvement occurs, convert to prednisolone 40–50 mg daily PO, with the dose gradually tapered (by 5-10 mg per week) until the lowest maintenance dose that controls the symptoms is reached
  - ☐ Corticosteroids should be reserved for cases where standard therapies have failed; when initiated they should be prescribed in addition to previously started effective antiemetics. Women taking corticosteroids should have their blood pressure monitored and a screen for diabetes mellitus

Motherisk PUQE-24 scoring system					
In the last 24 hours, for how long have you felt nauseated or sick to your stomach?	Not at all (1)	1 hour or less (2)	2–3 hours (3)	4–6 hours (4)	More than 6 hours (5)
In the last 24 hours have you vomited or thrown up?	I did not throw up (1)	1–2 times (2)	3–4 times (3)	5–6 times (4)	7 or more times (5)
In the last 24 hours how many times have you had retching or dry heaves without bringing anything up?	No time (1)	1–2 times (2)	3–4 times (3)	5–6 times (4)	7 or more times (5)
PUQE-24 Score: Mild 6; Moderate = 7–12; Severe = 13–15.					

Hypertension

Hypertension is common in pregnancy and defined as blood pressure >140/90mmHg on at least two occasions taken at least 4 hours apart. Regular measurements of blood pressure and monitoring urinalysis for proteinuria are effective tools to diagnose hypertensive disorders. The recognition and management of pre-eclampsia are discussed in Chapter 9.

Definition

- **Pre-existing/chronic hypertension:** This is hypertension diagnosed prior to pregnancy or before 20 weeks of gestation age. This is common and affects around 3% of women.
- **Pregnancy induced (gestational) hypertension:** This is hypertension that has developed after 20 weeks, resolves after delivery in 85% of cases and in not associated with proteinuria. This affects around 6% of woman.
- Between 10-50% of women with isolated hypertension of pregnancy develop pre-eclampsia subsequently.

Measurement of blood pressure

- Always check blood pressure manually in the first instance
- Ensure the woman is rested, right arm is relaxed and supported at heart level
- Use appropriate size cuff
- Take at least 2 measurements on the same arm
- Check the severity of hypertension

Table 6.1: Classification of hypertension

	Diastolic (mmHg)	Systolic (mmHg)
Mild	90-99	140-149
Moderate	100-109	150-159
Severe	≥110	≥160

Management

Table 6.2: Management of hypertension

	Severity of hypertension		
Management	**Mild**	**Moderate**	**Severe**
Measure blood pressure	Once a week	Twice a week	4 times a day
Test for proteinuria	At each visit	At each visit	Daily
Blood test	Only for routine care	Test, urea and electrolytes, liver function tests, and urate.	Test weekly: full blood count, urea and electrolytes, liver function tests, and urate.
Admit to the healthcare facility	No	Yes, for observation, blood pressure control and to exclude proteinuria Will be discharged if blood pressure controlled and no proteinuria or other signs of organ dysfunction.	Yes, until blood pressure is 159/109 or lower if no proteinuria.

Treatment

Treat all women with severe hypertension (≥160/110mmHg)

- **First line – methyldopa**: loading dose 500mg by mouth followed by 250mg by mouth twice a day up to 1g by mouth three times a day depending on how the blood pressure responses.
- **Second line – labetalol**: 100mg by mouth twice a day, up to 200mg by mouth three times a day (caution in asthmatics).
- **Third line – nifedipine**: slow release 10mg by mouth twice a day, up to 40mg by mouth twice a day.

Monitoring of women with pregnancy-induced hypertension is important as there is an increased risk of pre-eclampsia. Educate all women to understand the danger signs of pre-eclampsia (see Chapter 9):

- Headache, especially frontal
- Visual disturbances, blurring or flashing before the eyes
- Pain below the ribs
- Oedema other than feet and ankle

Diabetes Mellitus

Diabetes may exist prior to pregnancy (Type 1 diabetes or Type 2 diabetes) or may develop during pregnancy (gestational diabetes). It is also possible for Type 1 diabetes to arise for the first time during pregnancy.

Pre-existing diabetes is a metabolic syndrome characterized by hyperglycaemia due to a deficiency of or insensitivity to insulin. The prevalence of pre-existing diabetes doubled from 0.5% (95 %CI 0.1-1.0) to 1.0% (95 %CI 0.6-1.5) during the period 1990-2020. The pooled global standardized prevalence of Gestational DM was 14.0% (95% confidence interval: 13.97-14.04%).

Definitions

1. Type 1 diabetes is an autoimmune disease, which destroys the cells in the pancreas. The pancreas produces insulin, and people need insulin replacement to survive. It is usually diagnosed in childhood or early adulthood.
2. Type 2 diabetes is the most common form of diabetes at the population level. People with Type 2 diabetes produce insulin, but do not produce enough, and/or cannot use it effectively. It involves a genetic component, but is largely preventable, and associated with a later onset. Modifiable risk factors for type 2 diabetes include physical inactivity, poor diet, being overweight or obese, and tobacco smoking. Type 2 diabetes can be managed with changes to diet and exercise, oral glucose-lowering drugs, non-insulin injectable glucose-lowering medications, insulin injections, or a combination of these methods.
3. Gestational diabetes is defined as any degree of glucose intolerance resulting in hyperglycaemia that is first recognized during pregnancy. Gestational diabetes accounts for more than 90% of diabetes in pregnancy. It usually disappears after the baby is born, but can recur in subsequent pregnancies in 2/3 cases.

Table 6.3: Potential complications of diabetes during and after pregnancy

Developing baby/newborn	Woman
■ Birth defects (heart defects or neural tube defects) ■ Spontaneous miscarriage ■ Preterm delivery ■ Macrosomia ■ Stillbirth ■ Newborn complications: Respiratory Distress Syndrome, hypoglycaemia, polycythaemia, neonatal hypocalcaemia and neonatal jaundice	■ Chronic hypertension ■ Renal dysfunction ■ Preeclampsia ■ Polyhydramnios ■ Increased need for operative deliveries ■ Shoulder dystocia ■ Type 2 diabetes

Effect of pregnancy on diabetes

- Deterioration of glucose tolerance may occur during pregnancy, and careful blood sugar monitoring is necessary in order to alter insulin treatment according to need.
- Certain complications (e.g. retinopathy in Type 1 diabetes mellitus) may worsen in pregnancy.

Diagnosis of gestational diabetes

It is estimated that abnormal maternal glucose regulation occurs in as many as 14% of pregnancies. Different countries screen for diabetes during pregnancy in different ways, but the condition is usually identified via a screening programme rather than due to presentation with symptoms.

Risk factors include:

- Body mass index of greater than 30kg/m^2
- Previous gestational diabetes
- Previous macrosomia
- Family history of diabetes
- Ethnicity with a high prevalence of diabetes (e.g. South Asian)

Gestational diabetes may be suspected if:

- There are symptoms of diabetes (polyuria, excessive thirst, tiredness and/or unexplained weight loss).
- A fasting blood glucose is >5.6mmol/L.

If a risk factor is present or gestational diabetes mellitus is suspected, then an Oral Glucose Tolerance Test could be considered between 24 and 28 weeks of gestation (or 16-18 weeks if previous gestational diabetes). Gestational diabetes (or Impaired glucose tolerance) can be diagnosed during an Oral Glucose Tolerance Test on any one of the following values:

- A fasting plasma glucose level of 5.6mmol/L or above
  OR
- A 2-hour plasma glucose level of 7.8mmol/L or above

There is no agreement internationally for the use of fasting or random glucose or glycosuria on dipstick in the diagnosis of gestational diabetes mellitus.

Principles of management of Type 1 and Type 2 diabetes mellitus in pregnancy

The principles of management of Type 1, Type 2 and gestational diabetes are similar and require referral and increased monitoring. For women with pre-existing diabetes antenatal care must be supervised by specialists as there is a higher risk of complications.

For gestational diabetes, once diagnosed, good glucose control is important, either with diet alone or combined with metformin or insulin, under the care of a specialist. It is important that women are given dietary and lifestyle advice as well as medication.

Pre-conception care

- A woman with pre-existing diabetes should receive counselling during pre-conception care regarding the importance of good glycaemic control prior to conception and throughout pregnancy to reduce the risk of adverse fetal and neonatal outcomes
- Where available, offer monthly glycosylated haemoglobin level (HbA1c)
- Advise women to aim for an HbA1c below 6.1%
- Advise women with HbA1c above 10% to avoid pregnancy until control is improved

Antenatal care

Ideally, care should be given by a doctor specialising in the management of diabetes, in conjunction with healthcare providers in maternal health. Women with diabetes require an antenatal visit every 1-2 weeks to assess glycaemic control and they need testing strips with a diary to keep a record of their glucose levels, before meals three times daily as a minimum.

- Before or as soon as pregnancy is confirmed: stop oral hypoglycaemic agents, apart from metformin, and commence insulin if required.
- Aim to keep fasting blood glucose between 3.5 and 5.9mmol/L and 2 hour postprandial blood glucose below 7.8mmol/L during pregnancy.
- Women and their families should be warned of symptoms of hypoglycaemia and advised to carry high sugar drinks with them at all times in case of severe hypoglycaemia.
- Identify and treat infections e.g. urinary tract infections.
- Monitor fetal growth clinically or by ultrasound.
- Increase frequency of visits and monitor blood glucose at each visit.
- Induction of labour is recommended around 38 weeks in woman with poor glucose control and diagnosed macrosomia.
- Use of prostaglandin to ripen the cervix reduces the Caesarean section rate.
- Remain vigilant for the need for an operative delivery, shoulder dystocia, vaginal tears and post-partum haemorrhage in a woman who is pregnant with a macrosomia baby (>4.5kg).

Thyroid disease

The thyroid gland is an endocrine gland located in the neck. It makes two hormones that are secreted into the blood: thyroxine (T4) and triiodothyronine (T3). These hormones are necessary for all the cells in the body to work normally.

Thyroid disease in pregnancy is uncommon but is currently undetected in low-resource settings.

Hypothyroidism

Symptoms of hypothyroidism

- Tiredness
- Feeling inappropriately cold
- Dry skin
- Slow pulse
- Weight gain

Diagnosis of hypothyroidism

- Elevated Thyroid stimulating hormone (TSH)
- Low or normal free T4
- Raised anti-thyroid peroxidase antibodies are a marker for auto-immune thyroid disease

Effects of hypothyroidism on pregnancy

Well managed hypothyroidism poses no particular risks but there are increased risks of miscarriage, preterm labour, raised blood pressure and anaemia with under-treated disease.

Hypothyroidism in early pregnancy increases the risk of intellectual impairment in the baby.

Management of hypothyroidism in pregnancy

If already on thyroxine, increase dose by 30% from early in pregnancy.

Monitor thyroid function every 6-8 weeks from early in pregnancy. Aim to maintain TSH at 2.5 or less. Further dose increases may be necessary as pregnancy progresses to maintain TSH at this level.

Hyperthyroidism

Women with untreated hyperthyroidism rarely become pregnant.

Symptoms include:

- Fast pulse and palpitations
- Feeling inappropriately hot
- Insomnia
- Weakness
- Exopthalmos (bulging eyes)
- Weight loss

Diagnosis

- Elevated Free T4 and T3
- Low TSH < 0.02

Effects of hyperthyroidism on pregnancy

Increased risk of miscarriage with inadequate control.

Treatment

Propylthiouracil (PTU) is the drug of choice in the first trimester because of the risk of congenital abnormalities with carbimazole. 50 mg of PTU is equivalent to 5 mg of Carbimazole. After the first trimester if liver function is abnormal change to Carbimazole.

Monitor free T4 and TSH levels every 4-6 weeks throughout pregnancy, aim to maintain T4 within normal levels.

Table 6.4: Thyroid disease in pregnancy

	Hyperthyroidism	**Hypothyroidism**
Definition	Hyperthyroidism is a state of excessive thyroid hormones, caused by over activity of the thyroid gland.	Hypothyroidism is a state of a reduction in thyroid hormones, caused by underactivity of the thyroid gland.
Incidence	0.2% of pregnancies	1% of pregnancies
Cause	Graves' disease – an autoimmune disorder that causing the overgrowth of the thyroid gland	Commonly, autoimmune disorders cause hypothyroidism for example: ■ Hashimoto's thyroids ■ Atrophic thyroiditis
Risks to pregnancy	Increased risk of miscarriage, intrauterine growth restriction, PTL. Untreated hyperthyroidism can result in perinatal mortality.	Increased risk of miscarriage, pre-eclampsia, small-for-gestational age, stillbirth, impaired neurological development
Symptoms	Heat intolerance Palpitations and tachycardia Vomiting Mood swings Weight loss	Cold intolerance Lethargy, tiredness Dry skin, constipation Fluid retention Weight gain
Signs	Palmar erythema Tremor Eye changes – Lid lag, lid retraction	Goitre
Investigations	Thyroid function tests Increased free T4 or Increased free T3 And decrease in thyroid stimulating hormone	Thyroid function tests Decreased free T4 or T3 And increase in thyroid stimulating hormone
Management	Ideally seek advice or refer to a medical doctor Use an observation chart Oral thioamides, for example carbimazole 40mg or propylthiouracil (PTU) 400mg daily for 4-6 and titrate down depending on Thyroid function tests. Check Thyroid function tests every trimester and after delivery	Ideally seek advice or refer to a medical doctor Use an observation chart Thyroxine 100-200ug/day and titrate up depending on Thyroid function tests Check Thyroid function tests every trimester and after delivery

Asthma

Asthma is chronic, reversible, potentially life-threatening bronchoconstriction affecting about 4% of pregnant women, characterised by two or more of the following:

- Wheeze
- Breathlessness
- Cough
- Chest tightness

Symptoms are often more pronounced at night or in the early morning, or provoked by exposure to specific allergens, exercise or cold, or exacerbated by drugs including aspirin and other NSAIDS (voltarol) or beta blockers (labetalol). Triggers include dust, exercise, cold air, pollen. Often, there is a personal or family history of asthma, eczema or allergies.

Diagnosis

Spirometry is the gold standard diagnostic test, measuring peak expiratory flow rate. Normal values are adjusted depending on height and age. Spirometry is a part of more extensive pulmonary function testing.

Asthma in pregnancy

In most cases, asthma does not pose a major problem in pregnancy but, for a few women, it may deteriorate and become life-threatening. It is important to recognise when the condition is deteriorating and take appropriate action. Poorly managed asthma may increase the risk of preterm labour, intrauterine growth restriction, fetal hypoxia and intrauterine fetal death.

The physiological changes of pregnancy may be problematic for the asthmatic woman. As the diaphragm is pushed up by the growth of the uterus, the woman may experience a fall in lung capacity, exacerbating the effects of a fall in peak expiratory flow rate which may be expressed as a percentage of the woman's previous best rate. A fall of 20% or more represents a serious exacerbation of asthma.

Acute severe asthma

Symptoms: any one of:

- Severe wheeze/breathlessness/cough/chest tightness
- Inability to complete sentences in one breath
- Exhaustion, altered conscious level

Signs:

- Respiratory rate ≥25/min or poor respiratory effort
- Heart rate ≥110/min
- SpO_2 <92%
- Peak expiratory flow rate <33-50% best or predicted
- Silent chest
- Cyanosis
- Arrhythmia
- Hypotension

Differential diagnosis of severe asthma

- Consider severe anaemia
- Consider tuberculosis
- Consider pulmonary embolus
- Consider lower respiratory tract infection

Treatment of mild asthma: step-up guidance

1. Mild intermittent asthma
   Short acting inhalational beta-agonist as required (salbutamol or terbutaline inhaler)
2. Regular preventative therapy
   Add 200-800mcg inhaled corticosteroid daily
3. Initial add-on therapy
   Long acting beta-agonist, increase inhaled steroid up to 800mcg daily if required
   If control is still inadequate, stop long acting beta agonist and add leukotriene receptor antagonist or SR theophylline
4. Persistent poor control
   Increase inhaled steroid to 2000mcg daily, add in fourth drug, e.g. Slow Release theophylline or oral beta-agonist
5. Continuous use of oral steroids
   Add oral steroid in lowest dose to maintain control

Oral steroids and leukotriene receptor antagonist should not be withheld during pregnancy if they are required to achieve good control. They are not harmful to the fetus.

Treatment of a woman presenting with severe asthma

Severe asthma in pregnancy is a medical emergency and the women will require specialised treatment. After stabilisation, women should be referred to a higher-level healthcare facility. Oxygen supplementation must be given to maintain a saturation of 94-98% to prevent maternal and fetal hypoxia.

Beta-agonists

- O_2 nebulisers are preferred for the nebulizer – 6L/min required.
- Inhaled beta 2 agonists are the 1st line drug to be given as soon as possible, for example, use continuous nebulisation of salbutamol at 5 -10mg/hour if specialist nebuliser available, otherwise give nebulised salbutamol 5mg every 15 - 30 minutes.

Steroids

- Prednisolone 40-50mg daily or parenteral hydrocortisone 400mg (100mg six hourly)
- Consider IM Methyl prednisolone 160mg as an alternative
- Treatment should be continued for 5 days or until recovery
- Ipratropium bromide (0.5mg 4-6 hourly) can be combined with beta 2 agonists for women with acute life-threatening asthma
- Magnesium sulphate (1.2-2gm IV over 20 minutes) for women with poor response to inhaled bronchodilator treatment
- Aminophylline (5mg/kg loading dose over 20 minutes) for very severe cases of acute life-threatening asthma
- Once in established recovery, oral steroids can be stopped (apart from those on maintenance therapy) but inhaled steroids can be continued as necessary

Asthma is a potentially life-threatening condition which requires urgent and vigorous treatment. No treatment should be withheld because of pregnancy. Treatment is aimed at re-establishing optimum peak flow and oxygen saturation rapidly to prevent further complications for both the woman and fetus.

Venous Thrombo-embolism

This includes deep vein (leg or pelvic) thrombosis and pulmonary (lung) thrombo-embolism.

Risk factors of venous thrombo-embolism

- Past history of venous thromboembolic events – either deep vein thrombosis or pre-eclampsia
- Women with a known history of thrombophilia for example antiphospholipid syndrome
- Body Mass Index >30
- Age >35 years
- Parity ≥3
- Smoking
- Severe varicose veins
- Pre-eclampsia
- Multiple pregnancy
- Close relative with a history of deep vein thrombosis
- Sickle cell anaemia

Transient risk factors

- Severe dehydration e.g. secondary to hyperemesis
- Infection
- Long distance travel, especially by airplane
- Prolonged bed rest/immobility

Deep vein thrombosis

Definition

A deep vein thrombosis occurs when a blood clot forms in a deep vein, either in the calf or the pelvis. A fragment of clot may break off and travel through the venous system to the heart and thence via the pulmonary arterial tree to the lungs, where it becomes lodged. If the clot is large, this is an immediately life-threatening condition.

Incidence

The risk of a deep vein thrombosis increases 4 to 6-fold during pregnancy and further still in the post-partum period but overall the incidence in pregnancy and the puerperium is low, affecting 1-2 women per 1000.

Management

Maintain a high index of suspicion in women with multiple risk factors.

Signs of deep vein thrombosis:

- Painful swollen warm calf
- Redness of calf

An ultrasound scan may be used to locate the thrombus. Treat with anticoagulants on the basis of significant clinical suspicion.

Pulmonary embolism

Pulmonary embolism is a blockage of an artery in the lungs by a substance that has travelled from elsewhere in the body through the bloodstream (embolism). Symptoms of a pulmonary embolism may include shortness of breath, chest pain particularly upon breathing in, and haemoptysis (coughing up blood). Pulmonary embolism usually results from a blood clot formed in a leg or pelvic vein that travels to the lung.

Signs of pulmonary embolism

- Acute onset of chest pain, can be severe
- Shortness of breath
- Sudden maternal collapse
- Sudden death

Investigations

- Electrocardiogram may show characteristic changes in S1Q3T3 leads with prominent S wave in lead 1, Q wave and inverted T wave in lead 3 reflecting right ventricular strain.
- Sinus tachycardia
- Arterial oxygen saturation will be low in cases of large pulmonary embolism.
- Chest X-ray is inconclusive but may be helpful in ruling out other causes of chest pain and shortness of breath such as severe acute pneumonia or pneumothorax.
- Definitive tests include a ventilation/perfusion (V/Q scan) or a computerised tomography pulmonary angiography (CTPA) scan. These are rarely available in low resource settings so treatment should start based on clinical judgement and in the absence of chest X-ray signs to the contrary.

Treatment of venous thromboembolic events

Initial treatment of venous thromboembolic events

- Low molecular weight heparin
- Intravenous unfractionated heparin
- Subcutaneous unfractionated heparin

Maintenance treatment for venous thromboembolic events

- Oral anticoagulants
- Heparin
- Clopidogrel
- Vena cava filters

With severe life threatening pulmonary embolism, if no heparin is available, a difficult decision must be made as to whether to treat the woman with warfarin. Although this does carry significant fetal risks (highest during development in the first trimester), failure to treat may result in maternal death if the embolism extends. If there is sufficient clinical suspicion in the absence of any available heparin, it is, therefore, better to initiate treatment with warfarin than to risk a maternal death. After a thrombo-embolic event, treatment and monitoring should be maintained for 6 months.

Cardiac disease

Cardiac disease, a common cause of indirect maternal death, represents a diverse group of conditions which may be pre-existing, for example, long standing valvular heart disease, or which may arise in pregnancy, as for example, peri-partum cardiomyopathy.

Previously undiagnosed cardiac disease in pregnancy should be suspected in the presence of:

- Unexplained tachycardia
- New onset shortness of breath
- Chest pain
- Hypotension

Incidence of the various types of heart disease presenting in pregnant women vary. In countries with a significant incidence of poorly treated childhood rheumatic fever there will be a higher incidence of rheumatic valvular disease.

Physiological changes of pregnancy relevant to cardiac disease

By as early as 8 weeks' gestation, cardiac output increases by 20%, reaching a maximum increase of 40% by 28 weeks. Heart rate and stroke volume increase and peripheral resistance falls. Plasma volume increases by 50%. During the second stage of labour, cardiac output increases by a further 50%. Following delivery as the uterus contracts, 500ml blood is added to the general circulation. The early puerperium is therefore a time of additional risk for cardiac patients.

The different types of heart disease may be classified as follows:

- Structural

Table 6.5: Structural abnormalities of the heart

Valvular abnormalities	Non-valvular abnormalities
Valvular abnormalities include stenotic valvular lesions, e.g. aortic or mitral valve stenosis or regurgitate (leaky) lesion's. Aortic or Mitral valve regurgitation.	Marfans syndrome: is a genetic condition affecting connective tissue. The aortic root can be dilated and there is a risk of aortic rupture during pregnancy especially if the aortic root is more than 4cm wide, and in these cases pregnancy is contra-indicated due to the risk of rupture.
In general pregnancy is better tolerated by those with regurgitate lesions, and those with mild to moderate left to right shunting	
Those with stenotic valve lesions or right to left shunt, especially with pulmonary hypertension, are at significantly greater risk.	

- Cyanotic congenital heart disease
  This carries risks to both woman and fetus, including worsening cyanosis, and risks of death. Maternal mortality is particularly high in cases of Eisenmenger's syndrome where there is a reversed shunt (right to left) and pulmonary hypertension. Such women should be strongly counselled against becoming pregnant.
- Cardiomyopathy
  Hypertrophic obstructive cardiomyopathy is an autosomal dominant genetic disorder. It is mainly well tolerated in pregnancy but beta blockers may be necessary to control symptoms.
- Peripartum cardiomyopathy
  This condition arises in late pregnancy or several months into the puerperium, with an incidence of up to 1 in 1,000. This is a dilated cardiomyopathy. The condition presents with increasing dyspnoea, palpitations and pulmonary and peripheral oedema. There is a 40% risk of venous thromboembolism so prophylactic anticoagulation should be provided. Maternal mortality in severe cases is 50%. Treatment includes beta blockers, angiotensin-converting-enzyme inhibitors and diuretics.

Dysrhythmias

Sinus tachycardia and palpitations may be a normal feature in pregnancy, and ectopic beats are common in both woman and fetus in general with no adverse consequences. Anaemia and thyroid disease should be excluded or treated, and a full history taken. Sudden arrhythmic death syndrome is sudden cardiac death in the absence of all other causes. Such deaths are neither predictable or preventable.

Myocardial ischaemia and infarction

Myocardial ischaemia is increasing in women of childbearing age, especially in countries with high levels of obesity, diabetes and smoking. Management is similar to non-pregnant women, although angiotensin-converting-enzyme inhibitors and statins should be avoided.

Cardiac disease presents particular challenges in the pregnant woman. Physiological changes of pregnancy may mimic symptoms leading to a delay in diagnosis. Pregnant women with cardiac disease require specialist care for the best outcomes. All women need investigated with electrocardiograms, chest x-rays and echocardiograms.

Epilepsy

An epileptic seizure is a sudden alternation of consciousness, with motor, sensory, automatic or psychic events owing to abnormal excessive or synchronous neuronal activity in the brain. Epilepsy is a brain disorder characterised by a predisposition to epileptic seizures and affects approximately 1 in 150 women of childbearing years.

Effects of pregnancy on epilepsy

50-60% of women with epilepsy on medication will remain seizure-free during pregnancy but alterations in the metabolism of some anticonvulsants mean that the risk of seizures increases for 40-50% women with known epilepsy. The dose of some anticonvulsants (especially lamotrigine and levetiracetam) may need to increase substantially during pregnancy as a consequence. Pain, tiredness and fear may be trigger factors for epileptic convulsions during pregnancy.

Effects of epilepsy and anticonvulsants on pregnancy

Anticonvulsants are associated with an increased risk of congenital abnormalities. Ideally, women should be advised to take 5mg folic acid from 3 months prior to conception and throughout the first trimester. Congenital abnormalities particularly associated with anticonvulsant medication are neural tube defects, cardiac abnormalities and facial defects. The risks are highest for those on sodium valproate with up to 10% experiencing some congenital abnormality and 30-40% of offspring experiencing learning disabilities. The risk is dose dependant with those on the highest doses at most risk.

Topiramate and phenobarbital are also associated with elevated risks of congenital malformations and neurodevelopmental disorders, though the risks are lower than those of valproate. Lamotrigine and levetiracetam are relatively safe.

Consideration should be given to changing medication pre-pregnancy to a drug or combination with lower risks of teratogenicity.

If available, detailed fetal anomaly scans should be provided at 20-24 weeks' gestation.

Women on the following drugs should be provided with oral vitamin K 10mg daily from 36 weeks until delivery, although the evidence for this is not strong.

- Phenobarbitone
- Carbamazepine
- Phenytoin
- Primidone
- Topiramate
- Oxcarbazepine

All babies born to women with epilepsy taking enzyme-inducing AEDs should be offered 1 mg of intramuscular vitamin K to prevent haemorrhagic disease of the newborn.

Beware that convulsions in late pregnancy may not always be due to epilepsy and that women suffering from epilepsy are as vulnerable as any other women to pre-eclampsia/eclampsia.

Anaemia

Classification of anaemia

Anaemia is a decrease in the number of red blood cells, haematocrit or haemoglobin (Hb) level and the severity increases during pregnancy.

Anaemia is diagnosed when the haemoglobin (Hb) level of pregnant women is below 11 gm/dl and can be grouped as:

- **Mild**: Hb 10.0-10.9 g/dl
- **Moderate**: Hb 7.0-9.9 g/dl
- **Severe**: Hb <7.0g/dl

Causes of anaemia

During pregnancy, the growth of the fetus, placenta, and larger amount of blood circulating blood in the woman lead to an increase in the demand for nutrients, especially iron and folic acid. Due to the disproportionate increase in plasma volume in relation to the red blood cell mass during pregnancy, haemodilution occurs. In non-pregnant women, a normal haemoglobin is Hb <12.0g/dl or above. In pregnancy, Hb <11.0g/dl in the first trimester or <10.5g/dl in the third trimester is considered to be anaemia.

Causes and treatment of anaemia

Treatment of anaemia depends on the cause.

Table 6.6: Causes and treatment of anaemia

Causes	Treatment
■ Iron deficiency (commonest) ■ Depletion of iron stores	■ Dietary advice ■ Treatment of infestations, hookworm ■ Oral or parental iron supplementation
■ Folate deficiency ■ Depletion of folate stores because of inadequate diet	■ Dietary investigation and supplementation regime
■ Thalassaemia (inherited disorder) ■ Alpha (minor) ■ Alpha (major) ■ Beta (minor)	■ Screening ■ Iron supplementation/transfusions ■ Rare, unlikely to reach childbearing age ■ Transfusions
■ Sickle cell disease (inherited disorder) ■ When there is haemoglobin SS or haemnoglobin S with another abnormal haemoglobin phenotype, e.g. SC	■ Screening (Haemoglobin electrophoresis) ■ Education of parents for risks (Both parents with sickle cell trait) ■ Ensure, during labour, that the woman does not develop dehydration or severe hypoxia which may precipitate a crisis
■ Malaria	■ Intermittent Preventative Therapy (IPT) using sulfadoxine-pyrimethamine combination after the first trimester ■ Use of long-lasting insecticide-treated bed nets especially and indoor residual spraying ■ Environmental sanitation for vector control
■ Other parasitic infections (e.g. hookworm, schistosomiasis).	■ Albendazole or mebendazole ■ Education and advice to avoid re-infestation
■ Chronic infection, including HIV	■ Antibiotics or anti-viral medication ■ Any infection depresses erythropoiesis

Investigations

- Haemoglobin, ferritin level (<30ug/l indicates inadequate stores)
- Check serum and red cell folate
- Full blood count and peripheral blood film (to diagnose the type of anaemia)
- Stool examination to check for ova and cysts for parasitic infections. for parasitic infections
- Blood slide or rapid diagnostic tests to exclude malaria
- Blood group and Rhesus factor determination in case a blood transfusion is needed
- Screen for sickle cell disease

Management of anaemia

- If a woman is diagnosed with anaemia in the antenatal period (Hb <11.0mg/dl in the first trimester or <10.5mg/dl in the third trimester) give 120mg of elemental iron and 400ug (0.4mg) of folic acid daily
- Check the woman's Hb level monthly until her Hb concentration rises to normal (Hb 11.0mg/dl or higher).
- Thereafter, she can continue with the standard daily antenatal iron and folic acid dose (or the intermittent regimen if daily iron is not acceptable due to side-effects) to prevent recurrence of anaemia.

Parenteral iron therapy

- Consider administering parenteral iron therapy to a woman who is intolerant to oral preparation of iron.
- Consider referral to secondary care if severe anaemia detected after 36 weeks or the woman is symptomatic with severe anaemia (Hb <7.0g/dl).
- Admit to the healthcare facility for blood transfusion.
- Thereafter, maintain on iron 120mg plus folate 5mg orally once a day for six months during pregnancy and until 3 months postpartum.

! For women with congestive cardiac failure, administer a diuretic (e.g. frusemide 40mg IV) with each unit of blood. Transfuse as above slowly and maintain a strict fluid balance chart.

Prevention of anaemia

- Offer screening for anaemia at the booking visit and at 28 weeks. This allows time for treatment.
- Offer routine supplementation of iron (60mg elemental iron and folic acid 400mcg).
- Give intermittent preventive treatment of malaria in malaria endemic areas.
- Treat any concurrent infections, infestations and manage any other co-existing medical conditions as appropriate.

Give dietary advice which is appropriate for each woman depending on health status, religious and cultural preferences.

Sickle Cell Disease

Definition

Sickle cell disease is an inherited autosomal recessive condition, characterised by sickle-shaped red blood cells and chronic anaemia, due to the predominance of haemoglobin S (Hb S) and other abnormal haemoglobin types. The pathophysiology of SCD is a consequence of polymerisation of the abnormal haemoglobin in low-oxygen conditions, which leads to the formation of rigid and fragile sickle-shaped red cells. These cells are prone to increased breakdown, which causes the haemolytic anaemia, and to vaso-occlusion in the small blood vessels, which causes most of the other clinical features, including acute painful crises. Other complications of SCD include stroke, pulmonary hypertension, renal dysfunction, retinal disease, leg ulcers, cholelithiasis and avascular necrosis (which commonly affects the femoral head and may necessitate hip replacement).

Women with the sickle cell trait are carriers and usually asymptomatic.

- This abnormal Hb S variant results from the substitution of valine for glutamic acid at position 6 in the beta-globin chain
- If both parents are carriers, there is a one in four chance that the fetus will have sickle disease

Sickle cell disease increases maternal morbidity and mortality by enhancing the development of haemolytic anaemia, folic acid deficiency, embolism following bone marrow infarction and acute sequestration of red cells. The perinatal mortality rate is high in HbSS with a moderate increase in the other forms of sickle cell disease.

Symptoms and signs

Sickle cell disease is commonly diagnosed in infancy, and it presents with symptoms of c**hronic anaemia and/or infection.**

The hallmark of sickling episodes is ischemia and infarction in various organs resulting in severe pain. Sickle cell crisis is a medical emergency and needs to be managed by specialists.

Effect of pregnancy on sickle cell disease

Pregnancy aggravates sickle cell disease and increases maternal morbidity and mortality due to:

- Haemolytic and folate deficiency anaemia
- Increased frequency of crises
- Pulmonary complications
- Congestive cardiac failure
- Increased risk of venous thromboembolic events
- Increased susceptibility to infections

Effects of sickle cell disease on pregnancy

- Increased risk of crises especially painful crisis affecting the bones and joints
- Anaemia during pregnancy is frequent and may be severe
- Bacterial infections especially urinary and respiratory tract infections
- Increased incidence of pre-eclampsia
- Increased risk of postpartum haemorrhage
- Miscarriage
- Preterm delivery

Effect on the developing baby/newborn

- Intrauterine growth restriction
- Intrauterine fetal death
- Low birth weight
- Birth asphyxia
- Early neonatal death

Management of sickle cell disease in pregnancy

Preconception care

- Folic acid (5 mg) should be given once daily both preconceptually and throughout pregnancy
- Immunisation against pneumococcus and influenza where possible
- Stop Hydroxyurea at least 3months before pregnancy due to its teratogenic potential
- Malarial prophylaxis

Assessment for:

- Frequency of crisis
- End organ damage (nephropathy, heart failure, stroke)
- Pulmonary hypertension

Management of sickle cell disease during antenatal care

- Prevent anaemia and infections
- Penicillin prophylaxis or the equivalent should be prescribed.
- Effective treatment of other medical and obstetric complications
- Proper management of other sickling complications
- Folic acid supplementation – 5mgs once daily; in areas with folate deficiency give 30mg at each visit using directly observed therapy
- Due to the risk of iron overload, iron treatment should be reserved for haematologically proven iron deficiency
- Antimalarial prophylaxis (intermittent preventive treatment with sulfadoxine-pyrimethamine)
- Closely monitor fetal growth and wellbeing and look out for intrauterine growth restriction; the woman must also be admitted when Hb level drops and/or she develops bone pain
- Women with SCD should be considered for low-dose aspirin 75 mg once daily from 12 weeks of gestation in an effort to reduce the risk of developing pre-eclampsia

Chapter 7: Infections during pregnancy

In this chapter, you will find information about:

- How to manage a woman with suspected sepsis during pregnancy
- How to screen for and manage infections during pregnancy including bacterial infections, chorioamnionitis, sexually transmitted infections and viral infections

Common infections in pregnancy

Bacterial

- Urinary tract infection
- Typhoid
- Chest infection/pneumonia
- Chorioamnionitis
- Sexually transmitted infections (STI)
- Syphilis
- Gonorrhoea
- Chlamydia

Viral

- Hepatitis
- Chicken pox
- Zika virus
- Dengue
- Ebola
- Covid-19
- HIV

Protozoal

- Malaria

Sepsis

Definitions

Maternal Sepsis is a life-threatening condition defined as organ dysfunction resulting from a dysregulated host response to infection during pregnancy, childbirth, post-abortion, or post-partum period. Organ dysfunction is now considered if there is a change in sequential, sepsis-related organ failure assessment (SOFA), where two points or more are associated with a hospital mortality rate greater than 10%.

Septic shock is manifested by circulatory, cellular, and metabolic instability associated with a higher risk of death than sepsis itself. The criteria for diagnosing septic shock are: hypotension requiring vasopressor therapy to maintain mean arterial pressure >65 mm Hg and serum lactate levels greater than 2 mmol/L after appropriate management of hypovolemia.

The SOFA score criteria are outlined in the following chart:

Table 1. Sequential Organ Failure Assessment Score

Variables	SOFA Score				
	0	1	2	3	4
Respiratory	PaO_2/FiO_2: > 400 SpO_2/FiO_2: > 302	PaO_2/FiO_2: < 400 SpO_2/FiO_2: < 302	PaO_2/FiO_2: < 300 SpO_2/FiO_2: < 221	PaO_2/FiO_2: < 200 SpO_2/FiO_2: < 142	PaO_2/FiO_2: < 100 SpO_2/FiO_2: < 67
Cardiovascular (doses in mcg/kg/min)	MAP ≥ 70 mm Hg	MAP ≥ 70 mm Hg	Dopamine ≤ 5 or ANY dobutamine	Dopamine > 5 Norepinephrine ≤ 0.1 Phenylephrine ≤ 0.8	Dopamine >15 or Norepinephrine > 0.1 Phenylephrine > 0.8
Liver (bilirubin, mg/dL)	< 1.2	1.2-1.9	2.0-5.9	6.0-11.9	> 12
Renal (creatinine, mg/dL)	< 1.2	1.2-1.9	2.0-3.4	3.5-4.9	> 5.0
Coagulation (platelets x $10^3/mm^3$)	≥ 150	< 150	< 100	< 50	< 20
Neurologic (GCS score)	15	13-14	10-12	6-9	< 6

However in locations without appropriate laboratory facilities, the score has been modified to the qSOFA (quick SOFA) score, which has been further modified to take account of the altered physiology of pregnancy (omqSOFA) as follows:

- One point each for respiratory rate ≥25min, mental status (any non-alert state) and systolic blood pressure </=90
- A score of 2 or greater is significant

In women with suspected sepsis, the earlier treatment is started, the better the response and increased rate of survival. Whilst a full septic screen should be conducted prior to starting intravenous, broad spectrum antibiotics (for example, Cefotaxime 2gm TDS, and Metronidazole 500mgTDS), it is very important not to delay antibiotic therapy pending results of any investigationsas such delays may result in death. Management can then be adjusted later if necessary depending on culture and sensitivities from the septic screen.

What are the risk factors associated with maternal antenatal sepsis?

- Obesity
- Impaired glucose tolerance/diabetes
- Impaired immunity/immunosuppressant medication
- Anaemia
- Vaginal discharge
- History of pelvic infection
- History of group B streptococcal infection
- Cervical cerclage and other invasive procedures
- Prolonged spontaneous rupture of membranes
- General infection in close contacts/family members

What should prompt recognition of sepsis in the pregnant woman?

All healthcare providers should be aware of the symptoms and signs of maternal sepsis and critical illness and of the rapid, potentially lethal course of severe sepsis and septic shock. Suspicion of significant sepsis should trigger an immediate response with treatment including oxygen, fluid resuscitation and intravenous broad spectrum antibiotics followed by an urgent referral to secondary care. Pregnant women should be given paracetamol to lower any fever present as this

may precipitate preterm labour. Maternal pyrexia is also an independent risk factor for cerebral damage in the newborn.

Clinical signs suggestive of sepsis include one or more of the following: pyrexia, hypothermia, tachycardia, tachypnoea, hypoxia, hypotension, oliguria, impaired consciousness and failure to respond to treatment. These signs, including pyrexia, may not always be present and are not necessarily related to the severity of sepsis.

Regular observations of all vital signs (including temperature, pulse rate, blood pressure and respiratory rate) should be recorded on an observation chart.

- Disease progression may be much more rapid than in the non-pregnant state
- Severe infection may be associated with preterm labour
- Toxic shock syndrome caused by staphylococcal or streptococcal exotoxins can produce confusing symptoms including nausea, vomiting and diarrhoea

What are the clinical features suggestive of sepsis?

- Fever or rigors
- Diarrhoea or vomiting – may indicate exotoxin production (early toxic shock)
- Rash (generalised streptococcal maculopapular rash or purpura fulminans)
- Abdominal/pelvic pain and tenderness
- Offensive vaginal discharge (foul smell suggests anaerobic infection; yellow serous discharge suggests streptococcal infection)
- Productive cough
- Urinary symptoms

What are the appropriate investigations when sepsis is suspected?

- Blood cultures are the key investigation and should be obtained prior to antibiotic administration; however, antibiotic treatment should be started without waiting for microbiology results.
- Serum lactate should be measured within six hours of the suspicion of severe sepsis to guide management. Serum lactate ≥4mmol/L is indicative of tissue hypo perfusion.
- Any relevant imaging studies should be performed promptly to confirm the source of infection.
- Blood cultures and other samples as guided by clinical suspicion of the focus of infection (e.g. throat swabs, midstream urine, high vaginal swab or cerebrospinal fluid) should be obtained prior to starting antibiotic therapy as they may become uninformative within a few hours of commencing antibiotics but must not delay antibiotic therapy.
- Urine output should be monitored

Who should be involved in the collaborative care of women with sepsis?

- If sepsis is chart is recommended. There should be an urgent referral to a higher-level healthcare provider. The expert advice of a microbiologist or infectious disease specialist should be sought urgently when serious sepsis is suspected.
- An observation chart should be used for all maternity inpatients to identify seriously ill pregnant women and refer them to higher level healthcare providers if their condition deteriorates. Early, focused resuscitation has been shown to improve survival.

What are the commonly identified organisms, including hospital acquired infection?

- The most common organisms identified in pregnant women dying from sepsis are Lancefield group A beta-haemolytic Streptococcus and E. coli
- Mixed infections with both Gram-positive and Gram-negative organisms are common, especially in chorioamnionitis
- Coliform infection is particularly associated with urinary sepsis, preterm premature rupture of membranes, and cervical cerclage

General assessment of a woman with suspected sepsis during pregnancy

Assess

- Ask how long has the woman had a fever?
- Cough, is it productive?
- Colour of urine (dark indicates dehydration)?
- Frequent, painful urination?
- Abnormal vaginal discharge?
- Diarrhoea or vomiting?
- Pain and, if present, location?

Conduct a top to toe examination

- Cardiovascular system: tachycardia, bounding pulse
- Respiratory system: shallow fast breathing, lung sounds rattle or wheezing
- Abdomen: extreme localised or generalised tenderness
- Breasts: tenderness, redness
- Neck: stiffness
- If there is any discharge – conduct a speculum examination – check for liquor loss, abnormal discharge
- Skin rash

Septic screen

- Blood for full blood count, lactate, biochemistry profile, liver function tests, blood culture, syphilis and Hepatitis B and C, HIV
- RDT for malaria
- Urinalysis for full culture and sensitivities
- High vaginal swab, if clinically indicated
- A stool sample for culture and sensitivities, if gastrointestinal symptoms
- A wound swab, if clinically indicated
- Sputum culture and screen for TB, if clinically indicated

Treatment

- Give antipyretic (paracetamol)
- Start presumptive treatment with parenteral broad-spectrum antibiotics (e.g Cefotaxime 2g .TDS, Metronidazole 500mg TDS) and antimalarial medication
- Readjust treatment when laboratory test reports are ready
- Refer for inpatient admission if needed, for further management

! If a woman is hypotensive, this is a medical emergency. Call for help and admit to the healthcare facility.

Chest infection/pneumonia

Chest infection, both upper respiratory and pneumonia, is not uncommon in pregnancy. Infections may be bacterial, viral or fungal in origin.

Causative organisms for bacterial pneumonia include:

- Streptococcus pneumoniae
- Haemophilus Influenzae
- Mycoplasma pneumoniae
- Legionella pneumophilia
- Chlamydia Pneumoniae

A history of asthma or other chronic respiratory diseases increases risks, as does HIV infection, maternal smoking or illicit drug use.

Symptoms of pneumonia include cough, fever, dyspnoea and pleuritic chest pain. On auscultation there may be abnormal breath sounds, rattles or diminished air entry with bronchial breathing.

Investigations include full blood count, electrolytes, CRP, tests for Covid-19 and blood and sputum cultures. However empirical intravenous antibiotics should be commenced immediately and certainly prior to any results being available. In 50% of cases the causative organism may never be established.

Erythromycin may be started but if there are signs of severity, cefotaxime or ceftriaxone should be added.

The woman should be closely monitored using an early warning scoring chart and if there are no signs of improvement within 72 hours the treatment regime should be adjusted.

Monitoring should include pulse oximetry oif available. However, regardless of whether the the spO2 is within the normal range, Oxygen therapy should be provided if the respiratory rate is >20 breaths per minute.

Viral pneumonia may occur in association with Influenza, Varicella Zoster (chicken pox) or Covid-19. Symptoms may include cough, fever, rhinitis, malaise, myalgia, headache, sore throat and altered sense of taste and smell. It has been estimated that 5-10% of women infected with varicella develop pneumonitis.

Both influenza and Covid-19 vaccinations are safe in pregnancy. However, Varicella Zoster vaccine is a live vaccine so may not be used in pregnancy. Oral antivirals may be used if available in cases of varicella pneumonitis or given intravenously for more severe cases.

Fungal infections are most often associated with inadequately treated HIV infection.

Urinary Tract Infection

Definition

This is infection at any level of the urinary tract, from the kidneys to the bladder. Urinary tract infections are more common and can be more severe during pregnancy, due to the ureteric dilatation caused by the muscle relaxant effect of progesterone and mechanical obstruction of the ureters caused by the pregnant uterus.

Types of urinary tract infection

- Asymptomatic bacteriuria (3-8%)
- Lower urinary tract infection – Cystitis (bladder infection) (1.3-3.4%)
- Upper urinary tract infection – Pyelonephritis (kidney infection) (1%)

Urinary tract infections in pregnancy are associated with or can lead to complications including preterm birth and, if untreated, can lead to sepsis and renal failure.

Asymptomatic bacteriuria

Definition

The definition is based on laboratory criteria. It is defined as a pure culture (one species of organism) of at least 100,000 colony-forming units per ml of clean-catch midstream urine specimen in a woman with no symptoms or signs of a urinary tract infection.

Diagnosis

- Midstream urine for culture and sensitivity

Cystitis

Definition

Infection of the bladder wall.

Symptoms

- Increased frequency of urination and urgency
- Dysuria (discomfort or pain on urination)
- Cloudy or blood-stained urine
- Change in the smell of urine to a strong-smelling urine

Investigations

- Urine dipstick test (presence of leucocytes and/or nitrites)
- Midstream urine for microscopy (presence of white cells and/or bacteria)

Pyelonephritis

Definition

Infection of the kidney.

Clinical features

- Fever (>37.5°C), increased pulse rate, increased respiratory rate
- Pain and tenderness in the loin region
- Vomiting

Diagnosis

- The diagnosis of pyelonephritis in pregnancy can usually be made on the basis of the clinical symptoms and signs
- Midstream urine for microscopy (presence of white cells, red cells and bacteria)

Treatment

Treatment of a urinary tract infection in pregnancy consists of antibiotic therapy and supportive measures.

Antibiotic therapy

Asymptomatic urinary tract infection or cystitis

- Oral Amoxicillin 500mg 8 hourly for 3 days
  OR
- Oral Cefuroxime 250mg 12 hourly for 3 days
  OR
- Oral Nitrofurantoin 50mg 6 hourly for 7 days (**avoid during the first trimester**)

A three-day course of antibiotic treatment will suffice for most women with lower urinary tract infection, but if symptoms persist or worsen despite treatment, a urine culture and sensitivity must be done and antibiotics prescribed per the results of the test.

Pyelonephritis

- Refer to or admit the woman to a healthcare facility.
- In uncomplicated pyelonephritis: IV Ampicillin 2g 6 hourly + IV Gentamycin 5mg/kg body weight daily or in three divided doses. Once the woman is fever-free for 48 hours, give oral Amoxicillin 12 hourly for 14 days.

OR

- IM or IV Ceftriaxone 1g daily for 3 days, then oral Cefixime 400mg 12 hourly for 14 days.
- In complicated pyelonephritis: IM or IV Ceftriaxone 1g daily + IV Gentamicin IM 5mg/kg body weight daily or in 3 divided doses for 3 days, then oral Cefixime 400mg 12 hourly for 14 days.

Supportive therapy

- Pain relief with paracetamol
- Adequate fluid intake or vigorous hydration with IV crystalloids to increase urine output
- Manage fever with tepid sponging

Typhoid fever

- Typhoid fever, also known as enteric fever is caused primarily by *Salmonella enterica* species, more commonly the *Salmonella typhi*.
- It is spread via the faecal-oral route.
- When it enters the body, it invades the intestinal wall and spreads through the bloodstream to all organs.
- The indiscriminate use of antibiotics for this condition has resulted in the resistance of *Salmonella typhi* to previously effective treatments such as chloramphenicol.

Symptoms

Typhoid fever begins 1-2 weeks after the ingestion of the organism and can present the same way as malaria with:

- Fever
- Joint pains
- Severe headache
- Malaise
- Dry cough
- Abdominal pain
- Delirium, confusion
- Initial constipation followed by diarrhoea

Clinical features of a woman with typhoid fever may be different depending on the geographic region, the infecting bacteria strain and the timing of treatment. Pregnant women can be affected just as the general population and present as above. It is important to manage the typhoid in a timely and appropriate manner to avoid its potential complications.

Complications

- Perforation of the bowel with peritonitis
- Intestinal haemorrhage
- Heart conditions (valvular heart disease)
- Pulmonary oedema
- Severe intravascular haemolysis
- Acute renal failure
- Acute psychosis

Diagnosis

- Diagnosis of typhoid fever is primarily based on strong clinical suspicion.
- Headache is a considerable part of diagnosis and its absence should shed some doubt in the diagnosis.
- Widal test: this is a serological test that measures the titres of the Salmonella typhi antibodies found in a patient. It is important that the titres are read in a sequential way i.e. is there evidence of infection is rising titres of the antibodies. This would reflect presence of active infection. A single test of O titre of 1:100 or more and of H titre of 1:200 or more is significant. A rising titre of four-fold or higher in an interval of 7-10 days is more meaningful than one test. High levels of antibody are found in some healthy people in endemic areas and after vaccination.
- The results of the Widal test may also be falsely positive in such diverse conditions as chronic liver disease, malaria, brucellosis, systemic lupus erythematosus, acute rheumatic fever and streptococcal sore throat due to polyclonal activation of B lymphocytes. The Widal test should be restricted only to culture negative cases of typhoid fever in which the clinical features are typical of typhoid fever.
- Always check for malaria.
- Culture isolation of the organism remains the criterion standard for diagnosis (blood cultures are positive during first 10 days of fever, stool cultures are positive after the tenth day of fever up to fourth or fifth week, urine cultures are positive during second and third week).

Treatment

Pregnant women with suspected typhoid fever should be admitted to the healthcare facility. The treatment option depends on whether the woman is suffering from uncomplicated or complicated typhoid fever.

Antibiotic therapy

- The choice of antibiotics needs to be guided by the geographic region where the organism was acquired and the results of cultures once available
- Treatment should not be delayed for confirmatory tests
- Prompt treatment drastically reduces the risk of complications

1st Line Treatment

- Amoxicillin 1g 3 times a day for 14 days
- IV Ceftriaxone 2g once daily for 7 days may be preferred in pregnancy. It can be administered on an outpatient basis.

Chorioamnionitis

Definition

Chorioamnionitis is an ascending bacterial infection associated with the rupture of membranes, that occurs before or during labour. The condition can result in preterm birth or serious infection in the woman and baby.

Risk factors

- Preterm premature rupture of membranes
- Membranes that have been ruptured for an extended period, e.g. in prolonged labour
- Multiple vaginal examinations during labour (in women with ruptured membranes)
- Pre-existing infections of the lower genital tract (*Chlamydia trachomatis*, Group B streptococci)

Clinical features

Clinical chorioamnionitis should be suspected if one or more of the following are noted:

- Maternal pyrexia (>37.5°C)
- Maternal tachycardia (Pulse rate >120/min)
- Fetal tachycardia (>160/min)
- Abdominal pain or tenderness
- Uterine tenderness
- Offensive vaginal discharge
- Evidence of ruptured membranes

Diagnosis

The diagnosis is based on clinical signs and symptoms. Start treatment as soon as chorioamnionitis is suspected. Maternal pyrexia (above 37.5°C), offensive vaginal discharge and fetal tachycardia (rate above 160 beats/minute) indicate clinical chorioamnionitis. Additional laboratory tests are listed below.

Laboratory tests

- Increased white cell count, increased C-reactive protein
- High vaginal and endocervical swab: positive Gram stain and culture

Complications of chorioamnionitis

- Uterine atony
- Increased risk of Caesarean section
- Postpartum haemorrhage
- Septicaemia
- Septic shock
- Wound infection after Caesarean section
- Post-partum endometritis
- Pelvic abscess
- Fetal distress
- Neonatal sepsis
- Cerebral palsy

Treatment

This is an obstetric emergency. Admit to the healthcare facility. Maternal temperature, pulse and fetal heart rate auscultation should be checked at least every 4-8 hours and documented on an observation chart. Treatment consists of intensive antibiotic therapy and plan for immediate delivery (depending on gestational age of the baby). Corticosteroids for fetal lung maturation are not recommended in the presence of maternal chorio-amnionitis.

Antibiotic therapy

- **First-line choice**: IV Clindamycin 900mg 8 hourly + Gentamicin 5mg/kg body weight daily or in three divided doses**.**
- **Second-line choice:** IV Ampicillin 2g 6 hourly + IV Gentamicin 5mg/kg body weight daily or in three divided doses + IV Metronidazole 500mg 8 hourly.
- **For woman who are allergic to beta-lactam antibiotics**: Erythromycin 1g 6 hourly can be substituted for Ampicillin.

Hepatitis

Hepatitis is an inflammation of the liver that is caused by a variety of infectious viruses and non-infectious agents leading to a range of health problems, some of which can be fatal. There are five main strains of the hepatitis virus, referred to as types A, B, C, D and E. While they all cause liver disease, they differ in important ways including modes of transmission, severity of the illness, geographical distribution and prevention methods. In particular, types B and C lead to chronic disease in hundreds of millions of people and together are the most common cause of liver cirrhosis, liver cancer and viral hepatitis-related deaths. . Hepatitis A and E are spread by the faecal-oral route, while the other three (B, C and D) are transmitted via the bodily fluids (intravenous drugs, blood transfusion, delivery or sexual activity). An estimated 354 million people worldwide live with hepatitis B or C.

Hepatitis A

Vertical transmission to the fetus does not occur, whatever the stage of maternal infection. There is a risk of premature delivery in case of infection during the third trimester. Immunisation by inactivated vaccine can be performed during pregnancy.

Hepatitis C

Hepatitis C (HCV) can cause both acute and chronic infection. Some people recover on their own, while others develop a life-threatening infection or further complications, including cirrhosis or cancer. There is no vaccine for hepatitis C. Antiviral medicines can cure more than 95% of persons with hepatitis C infection, thereby reducing the risk of death from cirrhosis and liver cancer, but access to diagnosis and treatment remains low.

Hepatitis D

Hepatitis D (HDV) is only found in people already infected with hepatitis B (HBV); however, the dual infection of HBV and HDV can cause a more serious infection and poorer health outcomes, including accelerated progression to cirrhosis. Development of chronic hepatitis D is rare.

Hepatitis E

Hepatitis E is rare, but the risk of developing fulminating hepatitis is ten times higher during pregnancy. Epidemics have been observed.

Hepatitis B

Of the five known hepatitis viruses, the most significant during pregnancy is the Hepatitis B virus.

- Hepatitis B may have serious sequelae.
- The virus is endemic across many low resource settings.
- Individuals with a Hepatitis B infection may become chronic carriers of the virus.
- Chronic carriers have a high risk of developing chronic hepatitis, active chronic hepatitis, cirrhosis of the liver and hepatocellular carcinoma.
- The risk of becoming a carrier is related to the age at the time of infection; the younger the age, the higher the risk.
- If infection occurs at birth, the risk is 90%; if it occurs at 1-4 years of age, the risk is 25%. The risk for adult is 5-10%.
- Immunisation at birth should be given.
- Safe and effective vaccines for prevention of Hepatitis B virus infection are available.
- The Hepatitis B virus can be transmitted horizontally and vertically (mother-to-fetus transmission).
- Transmission to the baby commonly occurs during delivery when the fetus may ingest large amounts of blood and vaginal secretions containing the virus.

All pregnant women should be offered serological testing for the Hepatitis B virus surface antigenas part of antenatal routine screening.

Clinical features of viral hepatitis

During the acute or initial infection with all types of hepatitis viruses, women are often asymptomatic.

Common symptoms

- Myalgia (painful muscles)
- Nausea and vomiting
- Fatigue and malaise
- Right upper abdominal pain
- Pale stools and dark urine
- Generalised pruritus

Common signs

- Jaundice
- Hepatomegaly
- Splenomegaly
- Lymphadenopathy
- Right upper quadrant tenderness
- Severe illness with jaundice may occur
- Acute liver failure may develop

Risks for the fetus

- Premature birth if the women contracts hepatitis during the second or third trimester of pregnancy
- Trans-placental transmission or transmission of the virus during delivery

Diagnosis

- Based on serology: Hepatitis A, B and E viruses can be diagnosed by identification of their antibodies in serum
- Hepatitis C virus is diagnosed by enzyme-linked immunosorbent assay (ELISA)

Management of acute viral hepatitis

- Supportive therapy (IV infusion of normal saline and dextrose, restriction of fatty diet, prohibition of alcohol)
- Infection control measures
- Immunization to protect contacts of Hepatitis B virus infection
- Give babies of Hepatitis B virus infected women hepatitis B virus immunization at birth
- Health education and counselling
- Screen for other sexually transmitted infections
- Partner notification and contact tracing
- Avoid alcohol
- Nutritional support

Sexually Transmitted Infections

Women should be screened for sexually transmitted infections if they report symptoms. It is important that women are informed about partner notification and contact tracing. They should also be advised about safe sex practices and the need to abstain from sexual contact until the infection has been treated.

Syphilis

Syphilis is a sexually transmitted disease caused by spirochete *Treponema pallidum.* It is very important to screen routinely as an infected pregnant woman can transmit the disease to the developing baby. Syphilis is responsible for a large number of stillbirths and neonatal deaths. All partners of infected women should be treated to prevent reinfection. The disease can also be transmitted via blood transfusion. At least 50% of women with acute syphilis suffer serious adverse pregnancy outcomes that are potentially avoidable with effective treatment.

Complications include:

- Intrauterine growth restriction
- Stillbirth
- Neonatal death
- Preterm birth
- Congenital infection and anomalies

All women should have a venereal disease research laboratory test done at first antenatal contact to screen for syphilis.

If untreated, syphilis progresses through 4 stages:

- **Primary syphilis** is characterised by a solitary painless ulcer or chancre.
- **Secondary syphilis** manifestations include lesions affecting the skin and mucous membranes, malaise, fever, loss of appetite. and generalised lymphadenopathy.

- **Early latent syphilis** is an infection of less than two years' duration and has no clinical manifestations.
  - This is the contagious period that falls within the first 2 years of infection.
  - The incubation period averages 14-28 days but may last as long as 90 days.
- **Late latent syphilis** is an infection of more than two years' duration without clinical evidence of Treponema infection.
  - Includes benign late syphilis, cardiovascular and neuro syphilis.
  - Late syphilis can arise as soon as one year after initial infection or up to 25-30 years later.

Treatment

Antibiotic therapy

- Benzathine penicillin G 2.4 million units (1.8g) IM. Give a single dose for primary syphilis unless the woman is in her third trimester, then to have a second dose after 7 days to be given as 2 injections in separate sites. Give once a week for 3 weeks for secondary syphilis.
- Benzathine penicillin G 2.4 million units IM weekly for 3 weeks in **late latent syphilis**.
- A missed dose in pregnancy is not acceptable. Pregnant women must repeat the full course.

If allergic to penicillin, then erythromycin 500mg QID for 14 days in early and 30 days in late syphilis should be given.

Trichomonas vaginalis

Trichomonas is a sexually transmitted infection caused by the flagellated protozoan, *Trichomonas vaginalis.* The infection may be asymptomatic or symptoms include offensive vaginal discharge and vulval itching in women.

Symptoms

- Offensive smelling vaginal discharge
- Pruritus vulvae

Investigations

- Speculum examination shows frothy, yellow-green vaginal discharge.
- Perform a high vaginal swab

Treatment

- Metronidazole
  - 2g orally as a single dose (during the first trimester if treatment is needed, a single dose is better than seven days). Women can be treated with 2g metronidazole in a single dose at any stage of pregnancy.

  OR

  - 400 or 500mg orally, twice daily for 7 days, after first trimester.

Gonorrhoea

Definition

Gonorrhoea occurs when the bacterium *Neisseria gonorrhoea* colonizes the epithelial surfaces of the female urogenital tract, conjunctiva, pharynx, rectum or synovium. Neonatal infection can occur during delivery from an infected woman. This can lead to gonococcal conjunctivitis (acute bilateral purulent conjunctivitis), occurring in the first month of life and often in the first week, which is a major cause of blindness.

Symptoms

- Asymptomatic infections are much more frequent in women than in men
- Vaginal discharge may be observed (as *Neisseria gonorrhoea* infects the endocervix rather than the vagina, it is less associated with vaginal discharge)
- Dysuria
- Vulvar itching or burning, local oedema

Diagnosis

- History and signs
- Gram negative bacteria seen by microscopy in purulent discharge
- Endocervical swab

Treatment

- IM Ceftriaxone, 250mg as a single dose

OR

- Cefixime, 400mg orally, as a single dose

Chlamydia Trachomatis

Definition

Sexually transmitted infection due to the bacterium *Chlamydia trachomatis*.

Symptoms

- Chlamydial cervicitis is often asymptomatic
- Mucopurulent vaginal discharge (not always present)

Diagnosis

- Endocervical swab
- Urine specimen for culture
- Nucleic acid amplification test (gold standard)

Risks for the fetus

- The same as for gonorrhoea, even during the neonatal period.
- A small proportion of infants develop chlamydial pneumonitis, usually occurring between the ages of six weeks and three months with cough and tachypnoea but no fever.

Treatment

- Azithromycin, 1g orally, in a single dose

OR

- Erythromycin 500mg orally twice a day for 14 days

Other infections

Candida albicans (thrush)

! *Candida albicans* – this may or may not be a sexually transmitted infection.

This is a yeast (fungal) infection that is common during pregnancy especially during the second trimester. Candida is a normal vaginal commensal and only causes symptoms when the vaginal flora balance becomes altered due to changes in vaginal pH in pregnancy or antibiotic therapy. Candida infection during pregnancy may be asymptomatic but is usually associated with one or more the following:

- Pruritus vulvae
- Vaginal discharge (whitish, odourless, curd-like plaques adhering to the vagina) Possible erythema and/or oedema of the vulva and vagina

Investigation

A speculum examination shows curd-like plaques adhering to the vagina.

Treatment

Nystatin 100,000 IU intravaginal, daily for 14 days or topical or oral azoles, for example clotrimazole pessaries or fluconazole 150mg orally as a single dose.

Varicella zoster and chickenpox

Definition

Chickenpox is an infectious disease caused by varicella zoster virus (part of the herpes family). If a woman has had chickenpox previously, she will have acquired immunity.

Signs and Symptoms

- The symptoms of chickenpox take between 10 days and 3 weeks to appear – incubation period.
- The first signs are fever and feeling unwell.
- This is followed by the formation of watery blisters which can appear anywhere on the body but are concentrated centrally on the torso, face and head.
- After a few days, the blisters burst, crust over and then heal. This may take up to 2 weeks.

A person with chicken pox is contagious from two days before the rash appears until the time when all the blisters have crusted over.

Diagnosis

Generally, the diagnosis of chickenpox is based on the rash seen on the body. If there is any doubt about the diagnosis, chickenpox can be confirmed with laboratory tests, including blood tests or a culture of a lesion sample.

Risks for the woman

Complications that can occur include chest infection (pneumonia), inflammation of the liver (hepatitis) and inflammation of the brain (encephalitis).

Risks for newborn

The risk of for the newborn getting chickenpox depends on the time the woman acquires it during her pregnancy. The highest risk to the baby is when chicken pox occurs in the last 4 weeks of pregnancy.

Before 28 weeks of pregnancy
There is no evidence for an increased risk of early miscarriage. The baby is unlikely to be affected; however, there is a small chance that damage could occur to the eyes, legs, arms, brain, bladder or bowel. This happens in fewer than 1 in 100 babies. Findings that can be seen on ultrasound include musculoskeletal abnormalities seen as asymmetric limb shortening or malformations, chest wall malformations, intestinal and hepatic echogenic foci, intrauterine growth restriction, polyhydramnios, fetal hydrops, or fetal demise. Cerebral anomalies documented with ultrasound include ventriculomegaly, hydrocephalus, microcephaly with polymicrogyria, and porencephaly. Congenital cataract and microphthalmos are the most common ocular lesions but are not readily visible on ultrasound.

Between 28 and 36 weeks of pregnancy
The virus will be transmitted to the fetus, but will not cause any symptoms.

After 36 weeks of pregnancy
This is the time when the fetus is at greatest risk of getting chickenpox. Exposure of the baby to the virus just before or during delivery poses a serious threat to the neonate, which may develop a fulminant neonatal infection (neonatal varicella). Rarely, these neonates can develop disseminated visceral and central nervous system disease, which is commonly fatal. Neonatal infection occurs primarily when symptoms of maternal infection occur less than 5 days before delivery to 2 days after. This period correlates with the development of maternal IgG and is therefore too short to provide transplacental passive immunization to the fetus and neonate. When varicella zoster immune globulin is administered to the mother, 30% to 40% of newborns still develop infection; however, the number of complications is reduced.

Newborn babies who have chicken pox can be given varicella zoster immune globulin (VariZIG) and treated with acyclovir and monitored closely after birth.

Management

- If more than 20 weeks pregnant, give acyclovir 800 mg 5 times daily to reduce fever and symptoms.
- This should be given within 24 hours of the chickenpox rash appearing.
- Acyclovir is not licensed in pregnancy but does not appear to be harmful for unborn babies and therefore may also be considered for treatment before 20 weeks.

Treatment

- Prompt isolation of the woman until the lesions have crusted over
- Aciclovir 800mg orally 5 times a day for 7 days. Start within 24 hours of the onset of symptoms
- Skin lesions can be treated with calamine lotion to reduce itching

The recommended dose of intravenous aciclovir for *Varicella zoster* infections is 10mg/kg every 8 hours, although higher doses (12-15mg/kg) are sometimes used for life-threatening infections, especially in immunocompromised women.

Zika Virus Infection

Zika is a flavivirus that causes a mild self-limiting illness in the woman but can have significant effects on the unborn baby.

- Zika is spread mostly by the bite of an infected Aedes mosquito
- Zika can be sexually transmitted
- Zika can be passed from a pregnant woman to her fetus

Symptoms in the woman

The illness is usually mild with symptoms lasting for several days to a week. The most common symptoms of Zika are:

- Fever
- Rash
- Joint pain
- Red eyes

Effect on the developing baby

Zika virus infection during pregnancy is a cause of significant congenital brain abnormalities, including microcephaly.

Diagnosis

A diagnosis of Zika virus infection can only be confirmed through laboratory tests on blood or other body fluids such as urine, saliva or semen by a specialist laboratory using polymerase chain reaction.

Treatment

- There is no specific antiviral treatment available
- There is currently no vaccine to prevent Zika

Haemorrhagic fevers

Dengue

Definition

Dengue fever is a viral disease transmitted by the Aedes mosquito, prevalent in tropical and subtropical areas. In 80% cases, Dengue is asymptomatic. If symptoms appear they typically begin 3 to 14 days after infection. These may include a high fever, headache, vomiting, muscle and joint pains, and a characteristic skin itching and skin rash. Recovery generally takes two to seven days. In a small proportion of cases, the disease develops into severe dengue with bleeding, low levels of blood platelets, and severe hypotension.

The clinical manifestations, treatment and outcome of dengue in pregnant women are similar to those of non-pregnant women.

Diagnosis

Misdiagnosis or delayed diagnosis is not uncommon due to some of the overlapping clinical and/or laboratory features. These include:

- Eclampsia or pre-eclampsia
- Haemolysis
- Elevated liver enzymes and low platelet count (HELLP) syndrome
- Pneumonia
- Pulmonary embolism
- Various obstetric causes of per-vaginal bleeding
- Other infectious diseases

Risk of vertical transmission

The risk of vertical transmission is well established among women with dengue during the perinatal period.

Severe bleeding may complicate delivery and/or surgical procedures performed on pregnant women with dengue during the critical phase, i.e. the period coinciding with marked thrombocytopenia with or without coagulopathy and vasculopathy.

Management

- Early admission for close monitoring and supportive therapy is recommended, especially for women close to full-term/labour.

Ebola virus disease

Definition

Ebola virus disease, previously known as Ebola Haemorrhagic Fever, is a severe, often fatal illness. It is caused by the Ebola virus, one of the 30 known viruses capable of causing viral haemorrhagic fever syndrome. Ebola virus disease is highly contagious and is transmission is through direct contact with body fluids, including blood, saliva, amniotic fluid, urine, sperm, tears, sweat, breast milk, vomit and faeces.

Symptoms

- Fever
- Severe headache
- Muscle pain
- Weakness
- Fatigue
- Diarrhoea
- Vomiting
- Abdominal pain
- Unexplained haemorrhage (bleeding or bruising, including vaginal bleeding)

Symptoms may appear anywhere from 2 to 21 days after exposure to the Ebola virus, but the average is 8-10 days. Recovery depends on good supportive clinical care and the woman's immune response. People who recover from the infection develop antibodies that last for at least 10 years.

Diagnosis

Diagnosing Ebola virus disease in a person who has been infected for only a few days is difficult because the early symptoms, such as fever, are nonspecific to the Ebola infection and very similar to fever in other infectious diseases such as malaria, typhoid fever and meningitis.

However, anyone suspected of having Ebola virus disease should be isolated and public health authorities notified if:

- They have early symptoms of Ebola
- They have had contact with:
  - Blood or body fluids from a person sick with or who has died from Ebola virus disease
  - Objects that have been contaminated with the blood or body fluids of a person sick with or who has died from Ebola virus disease
  - Infected fruit bats and primates (apes and monkeys)
  - Semen from a man who has recovered from Ebola virus disease

The Ebola virus is detected in blood only after onset of symptoms, most notably fever, which accompany the rise in circulating virus within the patient's body. It may take up to three days after symptoms start for the virus to reach detectable levels.

Ebola virus disease may be confirmed using various investigations:

- Antibody-capture enzyme-linked immunosorbent assay (ELISA)
- Antigen-capture detection tests
- Serum neutralization test
- Reverse transcriptase polymerase chain reaction (RT-PCR) assay
- Electron microscopy
- Virus isolation by cell culture

Samples from patients are an extreme biohazard risk; laboratory testing on non-inactivated samples should be conducted under maximum biological containment conditions.

Management

Treatment for Ebola virus disease is being developed.

- Supportive therapy should be provided
- All therapy must be administered with strict attention to barrier isolation
- All body fluids should be handled with care

Ebola virus disease and obstetric complications

Ebola virus disease in pregnancy is associated with a high rate of obstetric complications and poor maternal and perinatal outcomes including:

- Spontaneous abortion
- Prelabour rupture of membranes
- Preterm birth
- Antepartum and postpartum haemorrhage
- Intrauterine fetal death
- Stillbirth
- Neonatal death
- Maternal death

Healthcare workers caring for women with suspected or confirmed Ebola virus disease should apply extra infection control measures to prevent contact with the woman's blood and body fluids and contaminated surfaces or materials such as clothing and bedding.

When in close contact (within 1 metre) of women with Ebola virus disease, healthcare providers should ideally wear hazmat suits but if not available then as a minimum:

- Face protection (a face shield or a medical mask and goggles)
- Clean, non-sterile waterproof long-sleeved gown and wellington boots
- Gloves (sterile gloves for some procedures)

Treatment

When an Ebola virus disease epidemic occurs, specialised isolation and treatment centres are set up to which any woman suspected of having the disease should be referred.

The WHO recommend that contacts of Ebola patients and contacts of contacts should receive Ebola vaccine, and this now includes pregnant and lactating women.

Sars-CoV-2

Sars-CoV-2 is an RNA virus that was first detected in Wuhan, China in 2019. It causes an infection named Covid-19 transmitted largely by aerosols and droplets from person to person. An infected person has the capacity to infect others in the pre-symptomatic phase of infection in addition to the symptomatic phase. A Global Pandemic developed in 2020. Covid-19 is a multi-system disorder of hugely variable severity, ranging from asymptomatic to death. Some cases go on to develop longer-term symptoms of so-called Long Covid.

Current prevalence is not known due to a substantial drop in testing in most countries. In May 2023, by which time there had been 765 million confirmed cases and 6.9 million Covid-19 deaths, the WHO declared an end to Covid-19 as a public health emergency but at that time Covid-19 was still causing at least one death every 3 minutes globally. Although death rates have decreased markedly Covid-19 remains a significant disorder from which deaths continue to occur.

Studies from around the world show that pregnant women are no more likely to get Covid-19 than other healthy adults. Roughly, three-quarters of pregnant women with Covid-19 have no symptoms at all, and most pregnant women who do have symptoms only have mild cold or flu-like symptoms. But people who are pregnant and unvaccinated or not fully vaccinated are at increased risk of becoming severely unwell if they catch Covid-19, which can lead to them needing intensive care, their baby being born prematurely, or their baby being stillborn.

Vaccination is strongly recommended in pregnancy. Wearing well-fitting respirator-type masks is protective.

Symptoms of COVID-19 include:

- A high temperature or shivering
- A new, continuous cough
- A loss or change to the senses of smell or taste
- Shortness of breath
- Feeling tired or exhausted
- An aching body
- Headache
- A sore throat
- A blocked or runny nose
- Loss of appetite
- Diarrhoea
- Nausea and/or vomiting

Symptoms are non-specific and testing with rapid Antigen tests (RAT) or PCR are necessary to make a diagnosis. RA tests may yield false negative results depending in part on the quality of the testing technique involving oro-pharyngeal and nasal swabbing.

In pregnant women with symptoms of Covid-19, it is twice as likely that their baby will be born early, exposing the baby to the risk of prematurity. Several international studies have also found that pregnant women who tested positive for Covid-19 at the time of birth were more likely to develop pre-eclampsia, more likely to need an emergency caesarean and their risk of stillbirth was twice as high.

There is evidence that COVID-19 infection causes a range of non-specific placental histological changes including fetal and maternal vascular changes, malperfusion, chorioamnionitis, acute inflammatory pathology, chronic inflammatory pathology, increased perivillous fibrin and intervillous thrombosis. Severe placental lesions in the context of proven Covid-19 placental infection, such as trophoblastic necrosis and massive haemorrhage, causing rapidly deteriorating placental function has been linked to a number of stillbirths in women with Covid-19 infection, described as Covid-19 placentitis.

Pregnant women over the age of 35, those who have a BMI of 25 kg/m^2 or more, and those who have pre-existing medical problems, such as high blood pressure and diabetes, are also at higher risk of developing severe illness and requiring admission to hospital.

Management

- Pregnant and postpartum women presenting with Covid-19 should be investigated and treated the same as non-pregnant women unless there is a clear reason not to do so.
- The decision for admission or for self-directed care at home depends on the overall clinical picture. Care at home should include clear advice on what to do if a woman feels she needs further advice or is deteriorating.
- Women presenting with a fever should be cared for in line with general sepsis guidance. Testing for SARS-CoV-2 and other respiratory viruses should be offered in parallel to a full sepsis assessment. Bacterial (rather than viral) infection should be considered if the white blood cell count is raised (lymphocytes are usually low with Covid-19) and antibiotics should be commenced.
- Radiographic investigations should be performed as for a non-pregnant adult; this includes chest X-ray and computerised tomography (CT) of the chest. Urgent chest imaging is essential for the evaluation of an unwell woman with Covid-19 and should be performed promptly when indicated.
- A diagnosis of pulmonary embolism or heart failure should be considered for women presenting with chest pain, worsening hypoxia or a respiratory rate above 20 breaths/minute (particularly if there is a sudden increase in oxygen requirement.
- Women reporting reduced fetal movements in the context of current or recent Covid-19 infection should be advised to attend for assessment. If fetal assessment is non-reassuring, further investigations should ideally include a FBC and coagulation screen (including fibrinogen level). A new finding of thrombocytopenia or low fibrinogen level in this context should prompt careful ongoing assessment for fetal compromise.

Chapter 8: HIV, TB and Malaria in pregnancy

Human Immunodeficiency Virus

Human immunodeficiency virus (HIV) causes a serious and potentially fatal viral illness, where the virus attacks the immune system, causing immune dysfunction and reducing the ability to fight infection. This allows infections, including opportunistic infections, to develop. In severe cases diseases that are clinical indicators of AIDS (Acquired Immune Deficiency Syndrome) develop leading to severe illness and even death.

Effective treatment with highly active antiretroviral therapy (ART) is available to reverse the effects of HIV on the immune system. Lifelong treatment is required to ensure HIV is suppressed.

Prevalence

Around the world, 1.3 million HIV infected women give birth every year, the majority in Sub-Saharan Africa. Between them, Mozambique, Nigeria, South Africa and Tanzania account for 50% of all newly infected HIV positive children. In 2022, it is estimated that 11% of HIV exposed infants were infected. In the same year, 18% of HIV positive pregnant women were not receiving antiretroviral medication.

Administering antiretroviral medication to HIV infected pregnant women can greatly reduce the probability of HIV transmission from mother to the newborn. Without antiretroviral medication, between 15-30% infants born to HIV positive mothers will become infected in pregnancy or during birth and an additional 5-15% through breastfeeding. With adequate maternal treatment, transmission rates fall to less than 5% in the breastfeeding population and less than 2% in the non-breastfeeding population. Transmission rates as low as 0.46% have been documented.

To achieve the aim of elimination of mother to child transmission, at least 95% of women should receive antenatal care. Testing should be provided 95% of pregnant women attending for antenatal care and at least 95% of all women who test HIV positive should receive treatment with antiretroviral medication. To achieve elimination status, a country should have a mother to child transmission rate of less than or equal to 50 cases per 100,000 live births. However, adherence to treatment throughout pregnancy and during breastfeeding must be maintained to achieve optimal results. This means that pregnant and lactating women must receive regular and timely supplies of ART and feel empowered to take the medication. Treatment, once commenced, should be life-long.

Antenatal counselling and testing

All women should be counselled and offered immediate rapid HIV and syphilis testing on their first antenatal visit. This may be the only occasion the woman presents herself for care and the opportunity must not be lost. A full sexual health screen is also recommended for women newly diagnosed with HIV.

Explain to the woman that testing is very important because:

- HIV is a highly treatable condition
- With good treatment, a woman can have a normal life expectancy
- Treatment can protect a woman from developing serious infections
- Treatment vastly reduces the chances of transmission of HIV to the baby. Without treatment, there is a risk of up to 45% that the baby will become infected

Explain to the woman why it is better to investigate and diagnose or exclude co-infection of syphilis, TB and malaria, explain symptoms and signs of syphilis, TB and malaria and its effect on her and the baby.

Diagnosis

- Rapid diagnostics test using enzyme immunoassay to detect antibodies
- Polymerase chain reaction to detect viral ribonucleic acid
- A positive test must be repeated to rule out a false positive

Disclosure to sexual partners

Despite the duty of confidentiality, a woman should be encouraged to disclose her status to her sexual partner(s) so that they can also be offered testing and given advice regarding protection if discordant, or provided with treatment if also positive.

In endemic areas. women who are HIV negative should be offered retesting in the third trimester and postnatally if breastfeeding, as seroconversion may occur later.

Monitoring

- The CD4 count, (a measure of immune functionality), helps to determine a woman's risk of acquiring an opportunistic infection.
- The viral load (copies of virus per ml) determines the risk of mother to child transmission.
- Both CD4 and viral load testing should be provided at least once in each trimester, and especially around 36 weeks in order to obtain the results before birth.
- If viral load is incompletely suppressed it is important to explore whether the woman is complying with treatment. This must be done in a blame-free and supportive manner, and further advice given as to the importance of compliance and the risks of developing resistance to the drugs with poor compliance. Resistance to antiretroviral drugs reduces treatment options in the future and exposes the women to the risk of developing opportunistic infections, in addition to being a public health hazard at population level.

Women should be advised to seek medical help if any of the following develop:

- Fever
- Persistent diarrhoea
- Cough
- Dysuria
- Vaginal discharge
- Weight loss
- Skin rashes/infection
- Foul smelling lochia (if postnatal)
- Oral candidiasis

Treatment

Antiretroviral therapy inhibits viral replication and reduces the viral load. Women who are HIV positive should be offered immediate treatment with triple antiretroviral therapy. Ideally treatment should be started by no later than 14 week's gestation to allow adequate time for viral load suppression. Aim of treatment is to reduce the viral load to <20 copies/ml. care should be taken to

monitor for any side-effects of therapy. In women commencing combination ART (cART) in pregnancy, liver function tests (LFTs) should be performed as per routine initiation of cART and then with each routine blood test. There is no evidence that any antiretroviral medication causes congenital abnormalities and women already on treatment prior to pregnancy should be strongly advised to continue their medication.

All women should be provided with life-long treatment from the time of diagnosis, regardless of CD4 count or viral load. In women who commence cART in pregnancy, an HIV viral load should be performed 2–4 weeks after commencing cART, at least once every trimester, at 36 weeks and at delivery.

In women conceiving on cART there should be a minimum of one CD4 cell count at baseline and one at delivery. In women who commence cART in pregnancy, a CD4 cell count should be performed as per routine initiation of cART with the addition of a CD4 count at delivery even if starting at CD4 >350 cells/mm^3.

Women taking dolutegravir who are trying to conceive or in the first trimester of pregnancy (<12 weeks) should be recommended to take folic acid 5 mgs daily.

All women not on cART should commence cART:

- As soon as they are able to do so in the second trimester where the baseline viral load ≤30,000 HIV RNA copies/mL
- At the start of the second trimester, or as soon as possible thereafter, in women with a baseline viral load of 30,000–100,000 HIV RNA copies/mL
- Within the first trimester if viral load >100,000 HIV RNA copies/mL and/or CD4 cell count is less than 200 cells/mm^3
- All women should have commenced cART by week 24 of pregnancy

Preferred first line treatment:
Tenofovir (TDF) or Abacavir, + Lamivudine (3TC) or Emtricitabine (FTC) + Efavirenz (EFV) or Atazanavir. However, different countries will have different preferred regimes and local protocols should be followed.

For women with high viral loads (>100,000 copies/ml the addition of raltegravir or dolutegravir may be recommended.

Possible side effects include nausea, diarrhoea and headache. These are usually transient.

Complications of HIV

- Kaposi's sarcoma
- Non-Hodgkin's lymphoma
- Opportunistic infections: pneumocystis carinii pneumonia, oesophageal candidiasis, CMV causing hepatitis and atypical mycobacterial infections
- Neurological complications: meningoencephalitis, myelopathy, cerebral toxoplasmosis

Risks of combination antiretroviral therapy (cART) treatment to the pregnancy

The benefits of treatment are significantly greater than the risks. However increased risks of preterm labour for women have been reported on some combinations of triple therapy and women should be warned of any treatment-specific risks if relevant.

Management

- All women who are HIV positive are advised to give birth in a healthcare facility
- For women with a plasma viral load of <50 copies/ml, planned vagnial birth should be supported. For women with a plasma viral load of 50–399 HIV RNA copies/mL at 36 weeks, pre-labour CS (PLCS) should be considered, taking into account the actual viral load, the trajectory of the viral load, length of time on treatment, adherence issues, obstetric factors and the woman's views. Where the viral load is ≥400 HIV RNA copies/mL at 36 weeks, PLCS is recommended. Where the indication for CS is the prevention of vertical transmission, CS should be undertaken at between 38 and 39 weeks' gestation.
- If a woman presents with preterm prelabour rupture of the membranes, a judgement must be made as to whether the risks of prematurity outweigh the risks of vertical transmission if the woman remains pregnant. Women with an undetectable viral load (<20 copies/ml) should generally be advised to continue with the pregnancy and await the spontaneous onset of labour, provided there is no sign of ascending bacterial infection leading to chorioamnionitis. Antibiotic prophylaxis should be provided per the usual protocol.
- In all cases of term pre-labour SROM, delivery within 24 hours should be the aim. For women with SROM and a last measured plasma viral load of 50–399 HIV RNA copies/mL, immediate CS is recommended, but should take into account the actual viral load, the trajectory of the viral load, length of time on treatment, adherence issues, obstetric factors and the woman's views. For women with SROM and maternal HIV viral load ≥400 HIV RNA copies/mL, immediate CS is recommended.
- Women with breech presentation at 36 weeks can be offered external cephalic version, ideally if the viral load is <50 copies/ml.

Tuberculosis (TB)

Key points

- TB is a public health problem and is a significant contributor to maternal mortality and is among the three leading causes of death among women aged 15-45 years in high burden areas. It is estimated that t more than 200,000 cases of TB occur in pregnant women annually. Even though TB is a leading cause of death among young women in high-burden countries, it is not known how many pregnant and postpartum women die of TB, as these numbers are often not recorded by national TB programmes. These deaths are, therefore, likely to be under-recognized.
- TB may be asymptomatic and screening for TB during pregnancy is not often available. Congenital TB though rare, is associated with high perinatal mortality.

Women with HIV/AIDS, due to weakened immune systems have a much higher risk of developing TB. Interventions aimed at integrating passive TB screening in other settings, such as antenatal clinics have proven to be acceptable. Active screening for TB among women who are HIV positive can reveal a significant number of women with undiagnosed TB.

Microbiology

Mycobacterium tuberculosis, is an aerobic, non-spore-forming, non-motile bacillus. Almost all TB infections are caused by inhalation of infectious particles aerosolized by coughing, sneezing and talking.

TB in Pregnancy

TB affects almost every organ in the body, but the usual site of the disease is the lungs, accounting for more than 80%of tuberculosis cases. The pattern of the infection in HIV positive women may, however, be different, with increasing trends towards extra pulmonary spread.

Pregnancy itself does not lead to progression of TB. The diagnosis of tuberculosis in pregnancy can be more challenging, as some symptoms may initially be ascribed to the pregnancy, for example, weight loss associated with TB may be masked by the normal weight gain in pregnancy. The worst prognosis is in women in whom a diagnosis of advanced disease is made in the puerperium as well as those with HIV co-infection. Failure to comply with treatment also worsens the prognosis.

Late diagnosis is an independent factor, which may increase obstetric morbidity about fourfold, while the risk of preterm labour may be increased nine-fold. In settings where the TB prevalence in the general population is 100/100,000 population or higher, systematic screening for active TB should be considered for pregnant women as part of antenatal care. Systematic screening is defined as the systematic identification of people with suspected active TB in a predetermined target group, using tests, examinations or other procedures that can be applied rapidly.

Women living with HIV who develop TB disease in the postpartum period are twice as likely to die during the year following the birth of their infant than similar women who did not develop TB. Their infants are three times more likely to die during their first year of life, and are more likely to become infected with HIV.

Screening for TB in pregnancy

All pregnant women are at increased risk for developing TB disease during pregnancy and in the six-month period after giving birth. Pregnant women living in areas of high TB burden (a prevalence of 100 cases per 100 000 population or greater) should be screened for TB disease at every contact with a health worker.

Pregnant women should be screened using the four symptom screening method (cough, night sweats, fever, weight loss). Screening for weight loss should not just consider absolute weight loss but should also check for failure to adequately gain weight during pregnancy.

It is important to consider TB in all women with chronic cough and/or who have recently visited areas endemic with tuberculosis and/or who have a family member with a chronic cough or diagnosis of TB.

Chest radiography can be used to screen pregnant women for TB disease, as long as good practices are followed to prevent radiation exposure of the fetus. The benefit of accurate TB diagnosis outweighs the risks of radiation exposure, although national guidance should be observed.

Women who screen positive require a clinical evaluation with further testing.

Symptoms of TB include:

- Chronic cough (>2-3 weeks' duration)
- Productive cough
- Blood noted on coughing (haemoptysis)
- Night sweats
- Night fever
- Weight loss

There are a number of ways in which TB can diagnosed and confirmed. These include:

- Microscopic examination and culture
- Mantoux or tuberculin test
- Chest x-ray
- GeneXpert

Microscopic examination

Microscopic examination of sputum or another specimen for acid-fast bacilli remains the cornerstone of routine laboratory diagnosis of TB in pregnancy. Three samples of sputum are obtained. Staining for acid-fast bacilli is done using the Ziehl-Neelsen, fluorescent, Auramine-Rhodamine, and the Kinyoun techniques. Light-emitting diode fluorescent microscopy has recently been introduced to improve diagnosis.

Culture

The traditional culture on Lowenstein-Jensen's medium may take 4-6 weeks to obtain a result. This may, however, still be useful in cases of diagnostic doubts and management of suspected drug-resistant tuberculosis.

Mantoux or Tuberculin Test

In pregnant women with signs and symptoms suggestive of TB, a tuberculin skin test can be carried out. This is a safe and sensitive test in pregnancy. A single-needle intradermal injection of 0.1 mL of purified protein derivative (5 Tuberculin units) is administered, and the skin reaction is analysed 48-72 hours later, based on the largest diameter of the indurations developed.

False-positive results may be obtained in individuals who had previously been vaccinated with the Bacillus Calmette-Guérin vaccine, those with previously treated tuberculosis, as well as in people with infection from another mycobacterium species. False negatives on the other hand are commonly due to a compromised immune system and technical errors. Newer diagnostic tools are now available to facilitate diagnosis, including the GeneXpert, which has been endorsed by the World Health Organization.

GeneXpert Test

The GeneXpert test is a new molecular test for TB which diagnoses TB by detecting the presence of TB bacteria, as well as testing for resistance to the drug Rifampicin. The test detects the DNA in TB bacteria. It uses a sputum sample and can give a result in less than 2 hours. it can also detect the genetic mutations associated with resistance to the drug Rifampicin. Many countries now have GeneXpert diagnostic facilities.

The main advantages of the test are reliability when compared to sputum microscopy and the speed of getting the result when compared with culture. For diagnosis of TB, although sputum microscopy is both quick and cheap, it is often unreliable. It is particularly unreliable when people are HIV positive. Although culture gives a definitive diagnosis, to get the result usually takes a much longer time (weeks) compared to the GeneXpert test (<2 hours).

Chest x-ray

A chest x-ray with abdominal lead shield may safely be done during pregnancy without concern for fetal health.

Possible findings:

- Infiltrate or consolidation
- Cavity lesions
- Nodules with poorly defined margins
- Pleural effusion
- Hilar or mediastinal lymphadenopathy

Treatment of TB

Commonly used anti-TB drugs are not teratogenic and are safe in pregnancy.

- Rifampicin, Isoniazid and Ethambutol are the first line drugs while Pyrazinamide use in pregnancy is gaining popularity.
- Isoniazid preventive therapy is aimed at reducing the infection in HIV positive pregnant women.
- Babies born to women with TB who are also HIV positive should be commenced on INH prophylaxis for six months, after which babies are vaccinated with Bacillus Calmette-Guérin if they test negative.

Untreated TB represents a far greater hazard to a pregnant woman and her fetus than treatment of the disease. Treatment is achieved with directly observed therapy, short course. This therapy entails the use of combination therapy for at least 6 months. Depending on the combination of anti-TB agents that are available, this includes isoniazid and rifampicin compulsorily, supported by ethambutol and pyrazinamide. For women with drug-susceptible TB and good drug adherence, these regimens will cure around 90% of TB cases. Treatment is done on an outpatient basis, unless otherwise indicated. The use of these first-line anti-TB drugs in pregnancy are considered safe for the woman and baby.

Isoniazid

Isoniazid is safe during pregnancy even in the first trimester, though it can cross the placenta. Pyridoxine supplementation is recommended for all pregnant women taking INH at a dose of 50mg daily.

Rifampicin

This is also believed to be safe in pregnancy, though in an unknown proportion of cases, there may be an increased risk of haemorrhagic disorders in the newborn (some authorities prescribe supplemental vitamin K (10mg/day) for the last four to eight weeks of pregnancy).

Ethambutol

The retrobulbar neuritis that may complicate the use of this drug in adults generated the fear that it may interfere with ophthalmological development when used in pregnancy but this has not been demonstrated when the standard dose is used.

Pyrazinamide

The use of pyrazinamide in pregnancy was previously avoided by healthcare providers due to unavailability of adequate data on its teratogenicity. Presently, many international organisations recommend its use and there are no reports of significant adverse events in pregnant women and it used as part of the standard regimen in many countries. Pyrazinamide is particularly indicated in women with tuberculous meningitis in pregnancy, HIV coinfection, and suspected Isoniazid resistance.

Streptomycin

The drug has been proven to be potentially teratogenic throughout pregnancy. It causes fetal malformations and eighth-nerve paralysis, with deficits ranging from mild hearing loss to bilateral deafness. Many centres do not use this drug in pregnancy.

Multidrug-Resistant TB

Pregnant women with multidrug-resistant TB have a less favourable prognosis. They may require treatment with second-line drugs including:

- Cyclomerize
- Ofloxacin
- Amikacin
- Kanamycin
- Capreomycin
- Ethionamide

The safety of these drugs is not well-established in pregnancy but ethionamide is not recommended for use in pregnancy. Individualised treatment regimens using various combinations of these second line anti-TB agents have been used in pregnant women with no adverse obstetric outcome. The recommendations for treatment of women who are pregnant and have MDR-TB are expected to change as experience and knowledge in the management of the condition increases.

Effect of TB on the developing baby

Congenital TB is a rare complication of an in utero TB infection while the risk of postnatal transmission is significantly higher. Congenital tuberculosis may be because of haematogenous spread through the umbilical vein to the fetal liver or by ingestion and aspiration of infected amniotic fluid. A primary focus subsequently develops in the liver, with involvement of the peri-portal lymph nodes. The tubercle bacilli infect the lungs secondarily, unlike in adults where over 80% of the primary infections occur in the lungs.

Congenital tuberculosis may be difficult to distinguish from other neonatal or congenital infections from which similar symptoms may occur in the second to the third week of life.

These symptoms include:

- Hepato-splenomegaly
- Respiratory distress
- Fever
- Lymphadenopathy

The possibility of postnatal transmission must be excluded by a thorough investigation of all contacts, including hospital staff and attendants. Up to 50% of newborn babies with congenital TB may die, especially in the absence of treatment.

Pyridoxine deficiency may cause seizures in the newborn.

In the absence of evidence of congenital TB, isoniazid (10 mg/kg/day) should be commenced at birth and continued for six months. Clinical or radiological features of active tuberculosis and a positive tuberculin skin test are indications for a full course of anti-TB treatment. The tuberculin skin test and chest x-rays are done at 6 weeks, 12 weeks, and 6 months. The baby is vaccinated with the Bacillus Calmette-Guérin vaccine at 6 months if these tests are negative. The baby is, however, changed to multiple drug therapy if any of these tests turn positive during the period of monitoring.

HIV and TB Co-infection in Pregnancy

Co-infection with HIV and TB is common. Treatment is complicated by the challenges of adherence, polypharmacy and the overlapping side effects of anti-TB and antiretroviral drugs.

The key concern is about the interactions between Rifamycin and some HIV medications. The suboptimal outcomes of therapeutic trials without Rifamycin has made the use of the drug mandatory, even in the face of drug interactions.

Nevirapine, which is an alternative to the use of efavirenz, also exhibits some drug interaction with rifampicin. Rifampicin may lead to the reduction of serum concentration of nevirapine by as much as 50%. To circumvent this problem, rifabutin, another rifamycin with similar effectiveness to rifampicin in the treatment of tuberculosis may be used, as the drug has less effect on the CYP3A system that metabolizes nevirapine.

Generally, there is a lack of studies and data on how pregnancy may affect the interactions. Caution is, therefore, of great importance when managing pregnant women with both TB and HIV. National guidelines, where available, available should be followed.

Prevention of Tuberculosis

The Bacillus Calmette-Guérin vaccine has been incorporated into the national immunization policy of many countries, especially the high burden countries, thereby conferring active immunity from childhood. Non-immune women travelling to tuberculosis endemic countries can also be vaccinated. However, the vaccine is contraindicated during pregnancy.

Preventative therapy

The WHO recommend that:
Pregnant women living with HIV in whom TB disease has been excluded should receive Tuberculosis Preventative Therapy (TPT) as part of a comprehensive package of HIV care.

This should be done regardless of whether the women are on antiretroviral treatment, irrespective of the degree of immunosuppression, and even if testing for TB infection is unavailable.

In settings of high TB transmission, pregnant women living with HIV who have an unknown or positive test of TB infection and who are unlikely to have TB disease should receive at least 36 months of isoniazid preventive therapy. This should be given whether or not the woman is on antiretroviral therapy and regardless of her CD4 count or history of previous TB treatment.

Malaria

Definition

Malaria is caused by protozoa of the genus Plasmodium, which is transmitted to humans through the bite of an infected female Anopheles mosquito.

- *Plasmodium falciparum* is the dominant parasite mainly responsible for over 90% of malaria cases and almost all the severe forms of the disease.
- The most vulnerable groups are under-five year old (U5) children and pregnant women, and immunosuppressed people, especially if CD4 is low secondary to infection with HIV.

The symptoms and complications of malaria in pregnancy vary according to malaria transmission intensity in the given geographical area, and the individual's level of acquired immunity.

High-transmission settings

In high-transmission settings, where levels of acquired immunity tend to be high, *Plasmodium falciparum* infection is often (although not always) asymptomatic in pregnancy. However, parasites may be present in the placenta even in the absence of documented peripheral parasitaemia. This may be associated with intrauterine growth restriction.

In high-transmission settings, the adverse effects of *Plasmodium falciparum* infection in pregnancy are likely to be most pronounced for women in their first pregnancy.

Low-transmission settings

In low-transmission settings, where women of reproductive age have relatively little acquired immunity, malaria in pregnancy is associated with an increased risk of severe malaria. In such settings, malaria can affect all pregnant women, regardless of their parity.

Prevention of malaria in pregnancy

The following interventions are recommended for the prevention of malaria during pregnancy:

- Use of long-lasting insecticide-treated bed nets
- In all areas with moderate to high malaria transmission in Africa, intermittent preventive treatment in pregnancy with sulfadoxine-pyrimethamine, as part of antenatal care services
- Prompt diagnosis and effective treatment of malaria infections

1 Intermittent preventive treatment for malaria in pregnancy

- All pregnant women (including HIV positive pregnant women except those on co-trimoxazole prophylaxis) in areas of moderate-to-high malaria transmission should receive intermittent preventive treatment in pregnancy with sulfadoxine-pyrimethamine at each scheduled antenatal care contact.
- The first dose should be given as early as possible after 13 weeks gestation, if gestational age is known, or alternatively after quickening). **Sulfadoxine-pyrimethamine should not be given in the first trimester of pregnancy**.
- The sulfadoxine-pyrimethamine doses should be given at least 1 month apart and the last dose can be administered up to the time of delivery without safety concerns. Every woman should have a minimum of 3 doses.

- Intermittent preventive treatment in pregnancy should be administered as directly observed therapy of three tablets sulfadoxine-pyrimethamine (each tablet containing 500mg/25mg sulfadoxine-pyrimethamine).
- Sulfadoxine-pyrimethamine can be given either on an empty stomach or with food.
- Folic acid at a daily dose of 0.4mg daily can be safely used with sulfadoxine-pyrimethamine. Any dose equal to or above 5mg should not be given together with sulfadoxine-pyrimethamine as this counteracts its efficacy.

Long-lasting insecticide-treated bed nets

- Each pregnant woman living in a malaria risk area should receive a free long-lasting insecticide-treated bed net at the first antenatal contact.
- Each pregnant woman is shown how to hang the long-lasting insecticide-treated bed nets and encouraged to use the net each night during her pregnancy and thereafter.

2. Provision of prompt diagnosis and treatment of fever due to malaria

- Testing every pregnant woman who presents with fever with a rapid diagnostic test kit for malaria
- Giving effective antimalarial medication to women who are confirmed with malaria

3. Health education/counselling

- Counsel the woman on the importance of completing the medication
- Seek treatment in case of febrile illness, encourage to have a RDT and avoid obtaining treatment over the counter which may be inadequate
- Regular long-lasting insecticide-treated bed net use

Clinical features of malaria in pregnancy

Uncomplicated Malaria

- Fever (Temperature 37.5°C or more)
- Chills/rigors
- Headache
- Joint pains
- General malaise
- Nausea and vomiting

Severe malaria

In addition to the above symptoms and signs, the following may be present in severe malaria:

- Generalized Convulsions
- Altered consciousness (change of behaviour, confusion, delirium, coma persisting for over 30minutes after convulsion)
- Severe anaemia – Hb <5g/dl
- Hypoglycaemia (blood glucose <2.2mmol/L or <40mg/dl)
- Spontaneous unexplained bleeding
- Haemoglobinuria (dark urine)
- Acute renal failure (failure to make urine or making very little quantity of urine)
- Shock or circulatory collapse (cold limbs, weak rapid pulse, low blood pressure)

- Jaundice
- Acute pulmonary oedema or difficulty in breathing (Adult respiratory distress syndrome)
- Fetal loss
- Preterm labour

Diagnosis

- Microscopy of a thick and thin blood film
  - Thick blood film is more sensitive to detecting parasites
  - Thin film helps to identify parasite species
- Rapid Diagnostic test

Treatment of Malaria Infection

Uncomplicated malaria

First trimester:

- Pregnant women with uncomplicated P. falciparum malaria should be treated with artemether–lumefantrine (AL) during the first trimester. Limited exposures to other Artemether combinations therapies (ACTs) (artesunate–amodiaquine (AQ), artesunate–mefloquine (AS/MQ) and dihydroartemisinin–piperaquine) suggest that the current evidence is insufficient to make a recommendation for routine use of these other ACTs in the first trimester of pregnancy. However, consistent with the previous WHO recommendation that provided for limited use of ACTs if the first-line recommended medicine was not available, these other ACTs may be considered for use where artemether–lumefantrine is not a recommended ACT for uncomplicated malaria or is not available, given the demonstrated poorer outcomes of quinine treatment, along with the challenges of adherence to a seven-day course of treatment.
- Antifolates are contraindicated in the first trimester of pregnancy. Therefore, ACTs containing sulfadoxine–pyrimethamine are contraindicated during the first trimester of pregnancy. Second and third trimester of pregnancy.
- Treat pregnant women in the second and third trimester presenting with uncomplicated malaria as non-pregnant adults using AL or AS+AQ as alternative.
- Give paracetamol together with the malaria treatment to reduce fever. (maternal pyrexia is a risk factor for preterm labour and fetal cerebral damage).

Severe malaria

- Severe malaria should be managed as an inpatient
- Artesunate should be given IV or IM for at least 24 hours or until the woman can take oral
- If in a BEmONC facility, give initial dose of Artesunate and refer to CEmONC facility
- If Artesunate is not available use Artemether in preference to Quinine
- Intravenous fluids
- If altered consciousness, check blood glucose hourly and if indicated give a bolus of 10% glucose as severe malaria msy cause severe hypoglycaemia. Repeat as necessary
- Test glucose frequently (hourly) with finger prick BM strips
- Antipyretics – paracetamol
- Anticonvulsants if convulsions have occurred
- Blood transfusion if Hb is <7g/dl

Dose of Artesunate:

- Adult: 2.4 mg/kg/dose.
- One dose on admission (H0) then 12 hours after admission (H12) then 24 hours after admission (H24) then, once daily.
- Administer parenterally at least 24 hours (3 doses), then, if the patient can tolerate the oral route, change to a complete 3-day course of an artemisinin-based combination. If not, continue parenteral treatment once daily until the patient can change to oral route (without exceeding 7 days of parenteral treatment).

To make up Artesunate for injection from powder:

- Powder for injection, in 60 mg-vial, with one 1 ml-ampoule of 5% sodium bicarbonate and one 5 ml ampoule of 0.9% sodium chloride, for slow IV injection (3 to 5 minutes) or slow IM injection. NEVER ADMINISTER BY IV INFUSION.
- Dissolve the powder in the entire volume of 5% sodium bicarbonate and shake the vial until the solution becomes clear. Then, add the 0.9% sodium chloride into the vial:
  - 5 ml of 0.9% sodium chloride to obtain 6 ml of artesunate solution containing 10 mg/ml, for IV injection
  - 2 ml of 0.9% sodium chloride to obtain 3 ml of artesunate solution containing 20 mg/ml, for IM injection

Quinine is no longer recommended as artemisia based drugs are effective with a lower side-effect profile and are safe throughout pregnancy. However if they are not available quinine may still be used.

Quinine IV:

- Loading dose: 20 mg/kg diluted in glucose solution (5% or 10%), administered over 4 hours. Then 5% glucose to keep the vein open over the next 4 hours.
- Maintenance dose: 10 mg/kg over 8 hours, every 8 hours (or, better, alternate 4 hours of quinine diluted in 5% glucose and 4 hours of 5% glucose).

Do not administer loading dose to patients who have received oral quinine or mefloquine within the previous 24 hours. In these cases, start with the maintenance dose.

Monitor the patient closely (risk of pulmonary oedema and hypoglycaemia).

As soon as the patient has received at least 3 doses of parenteral quinine and can tolerate oral treatment, change to **quinine** PO to complete 7 days of treatment or administer a 3-day course of ACT.

If the combination AS/MQ is used as oral completion treatment following IV quinine, start AS/MQ 12 hours after the last dose of quinine.

Chapter 9: Obstetric complications

In this chapter, you will find information about:

- Hypertensive disorders of pregnancy
- Intrahepatic cholestasis of pregnancy
- Antepartum haemorrhage
- Abnormally large uterus
- Intrauterine growth restriction
- Preterm birth
- Malpresentation
- Multiple pregnancy
- Induction of labour

Hypertensive disorders of pregnancy

Hypertensive disorders of pregnancy are a cause of severe morbidity, long term disability and death among both women and their babies. In Africa and Asia, nearly one tenth of all maternal deaths are associated with hypertensive disorders of pregnancy. Pre-eclampsia/Eclampsia stands out as a major cause of maternal and perinatal mortality and morbidity. Globally it is estimated that almost 19 million women are affected by hypertensive disorders of pregnancy annually and in low- and middle-income countries, hypertensive disorders are the second most common obstetrical cause of stillbirths and early neonatal deaths. Pre-eclampsia is the third leading pregnancy-related cause of death, after haemorrhage and sepsis, with an estimated 29,000 deaths of pregnant women per annum.

Definitions of Hypertension during Pregnancy

- **Pre-existing hypertension**: Hypertension diagnosed before or during the first 20 weeks of pregnancy with a blood pressure measurement of ≥140/90mmHg.
- **Pregnancy-induced hypertension**: Diastolic blood pressure >90mmHg on two consecutive readings after 20 weeks' gestation.
- **Pre-eclampsia**: It is clinically defined by the onset of hypertension (>140/90mmHg) on two consecutive readings after 20 weeks' gestation (in a previously normotensive woman) plus at least one other associated complication. These complications include proteinuria, maternal organ dysfunction or utero-placental dysfunction.

! It is no longer considered that proteinuria must be present to diagnose pre-eclampsia if organ dysfunction is present.

Diagnostic criteria:

- Proteinuria >300 mg/24 hours or a urine protein-to-creatinine ratio of at least 0.3
- New-onset hypertension (systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg; average of two measurements
- Proteinuria >300 mg/24 hours or a urine protein-to-creatinine ratio of at least 0.3
- Elevated transaminases (liver enzymes), for example, ALT or AST >40 IU/l
- Haematological abnormalities, platelets <150,000/µl, DIC, haemolysis
- Uteroplacental dysfunction (Fetal Growth Restriction, angiogenic imbalance, placental abruption)
- Cardio-respiratory complications, oxygen saturation <90%
- Angiogenic imbalance and intrauterine growth restriction
- Neurological complications (including eclampsia, altered mental status, blindness, stroke, or more commonly hyperreflexia when accompanied by clonus, severe headaches, and persistent visual scotomata
- **Severe pre-eclampsia**: Blood pressure with systolic blood pressure >160mmHg and/or diastolic blood pressure >110 mmHg proteinuria 3+ or more; and one or more signs or symptoms such as headache, blurring of vision and right upper abdominal pain
- **Eclampsia**: Blood pressure >140/90mmHg + convulsions; other signs and symptoms of severe pre-eclampsia. Rarely, eclampsia may occur with lower BP

! Be aware of the risk of seizures following delivery, many eclampsia cases occur postnatally. This risk is highest 48 hours postpartum, but it can occur at any time up to 4 weeks after delivery.

Management of pregnancy induced hypertension

Pregnancy induced hypertension is a common complication of pregnancy. Any woman who presents with elevated blood pressure should have a full assessment to establish the diagnosis and to exclude or confirm pre-eclampsia.

- Baseline bloods (liver function tests, full blood count, urea and electrolytes, uric acid) and urine test.
- Once the diagnosis of pregnancy induced hypertension (normal bloods, no proteinuria or symptoms), is confirmed then women can be monitored as outpatients.
- Monitoring throughout the pregnancy is important in women with pregnancy induced hypertension owing to an increased risk of developing eclampsia.
- The degree of monitoring will depend on the degree of hypertension from weekly in mild pregnancy induced hypertension (140-150/90-95mmHg) to three times a week if higher.
- Women should be advised to attend their nearest healthcare facility if they develop any symptoms of pre-eclampsia or have any concerns about fetal movement.
- Consider hypertensives when blood pressure is persistently above 140/90mmHg at any gestation.
- Monitor fetal growth with serial ultrasound scans in women on antihypertensives.

Follow-up

- Blood pressure usually settles within 6 weeks of delivery
- If hypertension persists, consider essential hypertension
- Women with pregnancy induced hypertension are at increased risk of recurrence of pregnancy induced hypertension in future pregnancies and of hypertension in later life

Management of pre-eclampsia

If pre-eclampsia is mild and stable, the woman may be managed as an outpatient and regularly reviewed (at least twice weekly). If the woman lives far away from the healthcare facility and has no access to transport, she should be managed as an inpatient. Pre-eclampsia can progress rapidly and unpredictably from mild to severe pre-eclampsia and women should be counselled about signs and symptoms of pre-eclampsia. Delivery is the definitive management.

Women with new onset pre-eclampsia (>140/90mmHg) on 2 consecutive readings after 20 weeks' gestation with significant proteinuria and/or signs of organ dysfunction and with fetal effects (reduced fetal movements, fetal growth restriction or abnormal fetal dopplers on ultrasound scan) should be referred to the most appropriate healthcare facility for inpatient treatment.

- Consider starting anti-hypertensives if blood pressure is persistently >140/90mmHg
- Anti-hypertensives control blood pressure but do not stop the disease process

Fetal monitoring

Maternal monitoring of movements is subjective but should be taken seriously.

- Fortnightly growth measurements by ultrasound scan
- If delivery is anticipated before 34 weeks, then consider steroids for fetal lung maturiturtion

Delivery

- The decision to deliver is multi-factored and includes all aspects of maternal and fetal wellbeing, including past obstetric history and current gestation
- Consider induction of labour at term if the cervix is favourable
- Delivery should be expedited in women who:
  - Have signs symptoms of pre-eclampsia or HELLP syndrome
  - Have uncontrollable blood pressure whilst on antihypertensives
  - Static fetal growth, reduced fetal movements or oligohydramnios

Table 9.1: Use of hypertensive drugs

Drug	Dose and route
Labetalol	100mg orally two times a day, increasing to 200mg three times a day
Nifedipine	10mg two times a day, can increased to 40mg two times a day
Methyldopa	250mg two times a day up to 1g three times a day

! If it is not possible to monitor a woman with mild pre-eclampsia at home, she should be admitted to the healthcare facility for close monitoring and treatment.

Symptoms and signs of severe pre-eclampsia or impending eclampsia include:

- Severe headache (especially frontal)
- Altered mental state/drowsiness
- Visual disturbances (e.g. blurred vision, flashes of flight)
- Epigastric pain
- Hyper-reflexia

Classification of pre-eclampsia/eclampsia

Pre-eclampsia is classified as mild, and severe. The clinical picture of the different stages is shown in Table 9.2 below.

Table 9.2: Clinical picture and symptoms of Pre-eclampsia and Eclampsia

Finding	Mild Pre-eclampsia	Severe Pre-eclampsia	Eclampsia
Diastolic blood pressure	Absolute level is >90 but <110	Absolute level is >110	As in severe pre-eclampsia plus fits
Proteinuria	May or may not be present	May or may not be present	
Generalized oedema including face and hands	Absent	Usually present	
Headache	Absent	Sometimes present	
Visual disturbance	Absent	Sometimes present	
Epigastric pain	Absent	Sometimes present	
Oliguria	Absent	Sometimes present	

The differential diagnosis of eclampsia includes:

- Epilepsy
  - History of epilepsy (but remember that women with a history of epilepsy are just as likely to suffer from Eclampsia as other women)
  - No elevated blood pressure
  - No proteinuria
- Cerebral malaria
  - Fever
  - Positive malaria blood slide
  - No proteinuria
  - No elevated blood pressure
- Meningitis
  - Headache
  - Fever
  - Stiff neck
  - Positive lumbar puncture
  - No proteinuria
  - No elevated blood pressure

Complications of Pre-Eclampsia and Eclampsia include:

- Placental abruption
- Renal insufficiency or failure
- HELLP syndrome (Haemolysis, Elevated Liver enzymes and Low Platelet count)
- Intracranial haemorrhage
- Disseminated intravascular coagulation
- Pulmonary oedema

Management of a woman with an eclamptic fit

While waiting for transport and referral and to stabilise the woman:

- Once the convulsion has ended place the woman in the left lateral 'recovery' position to prevent aspiration.
- Note the time and duration of fit.
- Commence medication with Magnesium Suplhate.
- Insert Foley catheter, monitor urine output and maintain strict fluid balance chart.
- Restrict fluids to 80ml/hour maximum to prevent maternal fluid overload. Fluids should be given at the rate of 40 mls per hour plus the equivalent of the previous hour's urine output up to a maximum of 80 mls per hour.This includes all fluids administered by any route.
- ADMIT as soon as possible to a healthcare facility.

Table 9.3: Use of anticonvulsant drugs

Drug	Dose and route	Continuing dose	Maximum dose	Precautions and contraindications
Magnesium sulphate	Loading dose of 4 g should be given IV over 5 minutes	IV infusion of 1 g/hour maintained for 24 hours OR 5 g 4-hourly IM into alternate buttocks	Recurrent seizures should be treated with a further dose of 1-2g given over 5 minutes	Observe for signs of Magnesium toxicity. If presemntstop Magnesium and if respiratory rate is <12 breaths per minute treat with calcium gluconate
Diazepam (only use of Magnesium Sulphate is not available)	0.15-0.25mg per kg (usually 10-20mg) is given by IV injection	The dose can be repeated if necessary after 30 to 60 minutes.	Maximum total dose 3mg per kg over 24 hours	Severe or acute respiratory depression

These women will need follow-up and treatment postnatally (see Chapter 12 for more information).

Intrahepatic Cholestasis of Pregnancy (ICP)

Definition

Intrahepatic cholestasis is a pregnancy specific condition characterised by pruritus without a rash, abnormal bile acid concentrations and with postpartum resolution. However, alternative diagnoses (such as pre-eclampsia) should always be considered before a diagnosis of ICP is made; it is also possible for other conditions to co-exist. Around 25% of pregnant women develop itching[2, 5]; the majority of these do not have and do not develop ICP.

Prevalence varies between populations but it generally affects between 0.7-1.5% of pregnant women. ICP is a multifactorial condition (genetic, endocrine and environmental factors are involved. It is more likely if there is a personal or family history of ICP.

Diagnosis

- Generalised pruritus, including the palms and soles of the feet without a rash. The itching is worse at night and disturbs sleep. There is poor correlation between the severity of the itching and the level of bile acids.
- Liver function tests and bile acids should be taken. Abnormal bile acids are the most useful test in the diagnosis of obstetric cholestasis.
- Blood pressure and urinalysis to rule out pre-eclampsia.

Management

The role of drug treatment in ICP is to try to reduce maternal itching (which may be of variable intensity and is unrelated to bile acid concentrations). There is no evidence that routine medical treatment improves maternal raised bile acid concentrations or perinatal outcomes.

- Once obstetric cholestasis is diagnosed, liver function tests should be checked weekly.
- Topical creams such as calamine lotion and aqueous cream with menthol may provide some relief.
- Ursodeoxycholic acid is frequently prescribed for use in the relief in pruritus in obstetric cholestasis although its effectiveness is limited and it has not been shown to improve perinatal outocmes. Antihistamines such as chlorpheniramine may also be helpful and the sedentary effects may alleviate the sleeplessness that accompanies the itching.

Decision to deliver

- With isolated ICP and a singleton pregnancy the risk of stillbirth only increases above population rate once their serum bile acid concentration is 100 micromol/l or more.
  - In women with peak bile acids 19–39 micromol/l (mild ICP) and no other risk factors, the risk of stillbirth is similar to the background risk. Consider options of planned birth by 40 weeks' gestation or ongoing antenatal care according to national guidance.
  - In women with peak bile acids 40–99 micromol/l (moderate ICP) and no other risk factors, the known risk of stillbirth is similar to the background risk until 38–39 weeks' gestation. Consider planned birth at 38–39 weeks' gestation.
  - In women with peak bile acids 100 micromol/l or more (severe ICP), the risk of stillbirth is higher than the background risk. Consider planned birth at 35–36 weeks' gestation.
- With ICP and a twin pregnancy that the risk of stillbirth is higher compared with a twin pregnancy without ICP.
- The presence of risk factors or co-morbidities (such as gestational diabetes and/or pre-eclampsia and/or multifetal pregnancy) appear to increase the risk of stillbirth and may influence decision-making around timing of planned birth.
- The importance of maternal monitoring of fetal movements should be explained and women encouraged to report any changes.

Antepartum Haemorrhage

Definition

Antepartum haemorrhage is defined as vaginal bleeding from 24 weeks' gestation.

Causes

- Placental abruption
- Placenta praevia
- Local and undetermined bleeding

Management of antepartum haemorrhage depends upon the cause, maternal and fetal condition, gestation and degree of bleeding. It is wise to treat antepartum haemorrhage of unknown origin as if it is small abruptions.

Local and undetermined bleeding

Cervical causes

Cervicitis, cervical polyps and rarely cervical carcinoma. A speculum examination should be performed on anyone who presents with bleeding once placenta praevia has been excluded.

- Cervical polyps should be assessed postnatally, and removed if still present.
- If cervical carcinoma is suspected, refer to a specialist.

Post-coital bleeding

This is a common presentation. Light painless bleeding from the cervix occurs secondary to sexual intercourse. It is usually noticed immediately after intercourse or when a woman next goes to the toilet.

- On speculum, a bleeding point may be seen. If confirmed post-coital bleed then the woman should be discharged.
- If the cause is in doubt, then always consider abruption or placenta praevia and treat appropriately.

Genital infections

- Bleeding can be secondary to vaginal infection (thrush, bacterial vaginosis and trichomonas vaginalis) or cervical infections including schistosomiasis.
- Candidiasis is very common in pregnancy and can be diagnosed clinically on speculum examination (see Chapter 5).

Placenta Praevia

Placenta praevia occurs when the placenta is partially or wholly inserted into the lower segment of the uterus.

Classification

Types of Placenta Praevia:

- *Complete* placenta praevia in which the placenta completely covers the internal cervical os
- *Partial* placenta praevia, in which the placenta partially covers the internal cervical os
- *Marginal* placenta praevia in which the placenta touches, but does not overlap, the internal os
- *Lateral* placenta praevia, in which the placenta is inserted in the lower segment, but more than 2 cm from the internal cervical os

In the first three cases, vaginal delivery is not possible

Signs and symptoms

- Bleeding is painless (unless provoked by uterine contractions)
- Bleeding is often unprovoked
- Women may present for the first time with bleeding in labour
- Bleeding can range from spotting with no maternal or fetal effect to life threatening bleeding and maternal shock
- No tenderness in the abdomen
- Soft and relaxed uterus
- Presenting part may be high or there may be abnormal presentation
- Fetal parts are easily palpable
- Fetal heart sounds are usually present

Management of placenta previa

Confirming the diagnosis

- If you suspect the woman has a placental previa, refer the woman to a hospital. Do not perform a vaginal examination.
- Where available, ultrasound can be done to confirm diagnosis and localise the placenta.
- The length of stay in hospital will depend on the amount of bleeding, gestation and degree of praevia and the ease with which the woman can return to the facility in the event of a repeat bleed. Women with placenta praevia should be advised that bleeding will inevitably recur sooner or later and may be sudden and heavy. Any bleeding, however light, should prompt an urgent return to the facility as it may become heavier rapidly.
- Women with major placenta praevia who have had previous bleeds in this pregnancy should be admitted to the healthcare facility in case of sudden heavy bleeding.
- Expectant management until 39 weeks is preferable to reduce prematurity.
- Women with complete, partial and marginal placenta praevia at term should have an elective Caesarean section at a facility able to provide comprehensive emergency obstetric care that has access to blood products. With lateral placenta praevia, vaginal birth may be possible provided there is not excessive bleeding.

Placental Abruption

A Placental Abruption is the premature separation of a normally sited placenta from the uterus. Separation may be marginal, partial or total.

- **Revealed bleeding**: blood from the placental separation moves to the cervix and causes vaginal bleeding.
- **Concealed bleeding**: blood forms a retroplacental clot between the placenta and uterus with little or no vaginal bleeding. This can result in a clinically shocked woman with no revealed bleeding.

Diagnosis

- Women present with vaginal bleeding and constant pain, and may or may not be in labour.
- Fetal heart rate abnormalities: fetal tachycardia, bradycardia or absent fetal heart.
- With severe abruption, the uterus feels woody hard and tender to touch.
- In half of placental abruption cases, the women will be in labour. Consider the diagnosis if there is bloodstained liquor and constant pain. It is likely there will be signs of fetal compromise.

Table 9.4 outlines the presenting signs and symptoms of antepartum haemorrhage and differential diagnosis.

Table 9.4: Differential diagnosis for antepartum haemorrhage during pregnancy

Presenting Symptom and/or Signs	Symptoms and/or Signs Sometimes Present	Probable Diagnosis
Bleeding after 24 weeks of gestation (may be retained in the uterus) Intermittent or more usually constant abdominal pain	Shock Tense/tender uterus Decreased/absent fetal movements Fetal distress or absent fetal heart sounds	Placental abruption
Painless bleeding after 24 weeks of gestation	Shock Bleeding may be precipitated by coitus Relaxed uterus (unless contracting) Fetal presentation not in pelvis/lower uterine pole feels empty Normal fetal condition (unless there is maternal shock)	Placenta praevia
Bleeding (intraabdominal and/or vaginal) Severe abdominal pain	Shock Abdominal distension/free fluid Abnormal uterine contour Tender abdomen Easily palpable fetal parts Absent fetal movements and fetal heart sounds	Ruptured uterus

Management women attending with acute bleeding

- Make a rapid evaluation of the general condition of the woman using the structures ABCD approach, managing every problem as you encounter it
- Give oxygen if available
- If you suspect shock, begin treatment immediately and start a rapid IV infusion (Normal saline or Ringer's solution)
- Start iv fluids and arrange for **immediate transfer** for further management unless in a CEmOC facility already
- Collect blood for grouping and cross-matching and check Hb

Abnormal fetal growth and wellbeing

An important aim of antenatal care is to detect abnormalities of fetal growth and to ensure fetal wellbeing. It is important that healthcare providers can detect and manage abnormal fetal growth problems and malpresentations.

Large-for-dates

Definition

The uterine size is larger than is compatible with the gestational age.

Possible causes

- Incorrect estimated due date
- Large for gestational age (macrosomia)
- Multiple pregnancy
- Polyhydramnios

Management

- Verify the due date.
- Perform ultrasound to check for macrosomia, polyhydramnios, multiple pregnancy and molar pregnancy.
- Macrosomia is a postnatal diagnosis confirmed after birth but if suspected antenatally (an estimated fetal weight of >4.5kg at term on ultrasound scan) an individualised plan should be made for birth. Bear in mind that using ultrasound for fetal size/weight estimation at term is subject to considerable error.

Polyhydramnios

Definition

Polyhydramnios is defined as an increase of the amniotic fluid volume in pregnancy and is associated with increased perinatal morbidity and mortality.

Incidence

Reported rates are influenced by variations in diagnostic criteria, i.e. the subjective volume of fluid where polyhydramnios is diagnosed, and the gestational age (preterm, term, or post term) at time of assessment. An underlying disease is only found in 17% of cases in mild polyhydramnios. In contrast, an underlying disease is detected in 91% of cases in moderate to severe polyhydramnios.

Common causes of polyhydramnios

- Gestational diabetes
- Fetal anomalies causing reduced or absent fetal swallowing
- Infections in the woman including toxoplasmosis, syphilis, rubella, etc.
- Polyhydramnios is often associated with fetal macrosomia

Diagnosis

- The diagnosis is obtained by ultrasound but suspect if the uterus is large for dates and fetal parts are difficult to palpate
- Maternal gestational diabetes should be screened for
- Maternal ToRCH screening is recommended where possible (ToRCH is Toxoplasmosis, Rubella, Cytomegalovirus, Herpes simplex and other diseases including HIV, syphilis and measles)

Management

- Screen for diabetes.
- There is a risk of an unstable lie which may result in cord prolapse if a spontaneous membrane rupture occurs when the fetal lie is not longitudinal. An unstable lie after 37 weeks is an indication for admission to a CEmOC where a stabilising induction may be required.
- Mild polyhydramnios can be simply monitored and treated conservatively.
- Preterm labour is common due to overdistension of the uterus, and measures should be taken to minimise this complication. This includes regular antenatal checks and inspection of the uterus. Serial ultrasound scans should be carried out to monitor the amniotic fluid index and fetal growth.
- Induction of labour should be considered if fetal distress develops. Induction by artificial rupture of the membranes should be controlled, performed by an obstetrician and with consent to proceed to lower-segment Caesarean section if required.
- Corticosteroids should be given to the woman antenatally if preterm delivery prior to 34 weeks is imminent or likely. This improves fetal lung maturity.
- Delivery in a hospital is recommended.
- Newborns that are noted to have suspected abnormalities should be reviewed by a paediatrician.

The small for gestational age fetus and Intrauterine fetal Growth Restriction

Definition

A small-for-gestational age fetus has a size or weight below a specific biometric or estimated weight threshold. The commonly used threshold is the 10th centile for estimated fetal weight or postnatal birth weight.

Intrauterine growth restriction affects 10-15% of all pregnancies. It may have placental, maternal or fetal origins.

Small fetuses are divided into normal (constitutionally small), non-placenta mediated growth restriction (e.g. structural, or chromosomal anomaly, inborn errors of metabolism and fetal infection), and placenta mediated growth restriction (placental dysfunction). Maternal factors such as low pre-pregnancy weight, undernutrition, substance misuse or severe anaemia can affect placental transfer of nutrients. Medical conditions can also affect placental implantation and vasculature and hence transfer (pre-eclampsia, autoimmune disease, thrombophilias, renal disease, diabetes, cardiac disease, and essential hypertension).

Early onset Fetal Growth Restriction (FGR) is associated with abnormal placentation that results in increased hypoxia and cardiovascular adaptions and therefore carries an increased risk of adverse perinatal mortality and morbidity. Early FGR also often coexists with maternal manifestations of placental dysfunction (hypertensive disorders of pregnancy) or maternal medical conditions. In late onset FGR, the deficit in placentation is milder, with less cardiovascular adaption and a lower risk of adverse events. However, late FGR is more common, and it is more difficult to identify fetuses that may be at risk (on ultrasound scan [USS]) and thus detect, and therefore these pregnancies account for a significant proportion of adverse outcomes. They are, therefore, an important area for effective surveillance and management.

Risk factors

- Previous affected pregnancy
- Ethnicity
- Advanced maternal age
- Undernutrition
- Previous stillbirth
- Maternal cardiac disease and hypertension
- Smoking
- Antepartum bleeding

Signs and symptoms

- Symphysis fundal height falls below expected range for gestation or is not increasing
- The woman reports her abdomen does not seem to be increasing in size
- Oligohydramnios

Screening

- Methods of screening for the small-for-gestational age fetus in the second and third trimester are abdominal palpation and measurement of symphysis fundal height.
- Serial measurement of symphysis fundal height is recommended at each antenatal appointment from 24 weeks of pregnancy.
- Ultrasound
  - Precise estimation of gestational age early in pregnancy, using the ultrasound scan
  - Diagnosis of a small-for-gestational age fetus usually relies on serial ultrasound measurements of fetal head and abdominal circumference to estimate fetal weight.
  - Serial ultrasound measurement of amniotic fluid volume
  - In tertiary centres, advanced monitoring using Doppler evaluation may refine decision regarding optimal time of birth

Management

- Ascertain cause of lower than expected growth
- Monitor growth and fetal wellbeing by serial ultrasound scans until timely delivery is indicated
- Women should be advised to report early if they notice changes in the usual pattern or diminished fetal movements
- Detect and manage maternal conditions known to be associated with intrauterine growth restriction
- Ultimately the only proven management of FGR is to deliver the baby
- Make best estimate of gestational age, if pregnancy dating was not done before the 20th week
- If the fetus is <34 weeks, give corticosteroids for lung maturity and, if it becomes necessary because there are signs that the fetus is compromised, deliver 48 hours after the first dose of corticosteroid (provided birth can safely be defered for that time)
- Appropriately treat any condition that may be causing the intrauterine growth restriction, e.g. severe anaemia, chronic malaria
- Carefully plan the time for and appropriate mode of delivery (Caesarean section versus induction of labour)

Prelabour Rupture of Membranes (PROM) at term

Prelabour rupture of membranes occurs in up to 15% of all pregnancies. Women are likely to progress to spontaneous labour within 24-48 hours of prelabour rupture of membranes An increasing time period with PROM increases the risk of infection, for both mothers and newborns, accordingly. Studies have demonstrated a significantly increased risk of chorioamnionitis after 12 h following membrane rupture, as well as an elevated risk of endometritis after 16 h post-rupture. There is a threefold risk of chorioamnionitis and the risk of early onset neonatal sepsis is twenty times more than in cases where labour onset occurs with membranes still intact.

International guidelines recommend the administration of antibiotics for term PROM women if the latency of PROM is greater than or equal to 12–18 h.

Signs and symptoms

- Sudden gush of fluid, soaking the clothes. Sometimes only dampness of underwear noted, this may be mistaken for urinary incontinence
- Abdominal pain, contractions
- Pyrexia, generally feeling unwell, abnormal vaginal discharge (This suggests an ascending infection and the onset of chorio-amnionitis)
- Vaginal bleeding
- Dysuria if urinary tract infection is present
- Cord prolapse (this is an obstetric emergency and required emergency delivery of baby)

Examination of a woman with prelabour rupture of membranes

- Take vital signs (temperature, pulse, blood pressure, respiration and fetal heart rate) and document on an observation chart.
- Abdominal: The abdomen may be tender in the presence of abruption or infection. Contractions will be palpated if threatened or actual preterm labour is present.
- Perform head to toe examination (including obstetric examination).
  - ☐ Evaluate the fetal movement, heartbeat and uterine contractions
  - ☐ Determine the baby's presentation and lie
  - ☐ Determine gestational age
- The woman should be advised to wear a pad and the healthcare provider can check if it is stained with amniotic fluid.
- There is no reason to perform a speculum examination unless there is uncertainty regarding the presence of of prelabour membrane rupture at term.
- Women with an uncertain history should be offered a sterile speculum examination to determine whether the membranes have ruptured. If liquor is not seen, asking the woman to cough may cause a trickle through the cervix.
- Do not perform a digital vaginal examination as this increases the risk of intrauterine infection.

Management

- Women should be advised concerning induction of labour at 18-24 hours after membrane rupture if not in labour by that time or at a time in accordance with local protocols.
- If the amniotic fluid is stained with meconium or the woman is a known carrier of Group B streptococcus, induction of labour should be advised immediately.
- If the period between membrane rupture and labour is greater than 24 hours, then the woman should be advised to stay in hospital for at least 12 hours after delivery (to allow observation of herself and the newborn).
- If there is no sign of infection postnatally in the woman or newborn, antibiotics should not be given routinely to the woman or baby.
- If there is evidence of infection or if the membrane rupture has persisted 12-18 hours pre-delivery, broad spectrum intravenous antibiotics can be prescribed (Ampicillin 2g iv 6 hourly and Metronidazole 500mg IV 8 hourly).

Preterm Prelabour Rupture of Membranes

Definition

Preterm prelabour rupture of membranes is a condition in which spontaneous rupture of membranes occurs before 37 completed weeks of pregnancy and before the onset of labour.

Incidence

It occurs in <3% of pregnancies but it contributes to over a third of preterm births. It varies considerably between different areas due to different population risk factors. It precedes about 30-40% of spontaneous preterm labours. A third of women with preterm prelabour rupture of membranes give birth within 48 hours and half of cases within 7 days.

Factors associated with preterm prelabour rupture of membranes

- Uterine over-distension as in multiple pregnancy or polyhydramnios
- Cervical incompetence/short cervix
- History of preterm birth
- Trauma, e.g. road traffic accident
- Intrauterine death
- Chorioamnionitis
- Antepartum bleeding

Diagnosis

Diagnosis of preterm prelabour rupture of membranes is usually made on the basis of maternal history and physical examination.

On admission note and document:

- Time of preterm prelabour rupture of membranes
- Type and colour of fluid loss
- Signs of infection including 'offensive smelling' vaginal discharge, uterine tenderness, maternal fever, and fetal tachycardia
- Assess for a differential diagnosis: Leakage of urine, physiological vaginal discharge, bacterial infection
- Abdominal palpation: depending on the gestation abdominal palpation may be appropriate to assess fetal size and presentation. Note any abdominal tenderness which may indicate infection

Investigations

- Low vaginal swab for microscopy and sensitivity
- Ultrasound examination for gestational age, fetal well-being, growth and estimation of amniotic fluid index
- Full blood count: Hb, white blood count (total and differential count)
- Erythrocyte sedimentation rate or C-reactive protein to monitor infection
- Urinalysis for microscopy and sensitivity
- Ultrasound if available to assess residual liquor volume

Management of preterm prelabour rupture of membranes

- Digital vaginal examination should be avoided unless the woman is in active labour or birth is imminent.
- Between 23 and 23+6 weeks' gestation, the decision to administer corticosteroids is made following consultation between the healthcare provider and the parents.
- A single course of antenatal corticosteroids should be considered for administration to women with preterm prelabour rupture of membranes in the absence of signs of infection between 23 and 36+6 weeks' gestation.
- If gestation is less than 34 weeks and in the absence of any signs of infection or complications and in circumstances when a course of corticosteroids has not yet been completed, tocolytics may be considered briefly for threatened premature labour. However, it should be noted that in general tocolytics are not associated with improved neonatal outcomes.
- Broad spectrum antibiotic administration is recommended following preterm prelabour rupture of membranes to prevent infection and prolong the pregnancy in the short term, leading to a reduction in neonatal and maternal morbidity. This should be given for 10 days or until labour, whichever is the shorter duration.
- A decision to induce labour should be made in consultation with the mother, taking gestation and fetal wellbeing into consideration. After 34 weeks there is a balance between the risks of developing chorioamnionitis if the pregnancy continues, versus the risks of prematurity to the newborn baby.

Management for gestation <34 weeks

Admit to hospital for assessment:

- Monitor liquor drainage for colour, odour and quantity.
  - Monitor fetal wellbeing by fetal movements and auscultation.
  - Monitor and document maternal pulse and temperature every 6 hours during the daytime.
  - Uterine tenderness by abdominal palpation.
  - The woman should be commenced on a 10-day course of erythromycin 250mg four times daily.
  - Check for fetal lie. If not longitudinal with a cephalic presentation there is a risk of cord prolapse.
- If there is evidence of chorioamnionitis, the risks of continuing the pregnancy outweigh the risks of prematurity and labour should be induced or delivery by caesarean arranged. Continuing the pregnancy is likely to be detrimental to both the mother and the fetus in this circumstance.
- Preterm labour may be spontaneous or birth may need to be expedited in case of fetal distress or infection.
  - In cases of extreme prematurity or severe fetal distress, Caesarean section may be recommended as the preferred mode of delivery.
- In some situations, the woman may be sent home if the presentation is cephalic and reviewed weekly if this is deemed appropriate. She should be advised to return if there is any change in the colour of liquor, if it becomes offensive in smell or is she is feeling unwell.

Management for gestation 34-37 weeks

Plan to deliver. Assess for fetal well-being and determine best mode of delivery. If labour onset does not occur spontaneously within 48 hours, consider inducing labour or perform a Caesarean section, if indicated.

Table 9.5: Use of Corticosteroids

Drug	Dose and route
Betamethasone	12mg IM twice a day for 1 days (12 hours apart)
Dexamethasone	6mg IM four times a day for 1 days (6 hours apart)

Preterm Birth

Definition

Preterm labour is defined as the occurrence of regular uterine contractions that produce progressive effacement and dilatation of the cervix before 37 completed weeks of pregnancy.

Incidence

Globally, the incidence of preterm labour continues to be about 10% of all live births. Preterm birth is the leading cause of perinatal loss.

Predisposing factors

- Preterm prelabour rupture of membranes
- Chorioamnionitis
- Uterine over-distension as in multiple pregnancy, polyhydramnios
- Pre-eclampsia and eclampsia
- Systemic febrile infections
- Cervical incompetence/short cervix
- Previous preterm birth

Management of Preterm labour

Conservative Management

This may be attempted if the cervix less than 4cm dilated and includes:

- Administration of corticosteroids to the woman to improve fetal lung maturity and chances of neonatal survival (Table 9.5)
- The use of tocolytics has not been shown to improve outcomes and is not recommended except in the short term to allow time for corticosteroids to take effect on the fetal lungs and for transport of the woman to a healthcare facility where there is a special care baby unit
  - ☐ Nifedipine, 20mg initial dose and then 10-20mg 4-8 hourly
- Treat any underlying cause of preterm labour

Active Management

This is recommended if the cervical dilatation is more than 4cm or there is fetal distress or intrauterine death. It involves the following:

- Administer corticosteroids in anticipation of preterm delivery. Contraindicated if maternal infection is present.
- Monitor labour in the usual manner. Beware that malpresentation is more common in premature labour, including breech presentation.

! Premature babies are more susceptible to sepsis, hypothermia and hypoglycaemia.

Malpresentation

The presenting part of the fetus is the part which is lowest in the uterus. In most cases, this is the head (cephalic). Breech presentation, transverse, oblique and unstable lie can all occur at term and are associated with specific risks.

Breech presentation

Definition

A breech presentation is the fetal position that leads to the feet or the buttocks presenting first. 3% of all term pregnancies present by breech.

Types of breech presentations

- Frank (extended) breech: the legs are flexed at the hip and extended at the knee
- Flexed (complete) breech: the legs are tucked in and the fetus is in a crouching position
- Footling) breech: one or both feet present, with the buttocks higher up

Figure 9.2: Types of Breech

Frank or extended breech **Flexed or complete breech** **Single footling breech**

Diagnosis

Although a breech presentation may be diagnosed through palpation and confirmed using ultrasound, the exact type of breech presentation may not be clear until during labour, when vaginal examinations allow a more precise diagnosis to be made, especially as the cervix dilates and allows direct palpation of the presenting part of the fetus.

Management

- **Before labour**
  External cephalic version may be offered, with or without the use of tocolytics to relax the uterus. Success rates vary but in the hands of an experienced practitioner, the procedure is successful in up to 40% of nulliparous women, and 60% of multiparous women.
- **Labour**
  If breech presentation persists, preparations for delivery are made. Delivery should be in a healthcare facility with an experienced midwife or doctor.

Transverse, oblique and unstable lie

Definitions

- **Transverse lie**: The fetus is lying sideways across the uterus with the head on one side and the buttocks on the other side. The fetal back may be up at the fundus or across the lower part of the uterus.
- **Oblique lie:** The head or breech lies off to one side rather than centrally located.
- **Unstable lie**: The fetal lie and presentation continually change.

Examination

- **Transverse lie**: The uterus may look wider than expected. Fetal parts felt laterally, and nothing palpalpable in the pelvis.
- **Oblique lie**: Fetal pole felt to the left or right with nothing centrally above or in the pelvis.
- **Unstable lie**: Various different positions recorded after 37 weeks gestation.

Management

- In many cases, with time, an abnormal lie will stabilise into a longitudinal lie.
- Expectant management is reasonable provided the woman can remain in a CEmOC after 37 weeks due to the risk of cord prolapse.
- Identify any causes of abnormal lie (e.g. placenta praevia, ovarian cyst impacted in the pelvis or fibroid uterus) as this will influence management and delivery.
- With abnormal presentation, limbs, cord, shoulder or back can be presenting, increasing the risk of cord presentation, cord prolapse and compound presentation.
- If the baby spontaneously settles in a cephalic presentation and remains stable, the woman may await the onset labour at home.
- If spontaneous version does not occur, external cephalic version can be attempted provided there are no contra-indications.

Always check the position of the placenta. In case of placenta praevia, external cephalic version is of no benefit as a Caesarean section will be necessary and should ideally be performed as an elective procedure.

External cephalic version

- This is a procedure carried out to turn babies lying in the breech, transverse or oblique presentation to a cephalic presentation.
- Attempt at or after 37 weeks. The baby is less likely to turn back to breech or transverse lie at that gestation.
- The procedure has been shown to reduce the number of breech presentations in labour and therefore reduce the Caesarean section rate for breech presentations.
- Ensure the procedure is explained to the woman and family if present and consent gained.

Contraindications

- Multiple pregnancy
- Ruptured membranes
- History of antepartum haemorrhage in this pregnancy
- Placenta praevia
- Multiple large fibroids
- Although not absolute contraindications, the procedure is more difficult with oligohydramnios or maternal obesity

Procedure

- Explain the purpose and method of the procedure to the woman along with risks and benefits and ensure she has given informed consent.
- Explain that the procedure is uncomfortable but will be limited to a few minutes and promise that you will stop immediately if she is unable to tolerate it and requests that you stop.
- In case of complications which require urgent Caesarean delivery, ensure that the theatre staff are prepared and the anaesthetist is on site. This is very rarely necessary.
- Perform ultrasound for liquor volume, position and engagement, if available.
- Record woman's vital signs and the fetal heart rate.
- Give 4mg Salbutamol orally. Terbutaline, if available, is preferable (250 micrograms injected S/C).
- Wait to ensure the medications have the desired tocolytic effect.
- Ensure the woman has emptied her bladder.
- Assist the women into a comfortable supine position.
- Recheck maternal vital signs and fetal heart rate.
- The foot of the bed should be elevated to disimpact the breech from the pelvis.
- Offer nitrous oxide (gas and air), if available, for pain relief.
- First push the presenting part up out of the pelvis and ensure the pelvis is empty.
- With one hand on each pole and with flexion maintained on the head, the clinician should attempt to encourage the fetus to perform a forward somersault. If this is unsuccessful, a backwards somersault may be attempted.
- Do not push on the uterus for more than a few minutes at a time.
- Minimize attempts at turning the fetus to 2-3 times.

Following the procedure, auscultation of the fetal rate be performed. Listen continuously for 5-10 minutes following the procedure if a Doppler device is available. IF abnormalities are detected do not stop listening but call for help.

Please note:

- Occasionally a transient bradycardia occurs following the procedure. Do not panic, this usually resolves within a few minutes.
- The procedure may fail for several reasons that may not be apparent immediately. There may be a sub-septate cavity. The fetal cord may be in a position that prohibits turning. It is important not to use excessive force and to abandon the procedure if no fetal movement is obtained.
- If the membranes rupture during the procedure, be aware of risk of cord prolapse if neither of the fetal poles is in the pelvis.
- In the event of persistent fetal heart rate or pattern abnormalities be prepared to perform a Caesarean section The most common complication by far is failure to turn.
- Success is more likely in multipravid women, thise with normal liquor volume and those where the fetus has flexed knees.

Multiple pregnancy

Definition

A pregnancy with two or more fetuses. This may arise due to splitting of a fertilised embryo (monozygous) or due to fertilisation of more than one egg in the same cycle. The incidence of monozygotic twin pregnancy is 4/1000. Dizygotic twin pregnancy is more common and occurs in approximately 60% of twin pregnancies. The incidence varies according to the population from 0.6-4.5% of pregnancies.

- **Dichorionic twins:** Each baby has an amnion and chorion.
- **Monochorionic diamniotic twins:** Both babies share a chorion but have separate amniotic sacs. There may be vascular connections (anastomoses) within the placenta leading to twin to twin transfusion, a significant complication of monozygotic twin pregnancies, occurring in 10-15% of cases.
- **Monochorionic monoamniotic twins:** Both babies share a chorion and amniotic sac. There is a large risk of cord entangelement and fetal loss.

Diagnosis

- Suspect when the uterus is large for dates or 3 fetal poles can be felt
- Confirm by ultrasound scan, if available
- Determine chorionicity at the time of detecting twin and triplet pregnancies by ultrasound the lambda or T-sign and membrane thickness

Management

- Almost all antenatal complications are more common in multiple pregnancy, including hypertensive disorders and pre-eclampsia, gestational diabetes, ante- and postpartum haemorrhage, preterm membrane rupute and labour, complications of prematurity, low birth weight, admission to Neonatal Intensive Care units, Caesarean section and maternal death. Perinatal loss is also increased in twin pregnancy. Clinical care for women with twin and triplet pregnancies should be provided by a specialist team, all of whom have experience and knowledge of managing multiple pregnancies. Fetal growth should be monitored by serial ultrasound scans every 4 weeks in dichorionic twin pregnancies and fortnightly for monochorionic twins, with careful attention to liquor volume. Discrepancy in liquor volume or fetal size may be an indication of twin-to-twin transfusion syndrome (TTS). Without specialist intervention, the outlook for pregnancies complicated by this condition is very poor. In this condition the donor twin will have oligohydramnios and fetal growth restriction whereas the recipient will have polyhydramnios and will be large for dates. Fetal death and preterm membrane rupture are common. If one twin with TTS dies, the surviving twin has a risk of fetal brain damage of 40%.
- Be aware that women with twin pregnancies have a higher risk of spontaneous preterm birth in particular if they have had a spontaneous preterm birth in a previous singleton pregnancy.
- All women should be advised to deliver in a comprehensive emergency obstetric care centre.
- Women should be offered information and emotional support specific to twin and triplet pregnancies at their first visit and provide ongoing opportunities for further discussion and advice including: antenatal and postnatal mental health and wellbeing antenatal nutrition.
- The risks, symptoms and signs of preterm labour and the potential need for corticosteroids for fetal lung maturation.
- Timing and possible modes of delivery, breastfeeding parenting.

Timing of birth

- **Monochorionic twin pregnancies**: Elective birth from 37 weeks 0 days, after a course of antenatal corticosteroids has been offered
- **Dichorionic twin pregnancies**: Elective birth from 38 weeks 0 days
- **Triplet pregnancies**: Elective birth from 35 weeks 0 days, after a course of antenatal corticosteroids has been offered

Induction of Labour

Induction of labour is the artificial initiation of uterine contractions before their spontaneous onset. The expected outcome is cervical effacement and dilation and delivery of the baby.

Indications for induction of labour

Any condition requiring early delivery for maternal or fetal benefit. Decisions should be made on an individual basis by the most senior healthcare provider in consultation with the woman

These conditions include:

- Deteriorating maternal health, cardiac, renal, malignant or auto-immune diseases
- Pre-eclampsia
- Intrauterine growth restriction
- Prelabour rupture of membranes at term
- Prolonged preterm ruptured membranes (> 48 hours)
- Suspected chorioamnionitis
- Post-term pregnancy (pregnancy exceeding a duration of 41 completed weeks)
- Intrauterine fetal death

Methods used to induce labour

The method used depends upon whether it is possible to rupture the membranes or not. The state of the cervix is assessed by means of the Bishop Score.

Membrane 'stretch and sweep'

This is not a means of formal labour induction but it serves to hasten the onset of spontaneous labour. If the cervix is slightly open perform a digital examination and reach to the internal cervical os and perform a cyclical sweeping motion, separating the membranes from the uterine wall, releasing prostaglandins. Membrane sweeping may be offered to women after 40 completed weeks of pregnancy. Assess the cervix using Bishop's Score (Table 9.6) and document findings of vaginal examination.

Mechanical

The aim of mechanical interventions is to put direct pressure on the internal cervical os, increasing local secretion of prostaglandins and oxytocin to ripen and dilate the cervix. Single balloon catheters, such as a standard Foley catheter, inflated above the cervix with 30 ml saline injected into the balloon, are used widely, and a commercial double balloon catheter, which squeezes the cervix from above and below, is also available. The use of balloon catheters does not increase the rate of infection or the risk of preterm birth in future pregnancies.

Once inserted and inflated, the balloon may stay in place for up to 24 hours.

It may safely be used for induction in women previously delivered by Caesarean section.

The use of the balloon is less likely to cause hyperstimulation as compared to pharmaceutical methods of induction.

Artificial rupture of membranes

Amniotomy is simple and cheap and requires little technology. The cervix should be assessed using the modified Bishop's score (Table 9.6).

There are risks of:
- Ascending genital tract infection
- Prolapse of umbilical cord. Consider carefully the risks and benefits of membrane rupture with a non-engaged presenting part and defer if possible

Prostaglandins

Prostaglandins are administered in the form of a vaginal gel or a suppository. They are:
- Expensive non-invasive (no intravenous administration required)
- Vulnerable to uncertainty about the best dosage schedule
- Once introduced, difficult to retrieve

In summary, the potential complications of induction of labour include:

- Failure
- Uterine hyper-stimulation/uterine rupture
- Postpartum haemorrhage
- Fetal distress (fetal monitoring is mandatory)
- Umbilical cord prolapse
- Abruptio placentae
- Iatrogenic prematurity
- Hyponatraemia secondary to excessive oxytocin infusion infection

Misoprostol is an orally active prostaglandin analogue. In some countries misoprostol is not licensed for labour induction, but its use is common because it is cheap and heat stable. The recommended doses vary with gestation and indication from 25 to 800 micrograms, with the dose required diminishing significantly as gestation advances and the uterus becomes more sensitive to it.

Although misoprostol use for IOL has typically been administered vaginally (tablets placed in the vagina to dissolve), it can also be given orally (swallowed), buccally (the tablet dissolves between the cheek and the gum) and sublingually (under the tongue). The oral and sublingual routes are rapidly absorbed, peaking at approximately 30 minutes versus 70–80 minutes when given buccally or vaginally.

At term, 25 micrograms orally is effective and less likely to cause hyperstimulation than higher doses. The dose may be repeated at 3-hourly intervals.

Oxytocin

To induce labour, oxytocin must be given by measured intravenous infusion, as per local policies. Induction of labour should be undertaken in a comprehensive emergency obstetric care centre.

There is no role for a bolus dose infusion; this can be dangerous. Oxytocin should be used after the membranes have ruptures, either spontaneously or by artificial means.

There are risks of:

- Hyperstimulation resulting in reduced fetal oxygenation
- Excessive stimulation resulting in rupture of the uterus (if previous uterine surgery / Caesarean section)

Table 9.6: Modified Bishop's Score

	Rating			
Factor	**0**	**1**	**2**	**3**
Dilation (cm)	closed	1-2	3-4	>5
Length of cervix (cm)	>2	1-2	0.5	<0.5
Consistency	firm	average	soft	
Position	posterior	mid	anterior	-3
Station	-3	-2	-1/0	

The induction process:

- The Bishop's score is an indication of cervical favourability. It will inform the healthcare professional of the best way to undertake induction of labour. A score of >8 is associated with ability to process to the artificial rupture of the membranes and induction labour.
- The woman needs to be involved in the decision and her wishes respected. Every effort should be made to ensure she is aware of the process, risks and benefits involved.
- Women who require induction of labour should deliver in a healthcare facility able to provide comprehensive emergency obstetric care.

Chapter 10: Postnatal Care for mother and newborn – first visit

In this chapter, you will find information about:

- Principles of postnatal care for mothers and babies
- Full assessment of both the mother and her baby after giving birth and at subsequent visits up to six weeks postnatally
- Screening for and management postnatal depression

Postnatal Care

Postnatal care provides a unique opportunity to provide a full comprehensive and holistic assessment and care of the mother and newborn. It aims to ensure the mother and baby are healthy, and she is equipped with the information she needs to take care of her baby.

Definition

Care that is given after birth from the delivery of the placenta up to six weeks after birth.

- Early postnatal period – the first 24 hours after birth
- Late postnatal period – after 24 hours up to 6 weeks after birth

Both mother and newborn need to have a full check and assessment within one hour of birth as well as in the first 24 hours after birth. In many countries, after birth, the mother and her baby are discharged before 24 hours.

Components of postnatal care

Childbirth and the time around childbirth is a social and cultural event with important local customs. These need to be taken into account when providing care.

Postnatal care is primarily about the provision of a supportive environment in which a mother, her newborn and family can begin their new life together. It is important to understand essential care that every woman and her baby should receive, as appropriate to their needs, during the first 6 weeks after birth, based upon the best evidence available.

In addition, it is important that the healthcare provider is able to identify and manage potentially life-threatening complications. The major complications accounting for nearly 75% of all maternal deaths are:

- Severe bleeding (mostly bleeding after childbirth)
- Sepsis
- Pre-eclampsia and eclampsia during and/or after pregnancy
- Unsafe abortion

Purpose of postnatal care

For both mother and newborn:

- To provide care to ensure the rapid restoration of the mother to optimum health
- To support initiation and establishment of exclusive breastfeeding
- To prevent complications occurring in the postnatal period in the mother or her newborn
- To identify and manage complications when these occur and refer if necessary
- To provide family planning advice and services
- To provide basic health education, including nutrition, to the mother

Rationale for postnatal care

Almost 50% of maternal deaths and 40% of newborn deaths occur during the first 24 hours after birth. It was estimated that globally 2.3 million babies died within the first 28 days of life in 2022. 47% of all deaths of children under 5 years occur in the neonatal period.

Among neonates, the leading causes of death include premature birth, birth complications (birth asphyxia/trauma), neonatal infections and congenital anomalies, which collectively account for almost 4 in every 10 deaths in children under 5 years of age. If recognised and treated early, many of these deaths could be prevented. For these reasons, mothers are encouraged to remain in the healthcare facility for at least 24 hours following birth so that both mother and baby can be closely monitored. This also gives the mother a chance to rest. In some cultures, mothers must remain at home or in a special birthing house for up to 40 days.

Following birth, the mother can experience both physical ill-health but also significant mental illness. For example, up to 20% of mothers suffer significant depression after birth.

In addition to the care given after birth, a minimum of three visits or consultations spread throughout the first six weeks is recommended for comprehensive postnatal care.

Number and timing of postnatal care visits

- Day three (within 48-72 hours of giving birth)
- Between days 7-14 after giving birth
- At six weeks after giving birth

Medical care after pregnancy

Women who have pre-existing conditions will continue under the care of specialist healthcare providers after pregnancy. If a woman is diagnosed with a medical condition in pregnancy, it is essential that she is aware of the condition, the treatment and care she will need to access in the future. It is important that there are good communication links between healthcare providers and that women are advised to attend for follow-up care when necessary. Women who have experienced complications during birth require additional care.

Immediate postnatal care – first 24 hours after birth

- For healthcare facility deliveries, both mother and newborn need to be checked within one hour of birth, at 6 hours of birth and again before discharge from the healthcare facility. Detection of any abnormalities should prompt urgent management.
- It is recommended that a woman is not discharged until breastfeeding is established.
- For home deliveries, the assessment needs to be completed as soon as possible and within 24-48 hours.

Routine maternal postnatal care checks after birth

- Check and chart (on an observation sheet) all clinical observations immediately after birth and then an hour later.
- If these checks are within normal parameters, then routine (4-6 hourly) checks can commence.
- If any checks are abnormal, then follow local protocols regarding escalation of observation and management.

Assessment

During the first postnatal assessment, it is important that the healthcare provider:

- Explains who they are and what they would like to do (with consent)
- Takes a full history
- Assess for danger signs and act urgently if detected
- Offers screening for all types of ill-health (physical, mental) and social problems to enable early recognition and prompt effective management and referral if required
- Conducts a full top-to-toe examination
- Conducts basic investigations
- Plans for the next visit or refer if needed
- Completes all records

Maternal Danger signs

- Severe headache
- Early Warning Score >/=2
- Lochia heavy with clots or foul smelling
- BP > 140/90
- Fever >/= 38C
- Difficulty breathing
- Unilateral swollen leg
- Abnormal behavior, restlessness or agitation
- Severe pain
- Abdominal distension
- Pallor
- Altered conscious level

History taking

Table 10.1: Overview of history taking

Information to include	
Personal information	Check and document: ■ Contact details ■ How many previous pregnancies (G)? ■ How many previous births (>24 weeks) (P)? ■ How many miscarriages (<24 weeks) (+) e.g. G_3P_{2+1}
Complications during pregnancy	Review any risk factors or complications the mother experienced during her pregnancy: ■ Sepsis/infection (premature rupture of membranes, abnormal vaginal discharge): check all clinical observations ■ Haemorrhage: check observations and Hb level ■ Pre-eclampsia: check observations, especially blood pressure, check urine for proteinuria
Birth	■ Record the date of birth ■ Record gestation at birth ■ Record where the birth took place ■ Record if live birth or stillbirth ■ Record the mode of birth ■ Record estimated blood loss ■ Record any complications, e.g. perineal tear, episiotomy
Past medical history	■ It is important to review any underlying medical conditions and ensure the woman has follow-up medical care/review if required.

Physical examination

Evaluation of the mother

It is better for the mother and her newborn to be together (in a room which is warm but well ventilated in hot climates) where the healthcare provider can observe them and easily detect if there is a problem with either the mother or the newborn.

Check vital signs; Pulse, BP, respirations and temperature.

Table 10.2: Overview of Physical Examination

Pain management after spontaneous vaginal delivery	■ Ask the woman if she has any pain ■ Women who have a spontaneous vaginal delivery/instrumental birth are encouraged to take regular analgesia if required for pain: ☐ For mild pain, paracetamol ☐ For moderate pain, NSAIDS and/or oral opiates
Perineal care	■ Inspect the perineum ■ Assess the type of vaginal tears ■ Assess the type and amount of bleeding
Bladder (Urine output)	■ Check if the woman has passed urine within 6 hours of giving birth and ask her if she is passing a good amount, (in order to exclude retention with overflow) ■ Increase fluid intake if needed ■ Perform abdominal examination – assess for bladder distention and urinary retention on abdominal examination, ask if there is any pain ■ Assess for urinary incontinence (screen for urge, stress and continuous incontinence) ■ In women with continuous leakage of urine and history of prolonged obstructed labour, assess for obstetric fistula (see Chapter 12)
Bowels	■ Assess for ability to pass flatus and faecal continence ■ Increase oral fluids and high fibre foods if necessary
Legs	■ Check that both legs are soft and non-tender, assess for deep vein thrombosis (see Chapter 6)
Uterus	■ Measure uterus (fundal) height. On day one the uterus will generally be palpable one finger measurement above the umbilicus. ■ Palpate: firmness/bogginess, determine the location of the fundus in relation to the umbilicus ■ Sub-involution may be a sign of retained products of conception and/or sepsis ■ Deviation of the uterus to one or other side may be an indication of a broad ligament haematoma ■ Check for signs of puerperal infection (fever, foul discharges)

Advise women on general hygiene and care

- Check for signs of infection (fever, foul discharge)
- Change sanitary pads regularly
- Regular bathing

Investigations

Review co-morbidities and check if the mother has been screened for HIV, TB, malaria, syphilis, anaemia or diabetes in pregnancy. If the woman has had investigations, ensure that they are followed up and she knows the results and implications of each test. IF previously HIV negative and breastfeeding, offer a repeat test to screen for possible seroconversion.

In cases in which a woman is diagnosed with anaemia, she should be treated in accordance with the country's policy or the WHO recommendation of daily iron (120 mg of elemental iron plus 400 µg folic acid) supplements until haemoglobin concentrations rise to normal.

For ease of implementation and continuity of care, postpartum supplementation should begin as early as possible after delivery and the iron supplementation regimen (e.g. dose and whether consumed daily or weekly) should follow that used during pregnancy, or alternatively should start with that planned for menstruating women.

Women should receive counselling on why and how to take iron and folic acid supplements. They should be informed of the common side-effects and be advised on how to manage them (e.g. take with meals or at bedtime).

In malaria-endemic areas, provision of iron and folic acid supplements should be implemented in conjunction with measures to prevent, diagnose and treat malaria. In areas using sulfadoxine–pyrimethamine, high doses of folic acid should be avoided, as they may interfere with the efficacy of this antimalarial drug.

Women who have suffered from antepartum haemorrhage or postpartum haemorrhage may be severely anaemic. Check Hb at 4 days and 10-14 days after being discharged from hospital. Consider blood transfusion IV or IM iron treatment if available. Ensure these women have a postnatal Hb check and manage as per Table 10.3.

Table 10.3: Management of anaemia

HB levels	Classified	Action
<7g/dl	Severe anaemia	Would benefit from a blood transfusion
7-11g/dl	Moderate anaemia	Iron tables for 3 months Advice on iron rich foods
>11g/dl	Normal	Preventative iron/folate tablets for 3 months and dietary advice

Symptoms and signs of anaemia are very non-specific and it can easily be missed unless Hb is measured.

Mental health

Psychosocial support is recommended for the prevention of postpartum depression among women at high risk of developing this condition. Those at increased risk include women who have suffered stillbirth or neonatal death, or have experienced a traumatic birth with complications, for example, those who have had hysterectomy, or rupture of the uterus (see Chapter 14).

Care of the perineum

Over 85% of women having a vaginal birth will sustain some form of perineal injury of which 60-70% of women require repair with sutures and 5.9% women will experience a third or fourth degree tear.

Table 10.4: Types of perineal tear and management

Degree	Trauma	Management
First degree tear	Injury to the skin only	■ Heals naturally and usually only requires suturing if bleeding significantly
Second degree tear or episiotomy	Injury to the perineum involving perineal muscles but not involving the anal sphincter	■ The tear requires suturing ■ It can take up to a month for a tear or cut to heal and for the sutures to reabsorb
Third degree tear	Injury to the perineum involving the anal sphincter complex **3a**: less than 50% of external anal sphincter thickness torn **3b**: more than 50% of external anal sphincter thickness torn **3c**: internal anal sphincter torn	■ Third and fourth degree tears must be repaired in theatre ■ Failure to repair the anal sphincter correctly will result in long term continence problems ■ Broad spectrum antibiotics and prophylactic laxatives (lactulose or fybogel) for around 10 days' post-birth to prevent wound infection or possible wound dehiscence
Fourth degree tear	Injury to the perineum involving the anal sphincter complex (Internal and external anal sphincter) and anal epithelium	

It is crucial that third and fourth degree tears are identified and repaired by an expert to give the woman the best chance of avoiding future anal incontinence. Failure to repair the anal sphincter adequately will result in long term incontinence problems.

Details of the perineal trauma sustained, including information on the type of repair and where the wound is sited, should be discussed with the woman, as this will enable her to more effectively manage and monitor her own recovery.

Discuss with the mother as relevant:

- Type of tear or episiotomy they experienced
- Perineal care and hygiene
- Pain relief that can be taken: paracetamol, ibuprofen, etc.
- Signs and symbols of infection
- Bleeding: how can a woman estimate blood loss? (e.g. number of pads used), size of clots
- Dietary advice to prevent constipation
- Dehiscence: a complication where the wound fails to undergo primary healing and breaks down
- Regular change of sanitary pads is advised
- Bleeding is likely to continue for up to 6 weeks after birth but should gradually reduce
- To report if there is urinary or faecal incontinence

Pain relief management

At each visit, the healthcare provider should ask women about their experience of perineal pain and offer advice on its management. For most women, paracetamol will be the first line of pain management. However, women who have more severe trauma may require stronger analgesia, with oral NSAIDS or oral opiates, although opiates are best avoided if possible due to side effects including constipation and respiratory depression. Some mothers may experience other persistent symptoms, including dyspareunia (difficult or painful sexual intercourse). Advise the woman to abstain from sexual intercourse until perineal area has fully healed. The perineum should be inspected with consent at each postnatal visit to check for signs of infection, dehiscence, haematoma or abscess.

Recognising complications

Dehiscence and infection of the perineum

A primary cause of wound dehiscence is sub-acute infection, sometimes resulting from inadequate aseptic technique, or failure of good knot-tying technique.

Dehiscence can be prevented by a good knot-tying technique when suturing, reducing stress on the wound edges, asepsis and good surgical technique to avoid the formation of haematomas.

Symptoms of dehiscence/infection include:

- Pain
- Inflammation of the perineal tissues
- Wound opening spontaneously
- Bleeding
- Purulent and offensive discharge

Once wound dehiscence or infection occurs, it can be treated by:

- Allowing granulation and healing.
- Re-suturing the edges after cleaning and debridement of any non-viable tissue. If the area was not approximated correctly in the first place, or even if a stitch cuts through later, the edges of the wound may not oppose and heal correctly.
- Antibiotic therapy.
- Attention to wound hygiene.

Care of the perineal area

Hygiene

Women should be advised of the need to:

- Wash their hands well before and after changing pads and using the toilet
- Change their pads/pieces of cloth regularly throughout the day
- Bathe regularly to keep their perineal area clean

Wound care

Keep the wound and surrounding area clean to reduce the risk of infection. After going to the toilet, pour warm water (ideally previously boiled water left to cool, or just clean water) over the vaginal area to rinse it. Pouring warm water over the outer area of the vagina when passing urine may also help ease the discomfort.

Sutures

Sutures should be removed if they are not re-absorbable (e.g. silk). Chromic catgut is a commonly used episiotomy suture that retains strength for about 2-3 weeks and does not need to be removed. In general, it is advised that absorbable sutures are used but these may not always be available.

! Assess, document and educate regarding the type and amount of vaginal bleeding.

Lochia

Vaginal loss (lochia), if normal, should be odourless.

Explain to the mother what normal lochia is and when to seek care:

- Lochia rubra is red in colour and normally lasts for the first 3-4 days, followed by Lochia serosa, which is pinkish-brown in colour and lasts from 4-10 days and finally Lochia alba which is yellowish white in colour and lasts from Day 10-28. Deviation from this should be reported, especially if loss turns back to red.
- Increase in amount of lochia.
- Offensive smelling lochia.
- Abdominal pains.
- Feeling generally unwell.

Care for the woman following a Caesarean Section

Routine care of woman following a Caesarean section

Monitoring

In addition to general postnatal care, women who have had a Caesarean section should be provided with:

- Regular post-operative observations, ideally every 15-30 minutes for two hours decreasing to hourly for the next two hours, provided observations are within normal parameters. Thereafter, twice daily.
- Breastfeeding: support should be provided to help the baby latch on and initiate breastfeeding as soon as possible after birth.
- Encourage skin to skin contact.

Pain management after Caesarean section

Women who have had a Caesarean section should be prescribed and encouraged to take regular analgesia for postoperative pain, using:

Analgesia	Dosage
Morphine (IV)	5-15mg (4 hourly)
Morphine (IM)	2.5-10mg (4 hourly)
Pethidine	50mg (6 hourly)
NSAIDs (Dicolfenac)	400mg (4 hourly)
Co-Codamol	30-500mg (4 hourly)
Paracetamol	1g 4-6 hourly

Wound care

- Remove the dressing 24 hours after the Caesarean section
- Specific monitoring for infection (increased pulse rate, respiratory rate, temperature)

Infection prevention

- Assess the wound daily for signs of infection (such as increasing pain, redness or discharge), separation or dehiscence.
- Gently clean and dry the wound daily with clean water.
- Check for wound haematoma.
- Plan for the removal of sutures or clips at day 5-7 if non-absorbable.
- Internationally, routine oral antibiotics treatment post Caesarean section is not recommended
- If women are showing signs of infection post Caesarean section, they should be treated with:
  - ☐ Clindamycin: 600mg IV 8 hourly
    PLUS
  - ☐ Gentamicin: 5mg/kg body weight IV 24 hours

Bladder

- Removal of the urinary bladder catheter should be carried out as soon as a woman is mobile.
- It is important to check that good volumes of urine are passed regularly and monitor for any signs of retention. Re-catheterisation may be necessary to prevent damage to the innervation of the bladder secondary to hyper-distension.
- Healthcare providers caring for women who have urinary symptoms should consider the possible diagnosis of urinary tract infection (occurs in about 4% of women after a Caesarean section).
- Iatrogenic uretero-uterine flstula may also be a complication of Caesarean section in addition to vesico-vaginal fistula from prolonged obstructed labour prior to Caesarean section.

Bowels

- Check that a woman who has had a Caesarean section has passed flatus within 24 hours. Failure to pass flatus, accompanied by excessive pain and abdominal distension may be a sign of paralytic ileus. Listen for bowel sounds. Most women experiencing ileus will recover within 24-48 hours of intravenous hydration and analgesia. Keep nil by mouth until normal bowel activity resumes.
- Check that the woman who has had a Caesarean section has passed faeces within 24-48 hours. If passing flatus but not faeces, laxatives may help.
- Women who have had a straightforward Caesarean section and who do not have complications can drink immediately after the procedure and eat when they feel hungry.

Legs

- Women who have had a Caesarean section are at increased risk of thromboembolic disease (both deep vein thrombosis and pulmonary embolism) (see Chapter 6).
- Encourage early and frequent mobilization and good hydration to prevent thrombosis and pulmonary embolism.
- Healthcare providers need to pay particular attention to women who have chest symptoms (such as cough, chest pain of sudden onset or shortness of breath) or leg symptoms (such as painful swollen calf).
- In cases of deep vein thrombosis, Warfarin may safely be prescribed after childbirth.

Resuming activities

Women who have had a Caesarean section should resume activities such as carrying heavy items and sexual intercourse only once they have fully recovered from the Caesarean section. This may take up to 4-8 weeks.

Early skin-to-skin contact between the woman and her baby should be encouraged and facilitated because it improves maternal bonding with the infant and breastfeeding outcomes. Women who have had a Caesarean section should be offered additional support to help them to start breastfeeding as soon as possible after the birth of their baby. This is because, without support, women who have had a Caesarean section are less likely to start breastfeeding in the first few hours after the birth, but, when breastfeeding is established, they are as likely to continue as women who have a vaginal birth.

Pregnancy and childbirth after a Caesarean section

If information available from the delivery notes, discuss the indication for the Caesarean section, avoiding the use of medical terminology and ensuring the woman understands. The healthcare provider should the make recommendations for subsequent pregnancies with the woman and discuss vaginal birth after Caesarean section unless the reason for the Caesarean was recurring or the woman prefers a further operative birth following counselling concerning the pros and cons. All women with a previous Caesarean section should be advised to deliver in a healthcare facility for subsequent births.

Planned vaginal birth after Caesarean section may be offered to the majority of women with a singleton pregnancy of cephalic presentation at 37+0 weeks or beyond who have had a single previous lower segment caesarean delivery, with or without a history of previous vaginal birth.

Planned vaginal birth after Caesarean section is contraindicated in women with previous uterine rupture or classical caesarean scar and in women who have other absolute contraindications to vaginal birth that apply irrespective of the presence or absence of a scar (e.g. major placenta praevia).

Care of the newborn baby

Assessment – History, physical or clinical examination and laboratory tests/ screening

Look for danger signs and take action: the healthy newborn baby must be given routine essential newborn care. A sick newborn must immediately be given appropriate treatment by the healthcare provider.

Ensure that all healthcare providers wash their hands before touching the baby and encourage mothers to do the same.

- **Thermal care:** dry the baby immediately after birth, place on the mother's abdomen (skin-to-skin), cover with a clean towel/blanket and a hat on the head. Do not bathe the baby for the first 24 hours.
- **Keeping the baby clean:** Clean birth practices, hand washing, clean dry umbilical cord care, and clean eye/skin care. Application of CHX for cord care (7.1% chlorhexidine digluconate aqueous solution or gel, delivering 4% CHX) in the first week after birth is recommended only in settings where harmful traditional substances (e.g., animal dung, dust, clay, mud) are commonly used on the umbilical cord.
- **Initiation of breathing:** Thorough drying, clearing the airway only if needed, stimulation through rubbing the back, basic neonatal resuscitation using a self-inflating bag and mask for babies who do not spontaneously breathe.
- **Feeding support:** Skin-to-skin contact, support for initiation of exclusive breastfeeding within one hour of birth, not discarding colostrum (or first milk).

Preventive treatment

Prophylaxis for gonococcal ocular infection

The World Health Organization (WHO) recommends the following treatments to prevent ophthalmia neonatorum:

- tetracycline hydrochloride 1% eye ointment
- erythromycin 0.5% eye ointment
- povidone-iodine 2.5% solution (water-based)
- silver nitrate 1% solution
- chloramphenicol 1% eye ointment

Newborns given preventive medication are likely to have a lower chance of conjunctivitis within one month of birth compared with newborns not given preventive medication (moderate-certainty evidence). The evidence for specific causes of conjunctivitis (gonococcal, chlamydial) was less certain.

Routine prophylaxis for haemorrhagic disease of the newborn

Newborn babies are relatively deficient in vitamin K and those who do not receive supplements of vitamin K are at risk of haemorrhagic disease of the newborn. This may result in bleeding, including intracranial. It is recommended that all newborn babies should receive vitamin K to prevent vitamin K deficiency bleeding (previously termed haemorrhagic disease of the newborn). Vitamin K may be given by a single intramuscular injection at birth; this prevents vitamin K deficiency bleeding in virtually all babies.

ALL infants should be given vitamin K, with maternal consent. The same dose may also be given orally.

- If birth weight below 1.5kg, give 0.5mg of vitamin K IM
- If birth weight above 1.5kg, give 1mg of vitamin K IM

Immunisation of the newborn

Consent for administration of all immunisations must be obtained from the parents and recorded in the immunisation card and child health record.

Always follow the country's national schedule but the WHO recommend the following immunisations are given within 24 hours of birth:

- Oral polio
- Hepatitis B
- If a non-immunised newborn is first seen 1-4 weeks of age, give the Bacillus Calmette-Guérin vaccine only

Advise the mother when to return for next immunisation.

Table 10.5: Schedule for immunisations

Routine immunisation schedule			
Age due	**Diseases protected against**	**Vaccine given**	**Dosages**
Birth <1 week	Tuberculosis	Bacillus Calmette-Guérin	Given as soon as possible after birth in most resource-poor settings
6 weeks old	Polio	OPV	Given orally at 6, 10 and 14 weeks
	Haemophilus influenzae	Haemophilus influenzae type B	At 6 weeks and twice more at 4-weekly intervals
	Rotavirus	Rotavirus	At 6 weeks and 10 weeks
Other	DTaP	Diphtheria, tetanus, pertussis	3 doses at intervals of 4 weeks; first dose at 6 weeks then at 10 weeks and 14 weeks
	Hepatitis B	HepB 2	Administered to those at high risk as soon as possible after birth with two further doses at 4-weekly intervals

Assessment and examination of the newborn baby

Assessment of the newborn

- Babies should be placed in skin-to-skin contact with their mothers immediately following birth unless in need of resuscitation or other urgent care.
- Initiate breastfeeding within one hour when the suckling reflex is at its strongest.
- Delayed cord clamping should be standard practice unless the infant needs immediate resuscitation. An alternative is to commence resuscitation in close proximity to the mother with the cord remaining intact.

Conducting an examination

- Prepare the room and equipment needed for the assessment
- Room temperate should be as warm as possible
- Greet and congratulate the mother or relative
- Gather information about the birth from the mother and the case records
- Wash your hands before and after touching the baby
- Within an hour of birth conduct a full examination of the baby and explain the results to the mother and document the findings

Table 10.6: Assessment of the newborn

Check	Look	Feel
■ Weight ■ Temperature ■ Breastfeeding ☐ Position ☐ Attachment ■ Respiratory rate ■ Heart rate	■ Screen from top-to-toe, midline and back examination ■ Colour ☐ Jaundice ☐ Cyanosis ☐ Anaemia ■ Skin ☐ Pustules ☐ Rash ☐ Bruises ■ Eyes ■ Ears ■ Mouth ■ Chest indrawing ■ Umbilicus ■ Orifices	■ Abnormal swelling ■ Femoral pulses ■ Capillary refill time ■ Palpate the abdomen ■ Feel for testes (male baby) ■ Fontanelles ■ Hips for congenital dislocation

Table 10.7: Observations in the healthy newborn

Observations	Minimum	Normal range
Heart rate	4-6 hourly	100-160 beats/min
Respiratory rate	4-6 hourly	30-60 breaths/min
Chest in drawing Nasal flaring	4-6 hourly	None
Colour	At birth, examination and once a day	Pink mucosa and capillary refill less than 2 seconds
Skin/Eyes	At birth, examination and once a day	Absence of rash or jaundice
Umbilical cord	Once a day	Absence of redness around the umbilical cord, absence of purulent discharge from the cord
Auxiliary body temperature	4-6 hourly	36.5 to 37.5°C
Posture and movement	At birth, once a day and at discharge	Arms and legs are flexed and newborn is active Reacts to touch, light and sounds
Feeding and breastfeeding positioning	During feeds in the first 48 hours	Baby is able to suck
Urine and stools	6 hourly	Passes urine and stools within 24 hours after birth From birth to 2 days: meconium (stool) is thick, sticky and dark green/black
Genitalia		Female infants may sometimes experience slight vaginal bleeding as they withdraw from the maternal hormones but this is normal
Weight		Low birth weight infant <2.5kg Normal birth weight 2.5kg-4.5kg Macrosomic infant >4.5kg
Head circumference and body length		Head circumference 31.5-37cm Length 45-55cm

Breastfeeding

- During the first 6 months of life, the baby needs nothing more than breast milk – NOT water, other milk, cereals, tea or juice.
- Breast milk contains exactly the correct amount of water and nutrients that a baby's body needs. It is easily digested and efficiently used by the baby's body. It helps protect against infections and allergies and helps the baby's growth and development.
- When the baby suckles, the uterus contracts. This helps reduce bleeding, but may cause painful contractions initially.
- Regular breast feeding delays the onset of ovulation and menstruation, but breastfeeding alone is not a reliable means of contraception.

Suggestions for successful breastfeeding

- The newborn baby should be with the mother at all times.
- Breastfeeding should start within 1 hour of birth.
- The newborn's suckling stimulates milk production. The more the baby feeds, the more milk the mother will produce. Mothers should be encouraged to feed the newborn 4-6 hourly.
- At each feeding, let the baby feed and release your breast, and then offer your second breast. At the next feeding, alternate and begin with the second breast.
- Inform the mother of the benefits of the first milk (colostrum). It is nutritious and has antibodies to help prevent infections.
- While breastfeeding, the mother should be encouraged to drink plenty of clean, safe water. The mother should eat increased amounts, healthier foods and rest when possible.

The healthcare provider should show the woman how to correctly position the baby and ensure the baby attaches to the breast. This will reduce breast problems for the mother.

Hand expressing

The healthcare provider should also show the mother how to express milk from her breast with her hands before she is discharged and inform the woman about breastfeeding support groups, if available.

- To stimulate milk supply if the newborn is sleepy, or not able to suckle well at the breast. For prematurity, or a newborn in a neonatal unit separated from its mother for another reason.
- Mothers in this situation should be encouraged to express eight times, including at least once during the night, in a 24-hour period.
- Hand expressing can relieve fullness if uncomfortable or for engorgement, blocked ducts or mastitis.
- It can be used prior to using a breast pump.
- If the mother is returning to work or is away from her baby, it will ensure and consistent supply of breast milk.

Perinatal death

Definitions

Perinatal describes the period surrounding birth, and includes the time from fetal viability (28 weeks of pregnancy) up to either 7 or 28 days of life.

- **Perinatal mortality:** fetal deaths after 24 completed weeks of gestation and death before seven completed days.
- **Stillbirth:** There are various definitions of stillbirth but the WHO uses the following:a baby born with a birthweight of 1000 g or more with an assumed equivalent of 28 weeks gestation and which did not, at any time breathe or show any other signs of life.
- A stillborn baby may show signs of maceration if the death has occurred more than 6 hours prior to birth, Fresh stillbirth is indicative of a fetal death during labour. However, if the labour has lasted longer than 6 hours maceration may be present in a baby that has died in labour.
- **Neonatal mortality:** death before the age of 28 completed days following live birth.
- **Early neonatal death:** death in the first seven days.
- **Late neonatal death:** from seven and up to 28 days.

Management

Bereavement care:

- Stillbirth is a devastating event for the mother, father and the wider family
- The mother and father should be given time and space for reflection in a suitable environment

It is important that the healthcare provider takes the time to listen to the concerns of the mother and explain what has happened clearly and non-judgementally. There are many causes of stillbirth, In LMICs, approximately 50% occur intrapartum. Modifiable disorders with the highest estimated population attributable fraction (PAF) at a global level include: maternal age of older than 35 years (PAF 6·7%), maternal infections (malaria 8·2% and syphilis 7·7%), non-communicable diseases, nutrition and lifestyle factors, such as obesity (many of which coexist, each contributing to about 10%), and prolonged pregnancy (14·0%). A higher risk of both antepartum and intrapartum stillbirth exists for those babies with fetal growth restriction than those without. Stillbirths are often the result of a causal network in which an already compromised fetus is more susceptible to infection or hypoxic effects. For example, the risk of death is higher for those who have had a hypoxic injury against a background of fetal growth restriction and infection, and this risk applies for stillbirths and liveborn babies who die or develop neonatal encephalopathy.

- Discuss with a woman whose baby is stillborn or dies soon after birth if:
  - ☐ She would like to see the baby
  - ☐ She would like to hold the baby
- Provide assistance if desired in making funeral arrangements
- Hospital counsellors and the priest and/or other religious leaders may provide comfort to families of stillborn infants or in a case of neonatal death

A medical certificate of still birth may be issued by the doctor or midwife present at the time.

- It is important that healthcare providers are aware of cultural practices surrounding stillbirth or the death of a newborn baby.
- It is important that the healthcare providers dispel myths and misconceptions and provides the mother with as much information as possible regarding the cause of the stillbirth or neonatal death. Women often suffer from feelings of guilt but a stillbirth is never their fault.

Women who have had a complication in pregnancy and childbirth

Up to 15% of women will experience complications during pregnancy or at the time of birth. In the postpartum period, this will require follow-up and sometimes treatment. The postpartum period is also a good time to review what happened during the birth, explain any complications the woman may have had, the management she received and any implications for future pregnancy and childbirth. It is essential that any follow-up treatment and care is planned with the woman postnatally and she is aware of need to attend for postnatal care.

Discharge Information

General advice to give the woman when discharging her from the facility after 24 hours

- Women should be offered information and reassurance on the physiological process of recovery after birth (within the first 24 hours) and the normal emotional changes in the postnatal period, that usually resolve within 10 to 14 days of giving birth
- Contact a healthcare provider if any danger signs (outlined below)
- Try to ensure adequate rest and sleep
- Exclusive breastfeeding
- Contraception: If she has not already received a postpartum method in the healthcare facility, every woman should receive advice on appropriate family planning options for a breastfeeding mother
- Immunisation and growth monitoring of the newborn
- Return postnatal visits: Day 3, between Days 7 to 14 after birth and at 6 weeks
- Documentation completing the postnatal card

Ensure that before discharge, you have documented everything correctly on both the mother's card, baby's card, and in the case notes.

Danger signs in the mother and newborn baby and emergency preparedness

The healthcare providers should inform the mother of danger signs for herself and the newborn and advise her to attend a healthcare facility as soon as possible. The healthcare provider needs to recognise and act on symptoms and signs of potentially life-threatening conditions. It is the responsibility of the healthcare provider to stabilise and refer women or newborn to the appropriate level healthcare facility immediately using an observation chart.

Table 10.8: Maternal danger signs and symptoms of potentially life-threatening conditions

Symptoms and signs	Diagnosis
Sudden and profuse blood loss or persistent increased blood loss; faintness; dizziness; palpitations/tachycardia	Postpartum haemorrhage
One or more of the following symptoms: ■ Headaches ■ Visual disturbances ■ Convulsions	Pre-eclampsia/eclampsia
Unilateral calf pain; redness or swelling of calves; shortness of breath or chest pain	Deep vein thromboembolism OR Pulmonary thromboembolism
Fever, shivering, abdominal pain and/or offensive vaginal loss, cough	Sepsis

Management of danger signs and complications in the mother are discussed in Chapter 12.

Table 10.9: Newborn danger signs

Symptoms and signs	Possible Diagnosis
Stopped or not breastfeeding well	Sepsis
Convulsions	Sepsis/ hypoxic-ischemic encephalopathy
Fast breathing at a rate of 60 breaths per minutes or more	Sepsis/Meconium aspiration
Severe chest in-drawing or grunting	Sepsis/Meconium aspiration
High temperature 37.5°C or more	Sepsis
Sepsis	Sepsis
Vomits after every feed	Congenital abnormality
Lethargic or unconscious – Less active than before	Sepsis
Movement only when stimulated, or no movement even on stimulation	Sepsis
Floppy or stiff	Hypoxic-ischaemic encephalopathy
Central cyanosis	Congenital cardiac abnormality
Mottled skin	Sepsis
>10 skin pustules	Sepsis
Any jaundice in first 24 hours of life, or yellow palms and soles at any age	Jaundice, pathological if presents within 24 hours
Umbilicus draining pus or umbilical redness extending to skin	Umbilical infection
Bleeding from umbilical stump	Cord clamp has been dislodged/infection

Management of danger signs in the newborn infant are discussed in Chapter 13.

Chapter 11: Postnatal Care for mother and baby – subsequent visits

In this chapter, you will find information about:

- Systematic assessment for mother and baby
- Screening and support for mental ill-health
- Screening and support for domestic violence and substance misuse

Postnatal care provides a unique opportunity to provide a full comprehensive and holistic assessment of the mother and baby. It aims to ensure the mother is healthy, able to take care of her newborn and is equipped with the information she needs to do so. This chapter will discuss care that is given in the late postnatal period. It is essential that the woman is informed of when she should attend for each postnatal visit and inform her to attend all scheduled postnatal visits along with her newborn. She should also be informed that if the healthcare worker has any concerns.

Schedule

- Day three (within 48 to 72 hours of giving birth)
- Between days 7 to 14 after giving birth
- At six weeks after giving birth

Assessment

History

- Discuss with the mother how she is feeling and ask whether she has noticed any danger signs in herself and/or for her baby (see Chapter 10, Tables 10.8 and 10.9).
- Assess the mother and baby and refer for appropriate treatment if required.

Physical examination

Clinical observations

Check mothers' vital signs – temperature, pulse rate, respiratory rate and blood pressure (measured at rest and take several measurements if high). If clinical observations outside normal limits assess for cause and treat.

- If blood pressure >140/90mmHg, and/or other symptoms are present that are indicative of hypertension refer for inpatient assessment.
- If the temperature ≥38°C or <36°C, identify the cause of fever.
  - ☐ Does the woman have a productive cough? If yes, admit for further diagnostics and management.
  - ☐ Does the lochia have an offensive smell and/or there is more than usual? If yes, treat with oral antibiotics. Consider the possibility of retained products and if suspected, admit.
  - ☐ Check the rapid test for malaria. If positive,admit.
- If not clear cause for fever is identified, admit.

Examination of the uterus

- By days 5 to 6, the fundus of the uterus is palpable halfway between the navel and the symphysis pubis.
- By day 10, the symphysis pubis should be palpable just above the symphysis pubis.
- After six weeks, the uterus returns to its normal size, i.e. it is not palpable abdominally.

Sub-involution may be a sign of retained products of conception and/or sepsis.

Examination of the perineum

- Check for healing of an episiotomy or any tears.
- Signs of infection include redness, persistent swelling, presence of pus. Note that delayed healing may be a sign of infection.
- Advise on perineal hygiene and safe disposal of sanitary wear.

Discuss personal hygiene in the context of local practices and the environment. Discuss with women the type of pads they will use and their disposal, and care of perineum/episiotomy in the context of home conditions.

Handwashing is particularly important to prevent infections. It is also important not to insert anything into the vagina.

Postpartum bleeding and lochia

Discuss with women how much blood loss they can expect and for how long. The lochia should progressively decrease and if it does not this may indicate a problem. When bleeding is more than normal, they must seek care urgently. Normal lochia does not have an offensive odour and lochia may persist for up to 6 weeks.

Examination of the legs

- Check that legs are soft and non-tender and not different in circumference
- Assess for calf pain which may be a sign of a deep vein thrombosis

Bladder and Bowel function

- Assess for urinary incontinence (ask about urge, stress or continuous incontinence).
- If the mother complains about continuous incontinence conduct a speculum examination or refer her to a healthcare facility for assessment of an obstetric fistula (see Chapter 12).
- Ask about bowel continence. Incontinence of either faeces or flatus may be a sign of either recto-vaginal fistula or undetected or incorrectly repaired third or fourth degree tears.

Screening for mental health problems

The birth of a new baby can lead to many emotional changes. Many women go through a period of mild depression following the birth of a baby. There is a need to differentiate between postnatal 'blues' (feeling down) which usually occur in the first week and can last up to two weeks after birth, and postnatal depression which is much more severe and usually lasts for a longer period.

Assess for symptoms and signs of postpartum depression (see Chapter 14). It is important to detect early onset severe postnatal depression with psychotic features as this is a psychiatric emergency with a high risk of suicide if untreated.

Management

If you identify a new mother with depression, then you should refer her as soon as possible to the nearest healthcare facility for management and treatment if required.

- Arrange to meet on a regular basis to show empathy, to listen and support
- Ask her consent to discuss her situation with a family member or friend who she feels may be able to provide her with support
- Encourage her family to involve her in social activities and activities that she previously enjoyed

Screening and support for domestic violence

- The healthcare provider must be alert for signs of any safeguarding issues and be aware of policies to communicate and refer concerns
- Screen for domestic violence using the HITS screening tool (see Chapter 14 and Appendix 6)

Supporting breastfeeding

Breast examination

The breasts are usually soft on palpation during the first 24 hours post-delivery.

Colostrum (first milk)

Breasts produce colostrum during the first few days after birth. It is usually a golden yellow colour with a high concentration of nutrients and helps the baby to fight infections. The amount of colostrum produced will vary from a few drops to a teaspoon, this is all the baby needs. In some cultures, feeding babies with colostrum is frowned upon and may require further explanation.

The newborn may want to feed quite often, perhaps every hour to begin with. Then often fewer, longer feeds once the breast start to produce more milk after a few days. It is important to inform the mother that the more she breastfeeds, the more the newborn's sucking will stimulate her supply and the more milk she will produce.

Examination of the breasts

- Check breasts for discolouration, bruising, open wounds, presence of mastitis
- Ask if there is pain when feeding
- From day 2-4, milk secretion is established in most cases and the breast should not be engorged if feeding is going well

Check

- **Inspect**: size, symmetry, shape of breast and nipples
- **Palpate**: fullness, soft or engorged, firmness and lumps
- Redness, bruising, open wounds, presence of mastitis (see Chapter 7)

It is important that the mother knows the correct technique for proper positioning of the newborn and attachment to avoid cracking of the nipples.

Flat or inverted nipples

- Suggest that the mother expresses a small amount of milk by hand or pump immediately before the feed.
- Use a nipple shield to assist the baby to latch onto the breast. The thin silicone shield fits over the nipple so making it easier for the baby to latch onto it. The nipple shape will gradually improve, as it will be pulled into the shield as the baby suckles.

Cracked nipples and how to manage

Symptoms – Nipple soreness when breastfeeding. Often caused by incorrect latching onto the breast.

Check the positioning of the newborn when feeding.

- Sometimes nipple pain is caused by Candida Albicans (Thrush) that can penetrate the nipple if cracked or if the baby has had a course of antibiotics, resulting in oral thrush. With thrush, breast pain is usually bilateral. Treat with anti-fungal medication such as Nystatin.

Breast engorgement

Breast engorgement is common in the first few days and weeks as the milk supply regulates and can also cause breast pain. It usually lasts for 2-3 days.

- Regular analgesia will be required until the engorgement settles.
- Apply a warm compress (towel) before breastfeeding.
- Hand express a little breast milk before feeding the baby. This will help to relieve some of the pressure and discomfort and soften the breasts to make it easier for the baby to latch on.
- Breastfeed more frequently to empty the full breasts.

Mastitis

- This becomes evident when the woman has a painful area of redness on her breast, has a fever and feels generally unwell with flu-like symptoms.
- Continue breastfeeding (or expressing milk).
- Ensure that the woman is using a proper breastfeeding bra, and that there is no pressure on the breast during feeding.
- Antibiotics are generally required.
- Analgesics may help until the infection clears.
- Tell her that this condition will usually resolve within a few days.

Inadequate supply of breast milk

- Encourage the woman to eat a nutritious diet and drink plenty of water
- Encourage the woman to take rest while the baby is asleep
- Put the baby to the breast frequently, and/or express 3 hourly, or more frequently

Assess correct breastfeeding attachment

Newborn:

- Mouth wide open
- Chin touching the breast, lower lip down, nose not blocked
- Very little areola visible underneath the chin

Mother:

- Should feel no pain when feeding

Table 11.1: Indicators of successful breastfeeding

Mother	Newborn
■ Breast softens after feeding ■ No misshapen nipple at the end of the feed ■ Mother relaxed during feeding	■ Swallowing visible ■ Audible rhythmic suck ■ Body is relaxed ■ Frequent passing of urine and stools

Contraception

There are opportunities for healthcare providers to discuss contraception options for women when they attend for antenatal care, delivery, postpartum care or the immunisation of their baby. There are several options available for women after childbirth. These are outlined in Table 11.2 below. Healthcare providers can discuss all relevant options with the woman so that she can make an informed choice.

The timing and choice of family planning method depends on:

- Breastfeeding status
- Reproductive health goal and fertility desires

Table 11.2: Family planning methods

Options for breastfeeding women		
Methods that can be used immediately postpartum: ■ Female sterilisation – within 7 days or delay 6 weeks ■ Intrauterine contraceptive device – in the 48-hour period after birth or delay until 4 weeks	Methods that must be delayed for 6-weeks: ■ Progestogen-only oral contraceptives ■ Progestogen-only injectable, implants	6-month delay: ■ Combined oral contraceptive pill ■ Combined injectable
Options for non-breastfeeding women		
Methods that can be used immediately postpartum: ■ Progestogen-only oral contraceptive ■ Progestogen-only injectable or implant ■ Female sterilisation – within 7 days or delay 6 weeks ■ Intrauterine contraceptive device – in the 48-hour period after birth or delay until 4 weeks	Methods that must be delayed for 6-weeks: ■ Combined oral contraceptive pill ■ Combined injectable	

The postpartum intrauterine device

A copper intrauterine device can be inserted within 48 hours of delivery and is a safe and highly convenient choice for women who desire long-acting, reversible, non-hormonal protection from pregnancy starting during the critical postpartum period.

After the assessment of the woman has been completed and the woman has made an informed choice, the healthcare provider may insert the intrauterine device and provide post insertion instructions to the woman.

Types of postpartum intrauterine device insertion are:

- Post placental insertion
  - When the intrauterine device is inserted within 10 minutes after the expulsion of the placenta following a vaginal delivery
- Immediate postpartum insertion
  - When the intrauterine device is inserted after the post placental period but within 48-72 hours of a vaginal delivery
- Trans-Caesarean insertion
  - When the insertion takes, place following a Caesarean delivery, before the uterine incision is closed
- Interval insertion
  - Insertion of the intrauterine device at ≥4 weeks postpartum

Assessment of the baby

Cord care

- The umbilical stump will naturally harden and dry once it is exposed to the natural air and so should not be covered.
- It takes on average 10 days for the cord to separate and drop off. During this time, it is normal to see some sticky discharge from the cord as it begins to separate which can be removed using clean water and cotton wool. DO NOT apply any creams or powder or natural herbs to the cord.

Chlorhexidine

- Daily chlorhexidine (7.1% chlorhexidine digluconate aqueous solution or gel, delivering 4% chlorhexidine) application to the umbilical cord stump during the first week of life is recommended for babies who are in in settings with high neonatal mortality (30 or more neonatal deaths per 1000 live births).
- Clean, dry cord care is recommended for babies born in healthcare facilities and at home in low neonatal mortality settings. Use of chlorhexidine in these situations should be considered in order to replace application of a harmful traditional substance, such as cow dung, to the cord stump.

Assessment of weight

Check the scales and calibrate them daily according to instructions.

- Weigh the baby at least once monthly but more often in the first week
- Weigh the baby if unwell or not feeding

Some babies tend to gain weight more slowly than others. Most newborn babies lose weight at first and then regain their birth weight at around two weeks old. The rate of weight gain varies depending on the baby's age:

- 2 weeks to 4 months: 125-200g (5-8oz) per week
- 4 to 6 months: 50-150g (2-6oz) per week
- 6 to 12 months: 25-75g (1-3oz) per week

Table 11.3: Acceptable weight loss and expect weight gain in the first month of life

Age	Weight
1 week	Loss up to 10%
2-4 weeks	Gain at least 160g per week (15g/day)
1 month	Gain at least 300g first month

If weight gain is not occurring within normal limits, observe feeding and consider referring the baby for investigations for failure to thrive. If the baby is dehydrated refer urgently.

HIV, TB and syphilis after childbirth

Babies born to mothers who are HIV or syphilis positive, or mothers that have been diagnosed with TB and started treatment less than 2 months before delivery should receive the treatment outlined below. It is essential that the healthcare provider teaches the mother to administer treatment at home and ensure she is given the medication or a prescription for the medication required until the next visit.

- Explain and how the drug is given
- Wash hands
- Demonstrate how to use the syringe and how to measure the dose
- Watch the mother as she administers the medication
- If the newborn vomits or spills the medication within 30 minutes the mother should repeat the dose

Table 11.4: Risk Identification in newborns

If mother:	Risk
■ Venereal disease research laboratory tested positive ■ Treated HIV Positive ■ Receiving TB treatment	■ Congenital syphilis ■ HIV transmission ■ TB

Table 11.5: Management

Baby classified as:	Management
1. Risk of Congenital Syphilis	■ Give the baby a single dose of Benzathine Penicillin 50,000 IU/kg immediately, whether the mother was treated during pregnancy or not ■ Ensure mother and partner are also treated ■ Follow up in 2 weeks
2. Risk of HIV Transmission	If the mother is: ■ On highly active antiretroviral therapy, whether breastfeeding or not, give the baby Nevirapine 2mg/kg/birth weight once daily for 6 weeks ■ If breastfeeding, give the baby Nevirapine 2mg/kg/birth weight once daily until on to four weeks after the cessation of breastfeeding ■ If not breastfeeding, give the baby the Nevirapine 2mg/kg/birth weight once daily for 6 weeks ■ Ensure mother, partner and other siblings are tested ■ Follow up in 2 weeks
3. Risk of Tuberculosis	■ Give the baby isoniazid 5mg/kg/birth weight prophylaxis for 6 months ■ Give Bacillus Calmette-Guérin vaccination to the baby only when the baby's prophylaxis is completed ■ Follow up in 2 weeks ■ X-ray the baby's chest at 6 weeks and review if the baby has active TB

Treatment of TB in women who breastfeed

Anti-TB drugs are excreted into breast milk, though the dose that is found in breast milk is less than the therapeutic dose for infants. Breastfed infants may receive as much as 20% of the therapeutic dose of isoniazid for infants, while other anti-TB drugs are less excreted.

No toxicity has been reported from this small concentration in breast milk. Caution must, however, be exercised as the breast milk dose may contribute to the development of abnormally high plasma levels in infants who are themselves on anti-TB medication.

See Chapter 8 for more information regarding care of the mother and infant with TB.

Feeding problems

Breastfeeding may not always be easy or successful straight away. It is very important that the mother is well supported to continue breastfeeding. It may take a few days for breast milk to be produced in sufficient quantity. The mother may need to drink more and may simply be tired or unwell. Initial difficulties may occur when breastfeeding a preterm baby or with twins or triplets.

Newborns who cannot breastfeed and/or use alternative feeding methods

- Give expressed breast milk via a cup or syringe, if the newborn can swallow.
- If the newborn is too weak to suck and swallow, or the baby has been choking or regurgitating after the feed, insert a nasogastric tube.

Reflexes involved in oral (breast) feeding

- **Rooting reflex:** seen in normal newborn babies, who automatically turn the face toward the stimulus and make sucking (rooting) motions with the mouth when the cheek or lip is touched. This reflex helps to ensure successful breastfeeding.
- **Sucking reflex**: when the roof of the baby's mouth is touched, the baby will begin to suck. This reflex does not begin until about the 32nd week of pregnancy and is not fully developed until about 36 weeks.
- **Swallowing reflex**: consists of both receptive and motor nervous system pathways.

These reflexes are normally fully developed by 36 weeks' gestation.

How to assess the rooting reflex

The healthcare provider uses a clean finger to touch the cheeks or upper lip of the baby and assesses the baby make sucking motions or turns the face towards the finger.

How to assess the sucking reflex

- Preterm babies may have weak or immature sucking ability.
- The healthcare provider can insert a clean finger in the baby's mouth to check the sucking reflex, an assessment can be made on the rate and strength of the suck.

How to assess the swallowing reflex

When the swallowing reflex is absent or the coordination between sucking, swallowing and breathing is impaired the baby is at risk of choking as the milk can block their airway.

The following are some causes of feeding problems in the mother and baby:

In the mother:
- Sore/damaged nipples
- Inverted nipples
- Mastitis
- Not enough milk produced
- Exhaustion from frequent/constant feeding
- Distress from failing to establish breastfeeding

In the baby:
- Premature birth
- Low birth weight
- Respiratory problems
- Tongue-tie

Tongue-tie

Also known as ankyloglossia, tongue-tie is caused by a short or tight membrane under the tongue (the lingual frenulum). Tongue-tie is congenital (present at birth) and hereditary (often more than one family member has the condition). Between 0.2% and 2% of babies are born with tight frenulums.

Management

Many babies who have tongue-tie have no symptoms or problems at all.

Treatment is needed if a tongue tie is preventing effective breastfeeding to the extent that the infant is losing significant amounts of weight or the mother's nipples are damaged. A trained healthcare provider can cut the tongue-tie. It is a relatively painless procedure and because the frenulum contains almost no blood, there is usually minimal blood loss. The baby is put on the breast immediately following the procedure, and any bleeding stops almost instantly. Anaesthesia and stitches are not necessary.

Localised infections

Once the newborn has been assessed and a localised infection has been identified that does not need treatment with antibiotics or referral to a healthcare facility, the healthcare provider should advise the mother how to treat at home. The healthcare provider should explain and show how the treatment is given and watch the mother as she carries out the first treatment. Ask the mother to let you know if the local infection gets worse and to return to the clinic if possible.

Management

Skin pustules or umbilical infections. Do the following 3 times daily for 5 days:

- Wash hands with clean water and soap
- Gently wash off pus and crusts with boiled and cooled water and soap
- Dry the area with clean cloth
- Paint with gentian violet
- Wash hands

Treatment for eye infection. Do the following 6-8 times daily for 5 days:

- Wash hands with clean water and soap
- Wet clean cloth with boiled and cooled water
- Use the wet cloth to gently wash off pus from the baby's eyes
- Apply 1% tetracycline eye ointment in each eye 3 times daily
- Wash hands

Once treatment has been initiated the infant should be assessed after 2 days

- Assess the skin, umbilicus or eyes
- If pus or redness remains or is worse, refer to hospital
- If pus and redness have improved, tell the mother to continue treating local infection at home.

Screening for other conditions in postnatal period

Advice on Nutrition

- Women in the postnatal period need to maintain a balanced diet, just as during pregnancy
- Advise the woman to eat a variety of healthy foods, such as meat, fish, oils, nuts, seeds, cereals, beans, vegetables and fruit, to help her feel strong and well (depending on local availability and affordability
- Discuss any local taboos that exist about foods
- Iron and folic acid supplementation should also continue for 3 months after birth
- Women who are breastfeeding require additional food and should drink sufficient clean/safe water

Malaria prevention

All pregnant women should be encouraged to sleep under a long-lasting insecticide-treated net from as early in pregnancy as possible and to continue using the net during the postpartum period, together with their babies. They should also be encouraged to seek care if the newborn becomes unwell. Assess any postpartum woman with anaemia and/or fever who has been exposed to malaria and treat if diagnosed.

Cervical cancer

- Cervical cancer is a leading cause of cancer-related deaths in women
- Women 30-49 years been sexually acitve and hence has potentially been exposed to human papilloma virus is at risk of developing cervical cancer

Symptoms and signs of cervical cancer

- Signs of cervical cancer include: vaginal discharge, vaginal bleeding, bleeding after sexual intercourse, or any post-menopausal bleeding. Women with these symptoms should seek medical care promptly.
- There are no symptoms or signs for the early changes of pre-cancerous lesions. These must be detected by screening. There are three methods of screening:
  - Visual inspection with Acetic Acid, This Requires trained health worker and method may be less acceptable to women, but most results available immediately and possibility of one-stop for diagnosis and treatment.
  - Conventional PAP smear and liquid based cytology. This requires skilled analysis. Method may be less acceptable to women.
  - HPV detection. Effective but high positivity rates may overwhelm services, likely to improve with increase in HPV vaccination. Self sampling has been shown to be as good as health worker collected.

WHO recommends women should be screened for HPV aged 30 and then every 5 to 10 years, unless HIV positive when screening should commence at 25 years and be repeated every 3-5 years.

Breast cancer

Symptoms

The first symptom of breast cancer most women notice is a lump or an area of thickened tissue in their breast. Women should be taught how to self-examine their breasts during antenatal care. Any abnormality detected and reported should prompt referral.

Advise women to check for:

- A new lump or area of thickened tissue in either breast that was not there before
- A change in the size or shape of one or both breasts
- Bloodstained discharge from the nipples
- A lump or swelling in either of the armpits
- Dimpling on the skin of the breasts
- A rash on or around the nipple
- A change in the appearance of the nipple, such as becoming sunken into your breast

Chapter 12: Obstetric complications in the mother after birth

In this chapter, you will find information about:

- Obstetric complications that may occur in the postnatal period (postpartum haemorrhage, eclampsia and sepsis)
- Urinary and faecal incontinence

Postpartum Haemorrhage

Definition

Postpartum haemorrhage is vaginal bleeding in excess of 500mls after childbirth, or any amount that compromises the woman. In women with anaemia in pregnancy, even a small amount of blood loss has potential to be dangerous. All women should be considered at risk of postpartum haemorrhage and prevention must be a part of the management of every birth.

Types of postpartum haemorrhage

- **Primary postpartum haemorrhage** is defined as blood loss of more than 500ml of blood within the first 24 hours after a vaginal birth, or any amount resulting in maternal compromise.
- **Secondary postpartum haemorrhage** occurs when you have abnormal or heavy vaginal bleeding between 24 hours and 12 weeks after the birth.

Table 12.1: Clinical signs and symptoms of postpartum haemorrhage

Circulating volume lost	Signs
Up to 500ml	No symptoms or signs
1.5L	Increase in pulse and respiratory rate, cold, pale
2L	Increase in pulse and respiratory rate, fall in blood pressure, cold, clammy, agitated
Over 2L	Rapid pulse and respiratory rate, low blood pressure, cold, clammy, confused, agitated, aggressive

Causes of postpartum haemorrhage

The most common underlying reasons for primary postpartum haemorrhage are:

- Atonic uterus
- Retained placenta or membranes
- Placenta praevia
- Placental abruption
- Trauma

In the presence of anaemia there will be less resiience and shock may develop with relatively less blood loss.

There are factors occuring in antenatal or intrapartum period which increase the risk of postpartum haemorrhage:

- Antepartum haemorrhage
- Prolonged labour
- Over-distended uterus: large baby, polyhydramnios, multiple pregnancy, multiparty, fibroid uterus

Management of primary postpartum haemorrhage is an obstetric emergency

- Perform a quick ABCD assessment and optimise
- Give oxygen if available
- Insert IV cannula, take samples for cross matching and baseline Full blood count, commence IV fluid resuscitation
- Give oxytocic drug
- Empty the bladder
- Check for placental completeness
- Massage uterus
- Give 1gm Tranexamic acid IV slowly and repeat after 30 minutes if still bleeding

Table 12.2: Use of oxytocic drugs

Drug	Dose and route	Continuing dose	Maximum dose	Precautions and contraindications
Oxytocin	IV: infuse 20 units in 1L IV fluids at 60 drops/minute IM: 10 units	IV: infuse 20 units in 1L IV fluids at 40 drops/minute	Not more than 3L IV fluids containing oxytocin	
Ergometrine	Give 0.2mg IM or IV (slowly)	Repeat 0.2mg IM after 15 minutes If required, give 0.2mg IM or IV (slowly) every 4 hours	Five doses (total 1.0mg)	High blood pressure Pre-eclampsia Heart disease
Misoprostol	600-1000 micrograms per rectum		1000 micrograms	

Table 12.3: Causes of vaginal bleeding in the postpartum period

Presenting symptom and other symptoms and signs			
Usually present	**Sometimes present**	**Probable diagnosis**	**Management**
Revealed Postpartum haemorrhage Uterus soft and not contracted	Shock	Atonic uterus	Oxytocics
Revealed Postpartum haemorrhage Uterus contracted	Complete placenta delivered	Episiotomy Tears of cervix, vagina or perineum	Suture episiotomy and second-degree tears. Third and fourth degree tears and cervical tears should be sutured in theatre
Revealed Postpartum haemorrhage	Placenta not delivered within 30 minutes after delivery	Retained placenta	Manual removal of the placenta
Portion of maternal surface of placenta missing or torn membranes	Postpartum haemorrhage Uterus contracted	Retained placental fragments	Manual exploration of cavity or MVA
Uterine fundus not felt on abdominal palpitation	Inverted uterus apparent at the vulva or within vagina	Inverted uterus	Manual or hydrostatic repositioning of the uterus
Pain Bleeding occurs more than 24 hours after delivery Uterus softer and larger than expected	Postpartum haemorrhage Bleeding is variable (light or heavy, continuous or irregular) and may be foul smelling	Secondary postpartum haemorrhage	IV antibiotics Exploration of the uterus may be necessary to remove any retained placental fragments or membranes
Postpartum haemorrhage (bleeding is intrabdominal and/or vaginal) Severe abdominal pain	Shock Tender abdomen Fetal parts may be easily palpable if not delivered	Ruptured uterus	Laparotomy

Bimanual compression of the uterus

In cases of atony, if bleeding is not controlled after the administration of medication, bimanual compression should be commenced to minimise bleeding pending definitive treatment or during transport and referral.

- Explain to the woman (and her support person) what is going to happen
- Provide continual emotional support and reassurance
- Insert a gloved hand into the vagina and form a fist
- Place the fist into the anterior vaginal fornix and apply pressure against the anterior wall of the uterus
- Place the other hand on the abdomen behind the uterus
- Press the abdominal hand deeply into the abdomen and apply pressure against the posterior wall of the uterus
- Maintain compression until bleeding is controlled and the uterus is well contracted

Management of secondary postpartum haemorrhage

The most common underlying reasons for secondary postpartum haemorrhage are:

- Infection (endometritis)
- Retained pieces of placental tissue or membranes

Treatment of secondary postpartum haemorrhage

- For secondary postpartum haemorrhage, it is important for the woman to be admitted and treated:
  - ☐ Give oxytocic drugs (Table 12.3)
  - ☐ Commence IV antibiotics
  - ☐ Explore the uterus to exclude retained placenta and/or membranes
- If anaemia is severe (haemoglobin less than 7g/dL or haematocrit less than 20%), give a blood transfusion

Sepsis

Maternal Sepsis is defined as a life threatening condition defined as organ dysfunction resulting from infection during pregnancy, childbirth, post-abortion or post-partum period.

Septic shock is defined as occurring when there is a vasopressor requirement to maintain MAP >/= 65 mmHg and serum lactate >2 mmol/l despite adequate volume resuscitation. (Lactate measurement may not be possible is some locations.)

Sepsis is one of the major causes of maternal death and accounts for 35,000 maternal deaths in low- and middle-income countries annually. Postnatal sepsis is also a cause of long-term health problems including chronic pelvic inflammatory disease and infertility. All healthcare providers should be aware of the symptoms and signs of maternal sepsis and critical illness and of the rapid, potentially lethal course of severe sepsis and septic shock. Suspicion of significant sepsis should trigger an urgent referral to secondary care.

Regular observations of all vital signs (including temperature, pulse rate, blood pressure and respiratory rate) should be recorded on a basic observation chart.

Women are more vulnerable to postnatal sepsis if they have experienced or are experiencing:

- Anaemia and/or malnourishment
- Prolonged labour
- Prolonged rupture of the membranes
- Frequent vaginal examinations
- Traumatic delivery
- Caesarean section
- Retained placental fragments

Common causes of infection after delivery:

- Pelvic abscess
- Wound Infection (abdominal or perineal)
- Mastitis, breast abscess
- Urinary tract infection
- Phlebitis
- Malaria, enteric fever
- Pneumonia

The following may be symptoms and of postnatal sepsis:

- Fever (temperature of 38°C or more) chills
- General malaise
- Lower abdominal pain
- Tender uterus
- Sub-involution of the uterus
- Purulent, foul-smelling lochia
- Dysuria
- Breathing difficulty

These signs, including pyrexia, may not always be present and are not necessarily related to the severity of sepsis.

The systemic response to sepsis is measured by the SOFA (Sequential Organ failure assessment) score. This has been requires various laboratory tests that may not always be available and it has therefore been modified to the qSOFA score.

One point each is allocated for:

- ☐ Altered mental state
- ☐ Respiratory rate >/= 22/minute
- ☐ Systolic BP </=100 mmHg

The score has been further modified to become the omqSOFA (obstetrically modified) to take into account the altered physiology of pregnancy as follows:

- ☐ Respiratory rate ≥25min, mental status (any non-alert state) and systolic blood pressure </=90
- ☐ A score of 2 or more requires an immediate response, with a primary survey (ABCD) assessment followed by a head to toe secondary survey to identify the source of the sepsis

- Inspection of the perineum and/or speculum examination can be conducted if clinically indicated (for symptoms of vaginal discharge, bleeding, pain) and high vaginal swabs taken
- Urinalysis can be performed using and sent for full culture and microscopy if indicative of a urinary tract infection
- Blood will be taken for:
  - ☐ Full blood count, lactate, biochemistry profile, blood culture, malaria
  - ☐ Syphilis and HIV and TB should all be tested for

Management

Within first hour:

- Oxygen
- Fluid resuscitation
- IV antibiotics
- Monitor urine output
- Blood cultures and swabs (urine, high vaginal swabs, throat, wound)
- Blood tests (lactate, urea and electrolytes, liver function tests, malaria, coagulation)

Treat unidentified sepsis with a combination of:

- Ampicillin: 2g IV 6 hourly
- Gentamicin: 5mg/kg IV every 24 hours
- Metronidazole: 500mg IV 8 hourly

Consider:

- Antimalarials
- Heparin for increased clotting risk
- Retained products
- An abscess will require surgical drainage

See Chapter 7 for treatment for specific infections.

Pre-Eclampsia and Eclampsia

The majority of deaths due to pre-eclampsia and eclampsia are avoidable through the provision of timely and effective care to the women presenting with these complications. Pre-eclampsia often starts during pregnancy but onset may occur postnatally. It can occur immediately after birth or up to 15-20 days postnatally.

Management of a woman with an eclamptic fit:

- Place the woman in the left lateral recovery position to prevent aspiration
- Note the time and duration of fit
- Commence medication as per Table 12.4
- Insert a Foley catheter, monitor urine output and maintain strict fluid balance chart
- Restrict fluids to a maximum of 80ml/hour to prevent maternal fluid overload

Table 12.4: Use of drugs

Drug	Dose and route	Continuing dose	Maximum dose	Precautions and contraindications
Magnesium sulphate	Loading dose of 4g should be given IV over 10 minutes	IV infusion of 1 g/hour maintained for 24 hours or 5g IM 4-hourly into alternate buttocks	Recurrent seizures should be treated with a further dose of 1-2g given over 5 minutes	Magnesium toxicity should be observed for and treated
Diazepam (only use if Magnesium Sulphate is not available)	0.15-0.25mg per kg (usually 10-20mg) is given rectally or by IV injection	The dose can be repeated if necessary after 30 to 60 minutes	Maximum total dose 3mg per kg over 24 hours	Severe or acute respiratory depression

Postnatal investigation, monitoring and treatment

In women with gestational hypertension, who have given birth:

- Measure blood pressure daily for the first 2 days after birth
- Measure blood pressure at least once between day 3 and day 5 after birth
- Continue the use of antenatal antihypertensive treatment (Table 12.4)
- Reduce antihypertensive treatment if blood pressure falls below 130/80mmHg
- Antihypertensive drugs may be necessary for up to 6 weeks or until the blood pressure returns to normal parameters
- Women with persisting hypertension and proteinuria after 6 weeks should be provided with further investigation and management

Urinary and faecal incontinence

Definition

The complaint of any involuntary leakage of urine or faecal matter.

Many women suffer from some urinary incontinence in the first few months after birth. But, if it persists, it is important to seek medical advice. Women may also have problems with bowel control after childbirth but many fail to seek treatment and advice due to embarrassment.

Obstetric fistula

- If a woman complains of continuous leakage of urine, it is important to check for vesicovaginal fistula, a hole between the bladder and vagina
- If faecal incontinence occurs or there is faecal matter in the vagina, check for a rectovaginal fistula
- The development of an obstetric fistula has profound effects on both the physical and psychological health of the woman

The most common obstetric fistulas are:

- **Vesicovaginal**: connection between the bladder and vagina
- **Rectovaginal**: connection between the rectum and vagina
- **Ureterovaginal**: connection between the ureter and the vagina

Vesicovaginal fistula

The most common cause of vesicovaginal fistula in low resource settings is obstetric trauma due to prolonged obstructed labour. This present with continuous leakage of urine, often accompanied by ammoniacal dermatitis and foot drop.

Screening for obstetric fistula

Examine the vagina, perineum and anus systematically to check for healing, scar tenderness, sphincter tone, or faecal soiling.

Initial assessment should include:

Vaginal speculum examination to assess the integrity of the anterior and posterior vaginal walls. A small fistula may heal spontaneously with 6 weeks of continuous catheterisation. After a prolonged obstructed labour, a catheter inserted pre-emptively for two weeks may prevent a fistula from forming.

In the absence of spontaneous closure surgical repair will be necessary. Women who have been diagnosed with an obstetric fistula should have a catheter inserted and be referred to a referral centre with specialist healthcare providers.

Chapter 13: Complications in the newborn baby

In this chapter, you will find information about:

- Respiratory distress (breathing difficulties)
- Meconium aspiration
- Neonatal infection
- Neonatal jaundice
- Prevention and management of hypoglycaemia in the newborn
- Hypothermia
- Preterm birth and low birth weight babies
- Kangaroo mother care
- Special treatment needs for newborn babies at risk – HIV/TB/Syphilis
- Care of a newborn baby with birth defects, congenital malformations or birth trauma

Observation of the newborn baby

All newborns that have risk factors should be observed for the conditions listed in Table 13.1. It is essential that all observations are recorded on a basic observations chart and newborns that are unwell are identified early and referred to the appropriate healthcare provider/facility. The table lists the minimum requirements for observation frequency and healthcare providers should use their clinical judgement in each individual case.

Table 13.1: Frequency of newborn observations

Condition	Frequency of observations
Babies born to mothers with one or more risk factors for bacterial infection: ■ Maternal group B streptococcal carriage/infection during current pregnancy (with or without intrapartum antibiotic prophylaxis) ■ Previous affected child with group B streptococcal sepsis ■ Prelabour rupture of membranes (>24 hours) ■ Spontaneous preterm labour (<37 weeks) ■ Intrapartum fever (>38°C) ■ Chorioamnionitis	1 hour, 6 hours, 12 hours of age
Receiving antibiotics for suspected or proven infection.	Observations as above for first 12 hours, then 4 hourly during treatment.
At risk of hypoglycaemia (<37 weeks, <10th centile, infant of diabetic mother)	Observations required before 3 hourly feeds until glucose measurements are stable.
Meconium stained liquor	Observations should be performed at 1 and 2 hours of age and then 2 hourly for a further 10 hours.
Baby requiring resuscitation for birth asphyxia	Hourly for 24 hours
Newborn causing other concerns	Use clinical judgement

Breathing difficulties in the newborn baby

Signs of respiratory distress or breathing difficulties in the newborn baby

Normally, neonatal respiratory rate is between 30 to 60 breaths per minute. Respiratory distress in the newborn is recognised as one or more signs of increased work of breathing:

- Increased respiratory rate >60 breaths per minute
- Nasal flaring
- Chest in-drawing
- Grunting

This may be due to transient tachypnoea of the newborn when the lungs are slow to dry out after birth. This is a self-limiting and benign condition but the baby may require initial support with oxygen. The condition has its onset soon after birth and normally resolves within 24 hours and often sooner. However, other more serious conditions may also present with the same signs.

Treatment

It is essential that newborns with breathing difficulties are referred for further assessment and treatment as soon as possible.

Oxygen is needed in young infants with any of the following:

- Central cyanosis or low oxygen saturations of <92% in room air
- Respiratory distress (respiratory rate >60 respirations per min)

Table 13.2: Method of oxygen administration

Method	Flow and concentration
Nasal prongs	Low = 0.5L/min Moderate = 0.5L-1L/min High = more than 1L/min
Nasal catheter	Low = 0.5L/min Moderate = 0.5L-1L/min High = more than 1L/min

Meconium aspiration in the newborn

Meconium is passed by a newborn soon after birth, before the baby has started to digest breast milk (or formula). In some cases, the baby passes meconium while still inside the uterus. This may happen for non apparent reason or may occur when babies are under stress when the supply of blood and oxygen decreases, often due to problems with the placenta.

Once the meconium has passed into the surrounding amniotic fluid, the baby may aspirate meconium into the lungs. This usually happens while the baby is still in the uterus, when the fetus may take a reflex deep gasp in response to hypoxia. Thick meconium may also block the infant's airways right after birth. There is no specific treatment for meconium aspiration although in severe cases the baby may require prolonged respiratory support. In a baby with respiratory depression at birth, any thick meconium should be aspirated using a Penguin sucker under direct vision. Meconium deeper in the respiratory passages cannot be suctioned and ventilatory support should be commenced without delay.

Management may include:

- Continuous positive airway pressure therapy to keep the baby's lungs inflated +/- mechanical ventilation
- Antibiotics to prevent or treat infection
- Radiant warmer to maintain body temperature
- IV fluids if newborn unable to breastfeed (see Table 13.5)

Neonatal infection

Early identification of newborn infections with prompt and appropriate antibiotic treatment will substantially reduce mortality due to newborn sepsis and pneumonia. Babies with serious infections should be treated with antibiotics and provided with supportive care.

Definition

Early onset sepsis (1-7 days after birth) is due to the infection mostly acquired during delivery.

Many early newborn infections can be prevented by:

- Avoiding unnecessary separation of the newborn from the mother
- Handwashing before delivering and handling the infant
- Avoiding unnecessary vaginal examinations in labour
- Appropriate umbilical cord care

Late onset sepsis (after seven days) can be acquired at the hospital or at home.

Many late onset newborn infections can be prevented by:

- Exclusive breastfeeding
- Strict procedures for handwashing or alcohol hand rubs for all staff and for families before and after handling infants
- Using kangaroo mother care rather than incubators for stable preterm infants
- Strict sterility for all procedures
- Clean injection practices
- Removing intravenous drips as soon as they are no longer necessary

Risk factors for infection:

- Membranes ruptured >18 hours before delivery
- Mother had a fever of >38°C before delivery or during labour
- Amniotic fluid that is foul smelling or purulent Group B haemolytic streptococcus vaginal colonisation

Causes of neonatal infection

- Preterm prelabour rupture of membranes
- Dehydration
- Infected cord insertion
- Pneumonia
- Urinary tract infection
- HIV

Clinical observations and symptoms indicating infection

The following are all signs of severe infection and/or sepsis. If one or more signs present, provide emergency stabilising treatment refer for further examination and management. Most babies with sepsis will have a fever (temperature >37.5°C) BUT this is not always the case. The baby can also be cold (temperature <36°C) when very ill. Chart all observations on a chart for early identification and treatment of sepsis.

- Fever >37.5°C
- Low temperature <36°C
- Respiratory rate less than 20 per minute or apnoea (cessation of breathing for >15 seconds)
- Respiratory rate greater than 60 per minute

Presentation of signs of infection

- Unable to breastfeed
- Bulging anterior fontanelle
- Convulsions
- Drowsy or unconscious
- High pitched cry
- Grunting
- Severe chest in-drawing
- Central cyanosis
- Mottled skin
- Generalized body stiffness
- Deep jaundice
- Severe abdominal distension
- Severe skin pustules

Signs of localised infections

- Less than 10 skin pustules
- Redness extending to the peri-umbilical area
- Umbilicus draining pus
- Oral thrush
- Eye discharge

Management

It is essential that antibiotics are given after the baby has been reviewed and prescribed antibiotics by the appropriate cadre of healthcare provider. Most drugs in babies are dosed according to body weight (mg/kg). Refer to local paediatric guidelines or World Health Organization country specific guidelines for dosage and frequency of medication.

Prophylactic antibiotics for infants at risk of infection

- Ampicillin IM or IV and gentamicin for at least two days
- After two days, the newborn should be reassessed and treatment continued only if there are signs of sepsis or a positive blood culture

Antibiotics for suspected neonatal sepsis

- Babies with signs of sepsis should be treated with ampicillin (or penicillin) and gentamicin as the first line antibiotic treatment for at least 10 days.
- If a baby with sepsis is at greater risk of staphylococcus infection (e.g. extensive skin pustules, abscess, or omphalitis in addition to signs of sepsis), they should be given cloxacillin and gentamicin instead of penicillin and gentamicin.
- Where possible, blood cultures should be obtained before starting antibiotics.
- If an infant does not improve in two to three days, antibiotic treatment should be changed, or the infant should be referred for further management.

Table 13.3: Antibiotic treatment for infections in newborns

Antibiotic	Dose
Amoxycillin	IM/IV: 50mg/kg every 12 hours
Gentamicin	Low birth weight infants: IM/IV 3mg/kg once a day Normal birth weight: IM/IV 5mg/kg once a day

Newborns identified with clinical severe infection whose families do not accept or cannot access hospital care should be managed in outpatient settings by an appropriately trained healthcare worker with one of the two following regimens:

- Gentamicin IM 5-7.5mg/kg (for low birth weight newborns Gentamicin IM 3-4mg/kg) once daily for seven days and twice daily oral amoxicillin, 50mg/kg per dose for seven days. Close follow-up is essential.
- Gentamicin IM 5-7.5mg/kg (for low birthweight newborns gentamicin 3-4mg/kg) once daily for two days and twice daily oral amoxicillin, 50mg/kg per dose for seven days. Close follow-up is essential. A careful assessment of the child on day 4 is mandatory for this option in order to determine if the child is improving.

Ophthalmia Neonatorum

Ophthalmia neonatorum refers to any conjunctivitis occurring in the first 28 days of life. It is most commonly infective in origin. Bacterial causes include Neisseria gonorrhoeae; Chlamydia trachomatis, Staphylococcus aureus, Streptococcus pneumoniae. Less frequently, there may be viral causes, notably due to herpes simplex virus. **All** infections require treatment.

In most cases, ophthalmia neonatorum is a mild illness. The exception is infection due to gonococcal infection, which can progress rapidly to cause corneal damage and permanent visual impairment. This may also cause systemic complications.

Diagnosis

- Red eyes
- Discharge
- Photo-sensitivity

The majority of newborn babies presenting with a sticky discharge have a benign cause, most frequently due to blocked nasolacrimal duct(s).

Features suggestive of gonococcal involvement include:

- Conjunctival redness, especially if the bulbar conjunctiva (overlying the sclera) is involved
- Onset is sudden and severe
- Both eyes are affected

Summary

- Use universal precautions to prevent neonatal infections
- Risk factors are maternal infection, prolonged rupture of membranes, small-for-age, asphyxia, hypothermia
- Know the danger signs
- Discriminate between localized and generalized infection and treat appropriately
- Identify newborn babies at risk of congenitally transmitted infections

Management

- Show the mother how to wash the eyes with water and to put ointment into the eyes
- The mother must wash her hands before and after doing so
- Tell the mother to wash the eyes and administer eye ointment four times a day for 5 days
- Give the mother a tube of tetracycline or chloramphenicol eye ointment to treat the child
- Review 48 hours after starting treatment if the child is not improving

Severe conjunctivitis (a lot of pus and/or swelling of the eyelids) is often due to gonococcal infection

- Treat as inpatient, as there is a risk of blindness, and twice daily review is required
- Wash the eyes to clear as much pus as possible
- Give ceftriaxone (50mg/kg up to a maximum total dose of 150mg

Swollen, red eyelids with pus

- Give ceftriaxone: 50mg/kg up to a maximum total dose of 150mg
  OR
- Kanamycin: 25mg/kg up to a maximum total dose of 75mg IM once, according to national guidelines
- Use as described above: tetracycline eye ointment or chloramphenicol eye ointment
- Treat the mother and her partner for sexually transmitted infections: amoxicillin, spectinomycin or ciprofloxacin for gonorrhoea and tetracycline for Chlamydia, depending on the resistance pattern in the country

Congenital syphilis

Clinical signs

- Often low birth weight
- Palms and soles: red rash, grey patches, blisters or skin peeling
- 'Sniffles': infectious rhinitis with nasal obstruction
- Abdominal distension due to enlarged liver and spleen
- Jaundice
- Anaemia

Some very low birth weight babies with syphilis have signs of severe sepsis with lethargy, respiratory distress, skin petechiae or other bleeding. If you suspect syphilis, do a venereal disease research laboratory test (VDRL).

Management

- Asymptomatic newborn babies born to women who test positive test for syphilis should receive 37.5mg/kg (50,000U/kg) of benzathine benzylpenicillin in a single IM dose
- Symptomatic infants should be treated with:
  - ☐ Procaine benzylpenicillin at 50mg/kg as a single dose by deep IM injection daily for 10 day
    OR
  - ☐ Benzylpenicillin at 30mg/kg every 12 hours IV for the first 7 days of life and then 30mg/kg every 8 hours for a further 3 days

Treat the mother and her partner for syphilis and check for other sexually transmitted infections.

Neonatal jaundice

Definition

Raised total serum bilirubin.

There may be yellow coloration of skin, mucous membranes and sclerae. Clinical recognition and assessment of jaundice can be difficult, particularly in babies with darker skin tones.

More than 50% of normal newborn babies and 80% of preterm infants have some degree of jaundice. Jaundice may be normal (physiological) or abnormal (pathological). Physiological jaundice (due to immaturity of the liver unable to process red cell aheomlysis after birth) does not need treatment. Continue breastfeeding even when the baby is sleepy. Jaundice may be prolonged in breastfeeding babies but again, this does not normally require treatment. Pathological jaundice needs treatment of the underlying cause(s) and may need phototherapy or exchange transfusion.

In young babies, unconjugated bilirubin can penetrate the membrane that lies between the brain and the blood (the blood–brain barrier). Unconjugated bilirubin is potentially toxic to neural tissue (brain and spinal cord). Entry of unconjugated bilirubin into the brain can cause both short-term and long-term neurological dysfunction (bilirubin encephalopathy). The term kernicterus is used to denote the clinical features of acute or chronic bilirubin encephalopathy, as well as the yellow staining in the brain associated with the former. The risk of kernicterus is increased in babies with extremely high bilirubin levels. Kernicterus is also known to occur at lower levels of bilirubin in term babies who have risk factors, and in preterm babies.

Physiological Jaundice

- The baby is generally otherwise completely well
- Onset on day 3 after birth
- Disappears within 2 weeks
- Common in babies, especially in preterm babies

Actions

- Educate the mother/caregiver to watch out for danger sign
- Continue breastfeeding until the baby looks and feeds well

Pathological Jaundice

- Jaundice starts on the first day of life
- Jaundice lasts longer than 14 days in term newborn babies, 21 days in preterm infants
- Jaundice accompanied with fever or other signs of illness
- Deep jaundice: palms and soles of the newborn are deep yellow

Actions

- Look for the cause and treat accordingly

Causes of Pathological Jaundice

- Serious bacterial infection
- Blood group (Rhesus and ABO) incompatibility
- Congenital syphilis
- Intrauterine infection
- Liver disease, hepatitis

Management

Management of jaundice is based on the level of serum Bilirubin. Newborns who need treatment should be referred to an appropriate healthcare facility and treated with phototherapy (see Table 13.4).

Table 13.4: Serum Bilirubin treatment levels

	Phototherapy			
	Healthy term baby		Preterm or any risk factor	
Day	mg/dl	mmol/L	mg/dl	mmol/L
1	Any visible jaundice		Any visible jaundice	
2	15	260	13	220
3	18	310	16	270
>4	20	340	17	290

Neonatal hypoglycaemia

Definition

This occurs when the blood glucose level is below 2.6mmol/L (45mg/dl) irrespective of gestation and postnatal age.

Diagnosis

Neonatal hypoglycaemia may be asymptomatic especially in preterm babies. Signs and symptoms include:

- Jitteriness
- Sweating
- Convulsions
- Apnoea
- Cyanosis
- Hypotonia

Risk factors associated with hypoglycaemia

- Prematurity (<37 weeks)
- Low birth weight (<2.5kg at birth)
- Intrauterine growth restriction
- Baby of diabetic mother
- Temperature Instability
- Systemic Infection

Prevention and management of hypoglycaemia in babies

- Promote skin-to-skin contact and early breastfeeding, ideally within the first hour.
- Use of ongoing skin-to-skin contact to support thermal control and breastfeeding.
- Support mothers to recognise signs of willingness for feeding (such as rooting, lip licking, hands moving to mouth, arm and leg movements, eye rolling prior to waking).
- Encourage frequent feeds, at least 3 hourly, but more frequently if baby is showing signs of hunger.
- Support breastfeeding mothers to recognise signs of effective positioning and attachment and signs of effective feeding, at each feed.
- Support formula feeding mothers to develop an effective technique for bottle feeding, ensuring adequate volume of intake to maintain blood glucose at an acceptable level. At least three hourly feeds are required.

Management of hypoglycaemia

- Blood glucose less than 1.1mmol/L (25mg/dl).
- Give a bolus of 2ml/kg body weight of 10% glucose IV slowly over five minutes.
- If an IV line cannot be established quickly, give 2ml/kg body weight of 10% glucose by gastric tube.
- Infuse 10% glucose at the daily maintenance volume according to the baby's age.
- Assess the blood glucose 30 minutes after the bolus of glucose.
  - ☐ If the blood glucose is less than 1.1mmol/L (25mg/dl), repeat the bolus of glucose (above) and continue the infusion then assess blood glucose again after 30 minutes.
  - ☐ If the blood glucose is between 1.1mmol/L (25mg/dl) and 2.6mmol/L (45mg/dl) continue the infusion and repeat the blood glucose testing every three hours until the blood glucose is 2.6mmol/L (45mg/dl) or more on two consecutive tests.
  - ☐ Allow the baby to breastfeed. As the baby's ability to feed improves, slowly decrease (over a three-day period) the volume of IV glucose while increasing the volume of oral feeds. Do not discontinue the glucose infusion abruptly.

Blood glucose between 1.1-2.6m/mmol/L (25-45mg/dl)

- If the blood glucose is between 1.1mmol/L (25mg/dl) and 2.6mmol/L (45mg/dl), allow the baby to breastfeed and repeat the blood glucose testing every three hours until the blood glucose is 2.6mmol/L (45mg/dl) or more on two consecutive tests.
- Once the blood glucose is 2.6mmol/L (45mg/dl) or more for two consecutive tests:
  - ☐ If the baby cannot breastfeed, give expressed breast milk using an alternative feeding method.

Frequency of blood glucose measurements after blood glucose returns to normal

- If the baby is receiving IV fluid for any reason, continue blood glucose testing every 12 hours for as long as the baby requires IV fluid. If the blood glucose is less than 2.6mmol/L (45mg/dl), treat as described above.
- If the baby no longer requires or is not receiving IV fluid, assess blood glucose every 12 hours for 24 hours (two more tests):
  - ☐ If the blood glucose remains normal, discontinue testing.

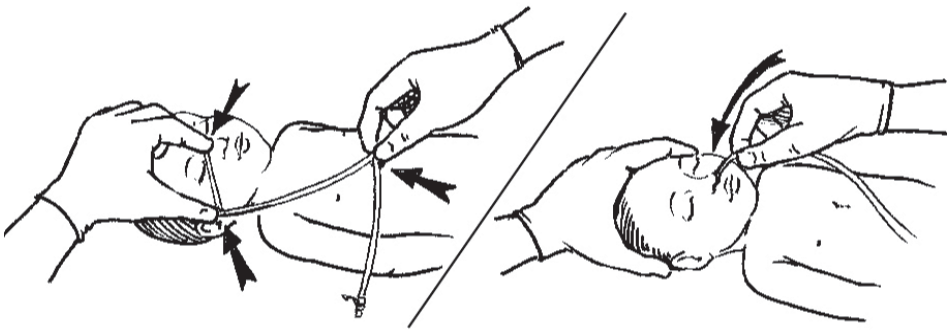
Nasogastric Feeding and IV Fluids

If a newborn is unable to feed orally, give expressed breast milk by nasogastric tube.

Insertion of a Nasogastric Tube

- Hold the tip of the tube against baby's nose.
- Measure distance from nose to earlobe, then to epigastrium. Mark tube at this point.
- Hold baby firmly.
- Lubricate tip with water. Pass it directly into one nostril, pushing slowly.
- The tube should pass easily down into stomach without resistance.
- When the measured distance is reached, affix the tube with tape at nose.

Figure 13.1: Insertion of a nasogastric tube



Aspirate a small amount of stomach contents with a syringe to confirm tube is in place (check that it turns **blue litmus** paper **pink**). If no aspirate is obtained, inject air down the tube and listen over the abdomen with a stethoscope. If in doubt about the location of tube, withdraw and start again. When the tube is in place, affix a 20ml syringe (without the plunger) to end of tube. Pour food or fluid into syringe, allowing it to flow by gravity.

IV fluids should be given in the following acute phase in newborn:

- If there is bowel obstruction, necrotizing enterocolitis, or the feeds are not tolerated, e.g. indicated by increasing abdominal distension or vomiting everything
- In infants who are lethargic, unconscious or having frequent convulsions

If IV fluids are given:

- Reduce the rate as the volume of oral or gastric milk feeds increases. IV fluids should ideally be given with an inline burette to ensure the exact doses of fluids prescribed
- It is essential that these infants are referred for specialist assessment and treatment. For the first 24 hours, 10% dextrose should be used
- After this period, the newborn will need specially prepared IV fluids

Table 13.5: Administration of IV fluids to a newborn

Day	ml/kg/day
1	60
2	80
3	100
Then slowly increase to 150ml/kg per day.	

Congenital malformations

Definition

Developmental abnormalities present at birth.

Diagnosis

All babies should be examined soon after birth to screen for congenital abnormalities (see Chapter 10).

In all cases of birth defects:

- Counsel parents in all cases
- Counsel both parents at the same time wherever possible
- Have the most qualified healthcare provider talk to the parents
- Ensure honesty, sensitivity and empathy is shown by all staff
- Parents should be shown any obvious defect on the baby and the implications explained to them
- Current and future management should be discussed
- Link with any community support groups should be made

Life threatening conditions

These include:

- Gastrointestinal obstruction e.g. tracheoesophageal fistula, upper gastrointestinal atresian, imperforate anus
- Severe cardiac defects
- Diagphragmatic hernia
- Chromosomal disorders, e.g. Trisomies 13 and 18
- Renal agenesis with pulmonary hypoplasia

Prevention

- Avoid unnecessary drugs and x-rays in pregnancy
- To reduce the risk of spina bifida, encourage the use of folate 400µg daily before pregnancy, encourage an adequate diet at all times

Oesophageal Atresia and Tracheoesophageal Fistula

This occurs when there is atresia of oesophagus with connection of the oesophagus to the trachea. This is a life-threatening condition.

Symptoms

- Copious amounts of mucus from the mouth
- Baby turns blue when feeding is attempted

Management

- Do not continue to try to feed baby, but start IV fluid
- Attempt to pass nasogastric tube and suction gently
- Refer to a tertiary hospital or specialised centre for further management

Imperforate anus

- Absent anal orifice
- Failure to pass meconium within 24 hours
- Diagnosed on inspection and subsequent failure to insert a thermometer into the anal canal

Management

- Establish an IV line, and give only IV fluid at maintenance volume according to the baby's age
- Keep the baby nil by mouth
- Insert a nasogastric tube and ensure free drainage
- Urgently refer the baby to an appropriate healthcare facility for surgery

Exomphalos and Gastrosceisis

These conditions occur when the abdominal wall does not close fully. With exomphalos there is herniation of bowel into the umbilical cord with bowel covered by a thin sac whereas gastrocseisis there is a separate abdominal wall defect with exposed gut. With Exomphalos there may be associated genetic deftects, e.g. Trisomies 13, 18 or 21.

Management

Exomphalos

- The baby can be fed with breast milk
- Cover with warm sterile saline gauze to reduce fluid and heat loss and to give a degree of protection
- Keep gauze moist at all times, and ensure that the baby is kept warm
- Refer the baby urgently to a tertiary hospital or specialised centre for surgery

Gastroschisis

- Cover with warm sterile saline gauze to reduce fluid and heat loss
- Establish an IV line and give IV fluid only at a maintenance volume according to the baby's age
- Start antibiotic treatment
- Insert a nasogastric tube, and ensure free drainage
- Refer the baby urgently to a tertiary hospital or specialised centre for surgery

Spina bifida

This occurs when there is a defect in the vertebral column.

Management

If the defect is not covered by skin:

- Cover with sterile gauze soaked in sterile normal saline
- Keep the gauze moist at all times and ensure that the baby is kept warm
- If ruptured, give Benzylpenicillin 50,000units/kg 12 hourly and Gentamicin 5mg/kg daily for 5 days

Refer the baby to a tertiary hospital or specialized centre for further evaluation or surgical care.

Cleft lip and palate

There is a defect in the upper lip that may be accompanied by a defect in the palate.

Management

- The mother needs to be told that feeding is important to ensure adequate growth until surgery can be performed
- Show the mother how to feed the baby with breast milk
  - Note that babies with minor clefts can breastfeed
  - However, those with bilateral clefts must be fed by cup and spoon
- Take care to prevent aspiration
- Refer to a tertiary hospital or special centre for surgery

Talipes equinovarus

This is a deformity of the foot where the ankle is turned downwards and the front part of the foot is turned inwards. This may be known as “club foot”.

Management

Refer as the baby will need a plaster cast to correct the growth of the foot. Regular follow-up visits will be needed.

Hydrocephaly

This occurs when there is an unusually large head arising from blockage in the free flow of cerebrospinal fluid in the ventricular system. It is diagnosed antenatally by ultrasound scan or at the newborn examination after birth.

Diagnosis

Babies born with hydrocephalus (congenital) often have distinctive physical features.

These can include:

- An unusually large head (>37cm)
- A thin and shiny scalp with easily visible veins
- A bulging or tense fontanelle (the soft spot on top of a baby's head)

Management

- Monitor head circumference
- Refer to a tertiary level hospital or specialised centre early for surgical cerebrospinal fluid drainage

Down's syndrome

Down's syndrome is caused by a random error in cell division that results in the presence of an extra copy of chromosome 21. In the majority of cases, the error occurs randomly during the formation of an egg or sperm.

Diagnosis

Newborns that have Down's Syndrome often have distinctive physical features:

- Floppiness (hypotonia)
- Eyes that slant upwards and outwards
- A small mouth with a protruding tongue
- Flat bridge of nose
- A flat back of the head
- Below average weight and length at birth
- The palms may have only one horizontal crease
- There may be accompanying congenital abnormalities including cardiac defects or duodenal atresia

Management

- Babies with Down's syndrome may need additional support with breastfeeding due to poor muscle tone and a protruding tongue.
- All children with Down's syndrome have some degree of learning disability and delayed development, but this varies widely between individual children. Children with Down's syndrome may be slower to learn skills such as sitting, standing, walking and talking. They will develop these skills but it will occur at a slower than normal rate.

Preterm birth and low birth weight

Low birth weight is defined as a weight between 1.5-2.5kg. Babies <2.5kg can usually be managed safely at home with some extra care and support.

Very low birth weight

Newborn babies with a birth weight less than 1.5kg are classified as very low birth weight. Suckling, swallowing and breathing are not well coordinated, so these babies require special attention in order to feed them adequately and safely. Very low birth weight babies also have great difficulty in maintaining their body temperature, so they are at increased risk of hypothermia. These babies need care in a high dependency newborn unit and should be referred immediately to a hospital with high dependency facilities for very small babies.

Characteristics of preterm and low birth weight babies

- The nervous system is not yet well developed
- There is little fat under the skin; especially brown fat which is found mainly over the shoulders, back, kidneys, neck and armpits and is very important to generate heat for the newborn baby
- Tend to lie still so the baby cannot generate heat by moving much
- There is a high ratio of surface area to body weight compared to that of a child or adult, so lose heat quickly from their skin
- Immature lungs, breathing problems
- Low immunity, extra vulnerable to infection
- Weak and unable to feed well

Low birth weight babies are more at risk of:

- Breathing problems
- Hypothermia
- Sepsis
- Feeding difficulties/hypoglycaemia
- Jaundice
- Bleeding

Table 13.6: Classification of newborn babies according to birth weight and gestational age

Birth weight and gestational age	Classification	Management
Weight <1.5kg	Very low birth weight	Refer urgently to a hospital with NICU facilities, making sure to keep the newborn baby warm on the journey.
Gestational age <32 weeks	Very preterm	Keep the baby warm and refer it urgently to a hospital.
Weight 1.5-2.5kg	Low birth weight	If there is no other problem, counsel on optimal breastfeeding, prevention of infection and keeping the newborn baby warm.
Gestational age 32-36 weeks	Preterm	Treat as above for low birth weight newborns.
Weight >2.5kg; gestational age ≥37 weeks	Normal weight and full term	Treat as above for low birth weight and preterm newborns.

Hypothermia

Definition

Normal axillary temperature is 36.5-37.5°C. In hypothermia, the temperature is below 36.5°C.

- Cold stress 36.0°C to 36.4°C
- Moderate hypothermia 32.0°C to 35.9°C
- Severe hypothermia <32°C

All newborn babies but particularly those born preterm have difficulty in maintaining their body temperature. Babies very easily lose heat leading to hypothermia which may become life threatening.

Recording temperature

- Axillary temperature is as reliable as rectal and probably safer (less risk of injury or infection).
- Axillary temperature: Place the bulb of thermometer against the roof of dry axilla, free from moisture. Hold the baby's arm close to the body to keep thermometer in place. The temperature is read after three minutes.
- Rectal temperature: Do not use this method for routine monitoring. However, it is the best guide for core temperature in cold (hypothermic) sick newborn babies. It is recorded by inserting the greased bulb of the thermometer backwards and downwards to a depth of 3cm in a term baby (2 cm in a preterm baby). Keep the thermometer in place at least for 2 minutes.

Factors leading to hypothermia

Hypothermia may be caused by environmental factors, sepsis, intracranial haemorrhage or a combination of these. The risk factors for hypothermia include:

- Maternal hypertension
- Caesarean delivery
- Low birth weight
- Low Apgar scores

Prevention of hypothermia

- Hypothermia can be prevented by immediately drying and then putting the baby in **skin-to-skin contact** with the mother. The baby's **head** needs to be well covered, because more than 90% of the heat loss is through the head if it is left uncovered
- Preterm very low birth weight infants also benefit from a polyethylene occlusive wrapping at the time of delivery
- A newborn baby exposed for resuscitation or observation should be placed under a radiant warmer to prevent radiant losses
- Sick newborn babies should be maintained in a neutral thermal environment to minimize the metabolic rate
- **Delay bathing** for at least 24 hours after delivery and use warm water

Kangaroo Mother Care

Definition

Kangaroo mother care has been shown to be an extremely effective method of caring for sick term babies, preterm and low birth weight babies. It involves holding the baby in skin-to-skin contact on the chest of the mother (or another responsible person if the mother is unable to do it all the time) for variable periods of time, ideally constantly.

Evidence shows that using kangaroo mother care to support preterm and low birth weight newborns results in greater stability of the newborn baby's heart rate and breathing, lower rates of infection and increased weight gain. In the mother, it results in increased breast milk supply and she is more likely to succeed in exclusive breastfeeding.

Benefits

- **Breastfeeding**: Kangaroo mother care increases breastfeeding rates in addition to increasing the duration of breastfeeding.
- **Thermal control**: Prolonged skin-to-skin contact between the mother and her baby provides effective temperature control and reduces the risk of hypothermia.
- **Early weight gain**: Tiny newborn babies gain more weight when receiving kangaroo mother care when cpmpared to those not receiving kangaroo mother care.
- **Less morbidity**: Newborns receiving kangaroo mother care have more regular breathing and are less likely to stop breathing and it reduces risk of infections.
- **Reduced oxygen requirement**.

The healthcare provider needs to explain kangaroo mother care to the mother and follow the steps below:

- Make sure the room is warm
- Request the mother to sit or recline comfortably
- Undress the baby gently, except for a hat, nappy and socks
- Place the baby lying flat, facing the mother's chest in an upright and extended posture, between the mother's breasts, in skin-to-skin contact
- Turn the baby's head to one side to keep the airways clear
- Cover the baby with the mother's shawl, or gown; wrap the newborn baby and mother together with an added blanket, and put a cap on the newborn's head
- Breastfeed the baby frequently, at least 8-12 times a day
- Aim to keep the newborn baby in this position for 24 hours every day except for brief breaks

The mother should be informed that the newborn should stay in kangaroo mother care continually except for hygiene, cord care and neonatal examinations.

At every postnatal assessment:

- Count the newborn baby's respiratory rate and make sure the respiratory rate is <60 breaths/min
- Observe that the newborn is breastfeeding optimally
- Measure the newborn's axillary temperature and make sure it is normal, i.e. >36.5°C

Kangaroo mother care should continue for as long as possible, or until the baby's age reaches the equivalent of term (40 weeks) or the weight reaches 2.5kg. However, if the newborn weighs >1.8kg and can maintain a stable temperature, there are no respiratory problems and the newborn is feeding well, it can be safely weaned from kangaroo mother care before 40 weeks.

Chapter 14: Mental health problems during and after pregnancy

In this chapter, you will find information about:

- Screening for mental health: changes in feelings and emotions, worry, fear and difficulty
- Initial management of depression, suicidal ideation and psychosis
- Screening and support for women who report domestic violence
- Support for women who have had an adverse event during or after pregnancy

Pregnant women, as all people, may suffer from all manner of mental health problems. However, there may be particular consequences if mental illness is not managed well both during and after pregnancy.

Mental health problems during and after pregnancy can have serious consequences for the health and wellbeing of a mother and her baby, and other family members.

The birth of a new baby can sometimes place stress on relationships. The transition to becoming a parent can be challenging and may often involve the loss of control and disruption to relationships.

Women with mental health problems may feel stigmatised and can sometimes avoid engagement with healthcare providers. Newborn babies are dependent on their mothers for breastfeeding, physical care, comfort and social interaction. The development of the newborn baby is compromised if a mother is unresponsive to the baby's behavioural cues and needs.

In low- and lower-middle-income countries, maternal depression is associated with higher rates of malnutrition and stunting, diarrhoeal diseases, infectious illnesses, hospital admissions, lower birth weight and reduced completion of immunisation schedules among infants.

Women with mental health problems during and after pregnancy should have the opportunity to make informed decisions about their care and treatment in partnership with their healthcare providers. Good communication between healthcare providers and women, and if appropriate, their husbands/partners, and family is essential. The treatment, care and information women are given regarding mental health problems needs to be culturally appropriate.

Screening for mental health problems

Many women experience mental health problems during pregnancy, often undiagnosed and unsupported. Up a fifth of pregnant women experience serious feelings of stress, anxiety or depression. Some women who experience postnatal depression will also have experienced antenatal depression, and similarly postnatal anxiety is often preceded by antenatal anxiety.

Through screening, it is possible to identify women who are depressed. The healthcare provider can ask a series of questions to explore whether women may have, mental health problems. Women can then be referred and assessed by a specialised healthcare provider.

It is important that the healthcare provider understands that women who have mental health problems may be:

- Unwilling to disclose or discuss their problem because of fear of stigma, and negative perceptions of them as a mother
- Reluctant to engage with the healthcare provider

Whooley questions for depression screening

The Whooley questions offer a relatively quick and convenient way of screening for healthcare providers who are not specialists in mental health. The questions are a screening tool which is designed to try and identify two symptoms that may be present in depression (see Appendix 4).

Healthcare providers can ask:

- Two questions at a woman's initial contact with maternity services
- Twice more during pregnancy, at the postnatal first contact
- At six weeks' postnatal

1. **"During the past month, have you often been bothered by feeling down, depressed or hopeless?"**
2. **"During the past month, have you often been bothered by little interest or pleasure in doing things?"**

A third question should be considered if the woman answers 'yes' to either of the initial questions:

3. **"Is this something you feel you need or want help with?"**

Answering yes to one or both questions means that the woman requires further evaluation. If the woman answers no to both questions it means that she is not depressed. The Whooley questions cannot be used to diagnose or measure the severity of depression. After identifying a possible mental disorder in a woman during pregnancy or the postnatal period, further assessment should be considered in consultation with colleagues, if necessary. Women should be advised that they can access care at any stage if they feel they need help with their mental health.

Edinburgh Postnatal Depression Scale

The Edinburgh Postnatal Depression Scale (see Appendix 5) is a questionnaire originally developed to assist in identifying possible symptoms of depression in the postnatal period. It also has adequate sensitivity and specificity to identify depressive symptoms in the antenatal period and is useful in identifying symptoms of anxiety. The Edinburgh Postnatal Depression Scale is not a diagnostic tool; rather it is a screening tool that aims to identify women who may benefit from follow-up care, such as a further mental health assessment, which may lead to a diagnosis based on accepted diagnostic criteria.

The Edinburgh Postnatal Depression Scale is a 10-item questionnaire. Women are asked to answer each question in terms of the past seven days. A score is calculated by adding the individual items as indicated below for each question (note that some items have reversed scoring). Complete the Edinburgh Postnatal Depression Scale at least once, preferably twice, in both the antenatal period and the postnatal period (ideally 6-12 weeks after the birth).

A total score of 13 or more means that there is a need for follow-up to assess if there are possible depressive symptoms. Scores may be influenced by several factors, including the woman's

understanding of the language used, their fear of the consequences if depression is identified, and differences in emotional reserve and perceived degree of stigma that is associated with depression.

Healthcare providers can:

- Recognise that some women may experience difficulties with the mother-baby relationship
- Assess the nature of this relationship, including verbal interaction, emotional sensitivity and physical care during the postnatal visits
- Offer help, advise and support when required

If a woman discloses thoughts of self-harm or suicide:

- Assess whether the woman has adequate social support and is aware of sources of help
- Arrange help appropriate to the level of risk
- Inform all relevant healthcare providers
- Advise the woman, her husband/partner and family to seek further help if the situation deteriorates

Postnatal mood changes

After birth is a recognised time for the development of serious mood disorders and depression, these include:

- Postnatal blues
- Postnatal depression
- Puerperal (postnatal) psychosis

Each of these have a different clinical presentation, and management which are outlined in Table 14.1 below.

Table 14.1: Postpartum Affective Disorders: Summary of Onset, Duration and Treatment

Disorder	Prevalence	Postpartum Onset	Duration	Treatment
Blues	30-75%	Within days of birth	3 or 4 days	No treatment required other than reassurance
Postpartum Depression	10-15%	Weeks – months	Variable but maybe many months	Treatment usually required
Puerperal Psychosis	0.1-0.2%	Rapid onset within days to weeks	Variable but maybe many months	Hospitalisation usually required

Postnatal blues

Many women go through a period of mild depressed mood following the birth of a baby. There is a need to differentiate between postnatal 'blues' (feeling down) which usually occur in the first week and can last up to two weeks after birth, and postnatal depression which is more severe and usually lasts for a much longer period.

Symptoms

- Crying readily
- Low mood
- Feeling inadequate
- Lacking motivation
- Experiencing disturbed sleep
- Lack of or increased appetite

Management

Postnatal blues are usually mild, last for a short period and do not require treatment other than reassurance, the symptoms usually stop within a few days.

Postpartum (or postnatal) depression

Depression can vary from mild to severe and it can affect women in different ways. Many women may not realise they are suffering with postnatal depression.

Postnatal depression can start any time in the first year after giving birth.

Symptoms

- A persistent feeling of sadness and low mood
- Loss of interest in life, no longer enjoying things that used to give pleasure
- Lack of energy and feeling tired all the time
- Trouble sleeping at night and feeling sleepy during the day
- Difficulty bonding with the baby
- Withdrawing from contact with other people
- Difficulties with concentration and making decisions
- Low self confidence
- Poor appetite or an increase in appetite ('comfort eating')
- Feeling very agitated or, alternatively, very apathetic
- Feelings of guilt and self-blame
- Thinking about self-harm or suicide

Management

Postnatal depression can be treated. It is a temporary illness from which recovery is expected with appropriate treatment and support. The treatment is likely to depend on how severe the depression is. Postnatal depression can be distressing and frightening for the woman, her partner and family, but support and effective treatments are available.

These include:

- **Self-help**: The woman can talk to her family and friends about her feelings and what they can do to help; making time for herself, resting and getting as much sleep as possible, regular exercise and eating healthily.
- **Psychological therapy**: Refer to a specialist for a course of counselling or cognitive behavioural therapy.
- **Antidepressants**: Antidepressant medication that is safe to use whilst pregnant and breastfeeding is available.

Support

- Women who feel depressed need emotional support.
- The healthcare provider can reassure them that this is usually a temporary condition due to the physical and hormonal changes taking place in the body.
- It sometimes helps if women know that feeling depressed following the birth of a baby is normal and many women experience these feelings.
- The healthcare provider can discuss the situation with the woman's family and explain to them the need for extra support at this time.
- Verify that the mother and the newborn are getting the care they need.

Puerperal psychosis

Puerperal psychosis should be considered to be a medial emergency requiring specialist management. There is a high chance of a woman suffering from this disorder losing her life to suicide if untreated.

Puerperal (or postpartum) psychosis affects between 1 and 2 in 1000 postnatal women Puerperal psychosis can occur in women with no previous psychiatric history although past and family history add to the risk of occurrence.

The most significant risk factors for postpartum psychosis are a personal or family history of bipolar disorder, or a previous psychotic episode. The risk of recurrence in subsequent pregnancy is thought to be 50%.

Risk factors

- Previous history
- Family history of bipolar disorder
- Previous psychotic episode

Definition

Postpartum psychosis: Psychosis often with mania and/or depressive symptoms in the immediate postnatal period, which can become very severe. The clinical onset is rapid. Symptoms usually appear in the first 48-72 hours (2-3 days) postpartum, and the majority of episodes develop within the first 2 weeks after delivery. Puerperal psychosis differs from postpartum depression in aetiology, severity, symptoms, treatment and outcome. Puerperal psychosis is the most severe form of postnatal depression. Puerperal psychosis is a psychiatric emergency. The woman should receive help as quickly as possible.

Symptoms

- Depressed or elated mood (which can fluctuate rapidly)
- Disturbed behaviour
- Confusion
- Delusions, hallucinations, beliefs in fantasy or illusions
- Inability to sleep

It can take 6-12 months or more to recover from puerperal psychosis. The most severe symptoms tend to last between 2 to 12 weeks. However, with good medical management and support, the vast majority of women will recover fully.

Management

Women with psychosis require constant observation until stabilised and urgent referral for specialist treatment with determination of the most appropriate medication. This usually includes an antipsychotic and/or mood stabiliser. Women who require inpatient care for depression or puerperal psychosis should ideally be admitted to a healthcare facility where specialist psychological and/or psychiatric care can be provided. Women with severe mental illness can be encouraged to breastfeed unless they are taking a medication that is unsafe to use whilst breastfeeding.

Domestic violence

Definition

Any incident or pattern of incidents of controlling, coercive, threatening behaviour, violence or abuse between those aged 16 or over who are, or have been, intimate partners or family members.

The abuse can encompass, but is not limited to:

- Psychological
- Physical
- Sexual
- Financial
- Emotional

A woman who is experiencing domestic violence may have difficulty accessing antenatal and postnatal care services. The perpetrator of the abuse may try to prevent her from attending appointments or may insist in attending with her in order to control what she says. The woman may in any case be afraid that disclosure of the abuse to a healthcare provider for fear of worsening her situation.

Domestic violence during pregnancy

Domestic violence is more common during pregnancy and has been found to be associated with fatalities and adverse health outcomes for the pregnant woman and her baby due to the direct trauma of violence to a pregnant woman's body, as well as the physiological effects of stress from current or past violence on fetal growth and development.

Injuries resulting from domestic violence during pregnancy may include:

- Broken bones, cuts, burns, bruises, broken teeth
- Domestic violence may be focused on the abdomen during pregnancy
- Abused pregnant women also report that their partners target other body parts, such as their buttocks, breasts, genitals, head and neck and extremities

Risks to the mother and her fetus

Domestic violence during pregnancy can result in a number of adverse outcomes including:

- Intrauterine growth retardation
- Preterm birth
- Increased risk of miscarriage and abortion
- Antepartum haemorrhage, abruptio placenta
- Perinatal death, intrauterine death
- Maternal death

Screening for domestic violence

Screening for domestic violence needs to occur at various times over the course of the pregnancy as most women will not disclose violence the first time they are asked and also, the onset of violence may be later in pregnancy. Women should be screened for domestic violence at the first antenatal visit, throughout their pregnancy and at each postnatal visit.

The 'HITS Domestic Violence Screening Tool' has been specifically developed as a short, efficient method of screening individuals for domestic violence (see Appendix 6). HITS is an easy to use screening tool and scale that stands for Hurt, Insult, Threaten and Scream. The tool includes four questions that healthcare providers can use to assess the risk of intimate partner violence. The woman can fill in the tool herself or the healthcare providers can ask the woman the questions.

Management

Women who experience domestic violence can be supported by:

- Informing the woman that the information she discloses will be kept in a confidential record and will not be included in her handheld record
- Providing information and support tailored to the specific needs of the woman
- Providing a more flexible series of appointments if needed
- Women may need to be provided with a place of safety away from their home. In an emergency this may be the antenatal ward

Information and support for women

Offer the woman information about other healthcare providers, including non-governmental organisations or charities which provide support for women who experience domestic violence.

Counselling after adverse incidents

A serious adverse incident is defined as any event or circumstance that led or could have led to serious unintended or unexpected harm, loss or damage to women and/or their newborn baby.

There are occasions in healthcare delivery when events occur that are undesirable. Such incidents are usually described as adverse or, untoward events.

Table 14.2: Examples of adverse incidents

Maternal incident	Fetal or neonatal incident	Organisational incidents
■ Maternal death ■ Shoulder dystocia resulting in injury ■ Blood loss >1500ml ■ Unanticipated return to theatre ■ Hysterectomy/laparotomy ■ Anaesthetic complications ■ Intensive care admission ■ Pulmonary embolism ■ Third/fourth-degree tears ■ Uterine rupture ■ Readmission of mother	■ Stillbirth >500g ■ Neonatal death ■ Apgar score <7 at 5 minutes ■ Birth trauma ■ Severe fetal laceration at Caesarean section ■ Neonatal seizures ■ Term baby admitted to neonatal unit ■ Undiagnosed fetal anomaly	■ Unavailability of health records ■ Delay in responding to call for assistance ■ Lack of referral ■ Faulty or absent equipment ■ Conflict over case management ■ Medication error

Adverse clinical events can have a devastating effect, not only on the mother and baby but on the healthcare providers involved in the event. Healthcare providers involved in adverse clinical incidents, whether directly or indirectly may need support. Support may take the form of someone to talk to, debriefing, help with writing statements or reflection.

Such incidents should be investigated honestly, fairly, thoroughly within the confines of a strictly no blame culture and with the intention of putting any appropriate system changes in place to minimise the likelihood of a repeat of the factors leading to the adverse consequence(s).

Healthcare providers can support women who wish to talk about their experience, encourage them to make use of support systems available from family and friends, and consider the effect of the birth on the partner/husband. Health and wellbeing extend beyond physical aspects.

- Healthcare providers should be aware of and responsive to possible variations in individual and cultural responses to the death of a baby or mother.
- Counselling should be offered to all women and their partners/husbands.
- Other family members, especially existing children and grandparents, should also be considered for counselling.
- Each woman's experience and reaction will be unique.
- Effective communication and empathy are essential aspects of care when supporting women after a serious adverse incident.
- Findings of investigations should be shared with the woman or family in a spirit of openness

Further Reading

Ahuja S, Muntode Gharde P. A Narrative Review of Maternal and Perinatal Outcomes of Dengue in Pregnancy. Cureus. 2023 Nov 11;15(11):e48640. doi: 10.7759/cureus.48640. PMID: 38090413; PMCID: PMC10711354

Australian Institute of Health and Welfare 2019. Diabetes in pregnancy 2014–2015. Bulletin no. 146. Cat. no. CDK 7. Canberra: AIHW

British HIV Association guidelines for the management of HIV in pregnancy and postpartum 2018 (2020 third interim update) https://www.bhiva.org/file/5f1aab1ab9aba/BHIVA-Pregnancy-guidelines-2020-3rd-interim-update.pdf

Prof Maurizio Cecconi[a], Laura Evans, Prof Mitchell Levy, Prof Andrew Rhodes (2018) Sepsis and Septic shock. The Lancet Volume 392, Issue 10141,7–13 July 2018, Pages 75-87

Fisher J, Cabral de Mello M, Patel V, et al. Prevalence and determinants of common perinatal mental disorders in women in low- and lower-middle-income countries: a systematic review. Bulletin of the World Health Organization. 2012;90(2):139-149

Getachew, T., Negash, A., Debella, A. *et al.* Prevalence and adverse outcomes of twin pregnancy in Eastern Africa: a systematic review and meta-analysis. *BMC Pregnancy Childbirth* **24**, 169 (2024). https://doi.org/10.1186/s12884-024-06326-0

Jullien S. Vitamin K prophylaxis in newborns. BMC Pediatr. 2021 Sep 8;21(Suppl 1):350. doi: 10.1186/s12887-021-02701-4. PMID: 34496783; PMCID: PMC8424792

Kapoor VS, Evans JR, Vedula SS. Interventions for preventing ophthalmia neonatorum. Cochrane Database of Systematic Reviews 2020, Issue 9. Art. No.: CD001862. DOI: 10.1002/14651858.CD001862.pub4

Laibl V, Sheffield J. The management of respiratory infections during pregnancy. Immunol Allergy Clin North Am. 2006 Feb;26(1):155-72, viii. doi: 10.1016/j.iac.2005.11.003. PMID: 16443149; PMCID: PMC7118874

Marston C, Hinton R, Kean S et al. Community participation for transformative action on women's, children's and adolescents' health. Bulletin of the World Health Organization. 2016;94(5):376-382.

Mathad JS, Gupta A. Tuberculosis in pregnant and postpartum women: epidemiology, management, and research gaps. Clin Infect Dis. 2012 Dec;55(11):1532-49. doi: 10.1093/cid/cis732. Epub 2012 Aug 31. PMID: 22942202; PMCID: PMC3491857

Nelson-Piercy C, Dean C, Shehmar M, Gadsby R, O'Hara M, Hodson K, et al; (2024) the Royal College of Obstetricians and Gynaecologists. The Management of Nausea and Vomiting in Pregnancy and Hyperemesis Gravidarum (Green-top Guideline No. 69). *BJOG*.2024; 131(7): e1–e30. https://doi.org/10.1111/1471-0528.17739

NICE guideline [NG133]Published: 25 June 2019 Last updated: 17 April 2023 Hypertension in pregnancy: diagnosis and management https://www.nice.org.uk/guidance/ng133/chapter/recommendations

Recht J, Clark R, González R, Dellicour S. (2023) Safety of artemisinin and non-artemisinin antimalarials in the first trimester of pregnancy: review of evidence. Geneva: World Health Organization; Licence: CC BY-NC-SA 3.0 IGO

Management of Varicella Infection (Chickenpox) in Pregnancy MARCH JOGC No. 274, March 2012 MARS P287 SOGC clinical practice guideline

Management of sickle cell disease in pregnancy RCOG Green top guideline 61 https://www.rcog.org.uk/media/nyinaztx/gtg_61.pdf

Epilepsy in pregnancy RCOG Green top guideline 68 https://www.rcog.org.uk/media/nyinaztx/gtg_61.pdf

Wang H, Li N, Chivese T, Werfalli M, Sun H, Yuen L, Hoegfeldt CA, Elise Powe C, Immanuel J, Karuranga S, Divakar H, Levitt N, Li C, Simmons D, Yang X; IDF (2022) Diabetes Atlas Committee Hyperglycaemia in Pregnancy Special Interest Group. IDF Diabetes Atlas: Estimation of Global and Regional Gestational Diabetes Mellitus Prevalence for 2021 by International Association of Diabetes in Pregnancy Study Group's Criteria. Diabetes Res Clin Pract. 2022 Jan; 183:109050. doi: 10.1016/j.diabres.2021.109050. Epub 2021 Dec 6. PMID: 34883186.

Weeks et al 2022 Evaluating misoprostol and mechanical methods for induction of labour. BJOG 129 (8) p e61-e65

World Health Organization (2003) Kangaroo mother care: a practical guide. Geneva: World Health Organization. Available from: http://www.who.int/maternal_child_adolescent/documents/9241590351/en/

World Health Organization (2004) Making pregnancy safer the critical role of the skilled attendant: a joint statement by World Health Organization, ICM and FIGO. Geneva: World Health Organization, Department of Reproductive Health and Research. Available from: http://www.who.int/maternal_child_adolescent/documents/9241591692/en/index.html

World Health Organization (2007) Managing complications in pregnancy and childbirth: a guide for midwives and doctors. Geneva: World Health Organization. Available from: http://www.who.int/maternal_child_adolescent/documents/9241545879/en/

World Health Organization (2007) Standards for maternal and newborn health Group 1: General standards of care for healthy pregnancy and childbirth, Geneva: World Health Organization. Available from: http://apps.who.int/iris/bitstream/10665/69735/1/a91272.pdf

World Health Organization (2008) Essential environmental health standards in health care. Geneva: World Health Organization. Available from: http://apps.who.int/iris/bitstream/10665/43767/1/9789241547239_eng.pdf?ua=1

World Health Organization (2009) World Health Organization recommended interventions for improving maternal and newborn health: Integrated management of pregnancy and childbirth. Geneva: World Health Organization. Available from: http://apps.who.int/iris/bitstream/10665/69509/1/WHO_MPS_07.05_eng.pdf?ua=1&ua=1

World Health Organization (2010) Antiretroviral therapy for HIV infection in adults and adolescents: recommendations for a public health approach. Geneva: World Health Organization. Available from: http://www.who.int/hiv/pub/arv/adult2010/en/

World Health Organization (2010) Working with Individuals, Families and Communities to improve maternal and newborn health. Geneva: World Health Organization. Available from: http://apps.who.int/iris/bitstream/10665/84547/3/WHO_MPS_09.04_eng.pdf

World Health Organization (2012) World Health Organization recommendations for the prevention of postpartum haemorrhage. Geneva: World Health Organization. Available from: http://apps.who.int/iris/bitstream/10665/75411/1/9789241548502_eng.pdf

World Health Organization (2013) World Health Organization recommendations on postnatal care of the mother and newborn. Geneva: WHO. Available from: http://www.who.int/maternal_child_adolescent/documents/postnatal-care-recommendations/en/

World Health Organization (2014) Active management of the third stage of labour: New World Health Organization recommendations help to focus implementation (WHO/RHR/14.18). Geneva: World Health Organization. Available from: http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/new-recommendations-amtsl/en/

World Health Organization (2014) Consultation on improving measurement of the quality of maternal, newborn and child care in health facilities. Geneva: World Health Organization. Available from: http://apps.who.int/iris/bitstream/10665/128206/1/9789241507417_eng.pdf

World Health Organization (2014) Integrated Management of Childhood Illness (IMCI). Geneva: World Health Organization. Available from: http://www.who.int/maternal_child_adolescent/topics/child/imci/en/

World Health Organization (2014) Prevention and elimination of disrespect and abuse during childbirth, Report Number WHO/RHR/14.23, Geneva: World Health Organization. Available from: http://apps.who.int/iris/bitstream/10665/134588/1/WHO_RHR_14.23_eng.pdf?ua=1&ua=1

World Health Organization (2015) Ebola situation report – 1st July 2015. Geneva: World Health Organization. Available from: http://apps.who.int/ebola/current-situation/ebola-situation-report-1-july-2015

World Health Organization (2015) World Health Organization recommendations for prevention and treatment of maternal peripartum infections, Geneva: World Health Organization. Available from: http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/peripartum-infections-guidelines/en/

World Health Organization (2015) World Health Organization recommendations on health promotion interventions for maternal and newborn health 2015, Geneva: World Health Organization. Available from: http://www.who.int/maternal_child_adolescent/documents/health-promotion-interventions/en/

World Health Organization (2017) Integrated Management of Pregnancy and Childbirth (IMPAC). Geneva: World Health Organization. Available from: http://www.who.int/maternal_child_adolescent/topics/maternal/impac/en/

World Health Organization, Department of Mental Health and Substance Abuse (2008) Improving Maternal Mental Health. Geneva: World Health Organization. Available from: http://www.who.int/mental_health/prevention/suicide/Perinatal_depression_mmh_final.pdf

World Health Organization, Stuart MC, Kouimtzi M and Hill SR (2008) World Health Organization Model Formulary, 2008. Based on the 15th Model List of Essential Medicines 2007. Geneva: World Health Organization. Available from: http://apps.who.int/medicinedocs/documents/s16879e/s16879e.pdf

World Health Organization, UNICEF, UNFPA and the World Bank (2010) Trends in maternal mortality 1990 to 2008: estimates developed by the World Health Organization, UNICEF, UNFPA and The World Bank. Geneva: World Health Organization. Available from: http://www.who.int/reproductivehealth/publications/monitoring/9789241500265/en/

World Health Organization, UNICEF, UNFPA and the World Bank. (2012) Trends in maternal mortality: 1990 to 2010: World Health Organization, UNICEF, UNFPA, and the World Bank estimates, World Health Organization, UNICEF, UNFPA and World Bank Geneva: World Health Organization. Available from: http://www.who.int/reproductivehealth/publications/monitoring/9789241503631/en/

World Health Organization, UNFPA, UNICEF and Bank (2006) Pregnancy, childbirth, postpartum, and newborn care: a guide for essential practice. Geneva: World Health Organization. Available from: http://apps.who.int/medicinedocs/documents/s16879e/s16879e.pdf

World Health Organization (2020) Guidelines for the management of pregnant and breastfeeding women in the context of Ebola virus disease [Internet]. Geneva: Recommendations. Available from: https://www.ncbi.nlm.nih.gov/books/NBK554100/

World Health Organisation (2020) recommendations on drug treatment for non-severe hypertension in pregnancy. Geneva: World Health Organization; 2020. Licence: CC BY-NC-SA 3.0 IGO

World Health Organisation Global Maternal Sepsis Study (GLOSS) Research Group. (2020) Frequency and management of maternal infection in health facilities in 52 countries (GLOSS): a 1-week inception cohort studyhttps://www.thelancet.com/action/showPdf?pii=S2214-109X%2820%2930109-1

WHO Guidelines for malaria, 3 June 2022. Geneva: (WHO/UCN/GMP/2022.01 Rev.2). License: CC BY-NC-SA 3.0 IGO

World Health Organisation (2022) recommendations on antenatal corticosteroids for improving preterm birth outcomes. Geneva: Licence: CC BY-NC-SA 3.0 IGO

WHO recommendations on maternal and newborn care for a positive postnatal experience. Geneva: World Health Organization; 2022. Licence: CC BY-NC-SA 3.0 IGO

WHO (2023) Trends in maternal mortality 2000 to 2020: estimates by WHO, UNICEF, UNFPA, World Bank Group and UNDESA/Population Division. Geneva: World Health Organization; 2023. Licence: CC BY-NC-SA 3.0 IGO

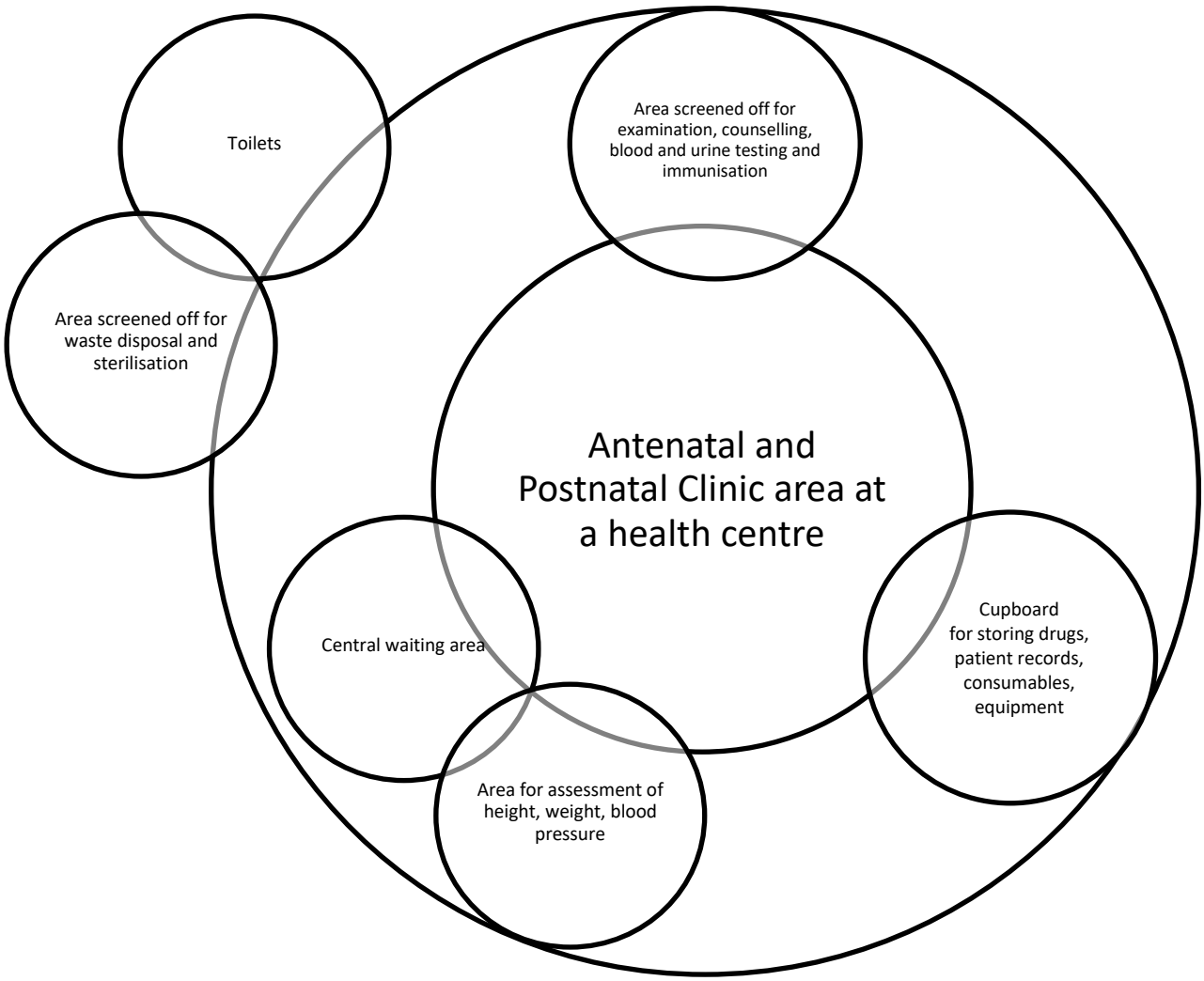
WHO fact sheet on Hepatitis C Available from https://www.who.int/news-room/fact-sheets/detail/hepatitis-c

WHO recommendations on antenatal care for a positive pregnancy experience: screening, diagnosis and treatment of tuberculosis disease in pregnant women. Available from https://iris.who.int/bitstream/handle/10665/365953/9789240057562-eng.pdf?sequence=1#:~:text=Tuberculosis%20(TB)%20poses%20a%20serious,of%20the%20mother%20and%20infant

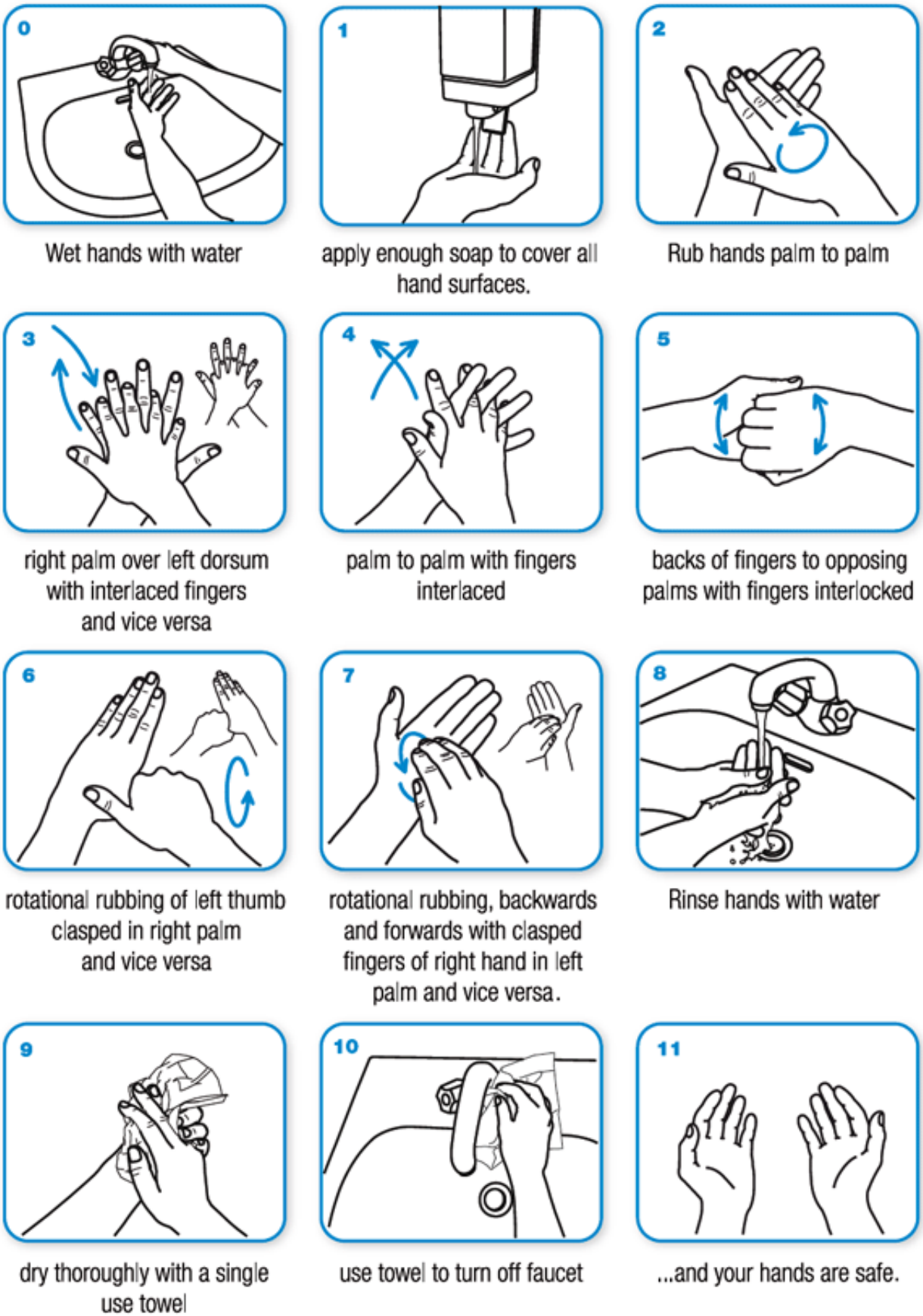
Appendices

Appendix 1: Suggested layout for an antenatal and postnatal clinic

A suggested layout for an antenatal and postnatal clinic at either a small health centre or a larger hospital when no separate rooms are available:



Appendix 2: Handwashing technique



Appendix 3: Use of obstetric ultrasound during and after pregnancy

1st Trimester	2nd Trimester	3rd Trimester	Intrapartum	Puerperium
■ Pregnancy dating/gestational age assessment which is most accurate between 10+0 and 13+6 weeks ■ Pregnancy localisation in cases of suspected ectopic pregnancy ■ Assessment of early pregnancy bleeding to confirm viability before management of suspected miscarriage ■ Chorionicity and placentation in multiple pregnancy ■ Nuchal Translucency measurement as part of downs syndrome screening	■ Fetal anomaly scan at between 18 and 22 weeks ■ Cervical length assessment in suspected cervical insufficiency ■ Uterine artery flows in women at high risk of preeclampsia and intrauterine growth restriction ■ Placenta localisation for placenta praevia and accreta ■ Intrauterine fetal death confirmation	■ Fetal growth and wellbeing in suspected small-for- gestational age, intrauterine growth restriction and previous stillbirth ■ Assessment of large for gestational age babies ■ Assessment of fluid volume for oligohydramnios and polyhydramnios ■ Presentation to rule out abnormal lies such as breech, transverse and unstable lies ■ External cephalic version as an aid to diagnosis and the procedure ■ Intrauterine fetal death confirmation	■ To confirm presentation in labour e.g. suspected breech ■ Twin delivery to aid in fetal localisation ■ Localisation of fetal heartbeat especially in high body mass index ■ Intrauterine fetal death confirmation	■ Late postpartum bleeding to rule out retained placental tissue (commonest cause is endometritis)

Appendix 4: Whooley questions for depression screening

1. During the past month, have you often been bothered by feeling down, depressed or hopeless?	☐ Yes	☐ No
2. During the past month, have you often been bothered by little interest or pleasure in doing things?	☐ Yes	☐ No
A third question should be considered if the woman answers 'yes' to either of the initial questions: 3. Is this something you feel you need or want help with?		

'Yes' to one (or both) questions = positive test (requires further evaluation)
'No' to both questions = negative test (not depressed)

- A positive test identifies women who may benefit from further evaluation
- A negative test essentially rules out depression
- The Whooley questions cannot be used to diagnose or measure the severity of depression
- Clinical judgement should always be used when assessing depression

Appendix 5: Edinburgh Postnatal Depression Scale

Postpartum depression is very common. The Edinburgh Postnatal Depression Scale is a 10-question self-rating scale has been proven to be an efficient and effective way of identifying women at risk for depression related to pregnancy.

Please select the answer that comes closest to how you have felt **in the past 7 days**:

1. I have been able to laugh and see the funny side of things
   - ☐ As much as I always could
   - ☐ Not quite so much now
   - ☐ Definitely not so much now
   - ☐ Not at all
2. I have looked forward with enjoyment to things
   - ☐ As much as I ever did
   - ☐ Rather less than I used to
   - ☐ Definitely less than I used to
   - ☐ Hardly at all
3. I have blamed myself unnecessarily when things went wrong *
   - ☐ Yes, most of the time
   - ☐ Yes, some of the time
   - ☐ Not very often
   - ☐ No, never
4. I have been anxious or worried for no good reason
   - ☐ No, not at all
   - ☐ Hardly ever
   - ☐ Yes, sometimes
   - ☐ Yes, very often
5. I have felt scared or panicky for no very good reason *
   - ☐ Yes, quite a lot
   - ☐ Yes, sometimes
   - ☐ No, not much
   - ☐ No, not at all
6. Things have been getting on top of me *
   - ☐ Yes, most of the time I have not been able to cope at all
   - ☐ Yes, sometimes I haven't been coping as well as usual
   - ☐ No, most of the time I have coped quite well
   - ☐ No, I have been coping as well as ever

7. I have been so unhappy that I have had difficulty sleeping *
   - ☐ Yes, most of the time
   - ☐ Yes, sometimes
   - ☐ Not very often
   - ☐ No, not at all
8. I have felt sad or miserable *
   - ☐ Yes, most of the time
   - ☐ Yes, sometimes
   - ☐ Not very often
   - ☐ No, not at all
9. I have been so unhappy that I have been crying *
   - ☐ Yes, most of the time
   - ☐ Yes, quite often
   - ☐ Only occasionally
   - ☐ No, never
10. The thought of harming myself has occurred to me *
    - ☐ Yes, quite often
    - ☐ Sometimes
    - ☐ Hardly ever
    - ☐ Never

The Edinburgh Postnatal Depression Scale

Scoring

QUESTIONS 1, 2, & 4 (without an *) are scored 0, 1, 2 or 3 with top box scored as 0 and the bottom box scored as 3

QUESTIONS 3, 5-10 (marked with an *) are reverse scored, with the top box scored as a 3 and the bottom box scored as 0

Range of scores

0-9: Scores in this range may indicate the presence of some symptoms of distress that may be short-lived and are less likely to interfere with day to day ability to function at home or at work. However, if these symptoms have persisted more than a week or two further enquiry is warranted.

10-12: Scores within this range indicate presence of symptoms of distress that may be discomforting. Repeat the EDS in 2 weeks' time and continue monitoring progress regularly. If the scores increase to above 12 assess further and consider referral as needed.

13 +: Scores above 12 require further assessment and appropriate management as the likelihood of depression is high. Referral to a psychiatrist/psychologist may be necessary.

Item 10: Any woman who scores 1, 2 or 3 on item 10 requires further evaluation before leaving the health facility to ensure her own safety and that of her baby

Appendix 6: Domestic Violence Screening Tool

Hurt, Insulted, Threatened with Harm and Screamed (HITS) Domestic Violence Screening Tool

Please read each of the following activities and place a check mark in the box that best indicates the frequency with which your partner/husband acts in the way depicted.

Date: _____

Age: _____

How often does your partner/husband?	**Never**	**Rarely**	**Sometimes**	**Fairly often**	**Frequently**
1. Physically **H**urt you					
2. **I**nsult or talk down to you					
3. **T**hreaten you with harm					
4. **S**cream or curse at you					
	1	2	3	4	5
Total Score:					

Each item is scored from 1-5.

Score range is between 4-20.

A score greater than 10 signifies that a woman is at risk of domestic violence, and should seek counselling or help from a healthcare provider or a domestic violence resource centre.

Appendix 7: Essential drugs for antenatal and postnatal care

Note NATIONAL GUIDELINES to be followed

Drug	Dosage	Notes
1. Antibiotics		
Amoxicillin	500mg capsules	8 hourly 7 days' treatment = 21 capsules of 500mg/full course.
Ampicillin	500mg powder (ampoules) for reconstitution for IV use	Estimate average regimen at: IV dose 1g start then 500mg 6 hourly for 5 days (can move to oral) = 22 doses of 500mg Neonatal dose: 25mg/kg ampicillin or penicillin and gentamycin (age up to 2 weeks: 3mg/kg 12 hourly; age 2 weeks to 12 years: 2mg/kg 8 hourly)
Azithromycin	250mg capsule	1g as a single dose
Benzylpenicillin (penicillin G)	1-g vial of powder for IM or IV use	Benzathine benzylpenicillin powder for injection 1.44g benzylpenicillin (=2.4 million units) in 5ml vial. Often given stat 2.4 million units IM
Cefixime	200mg capsule	400mg/day in 2 divided doses 12 hourly
Cephalosporin (e.g. cefazolin, cefotaxime, ceftriaxone)	Dosage will be 500mg either IV or oral	Estimate average IV regimen at 500mg 8 hourly for 5 days (can then move to oral) = 15 doses/case Estimate similar amount for oral use: 750 doses 500mg cephalosporin for oral use (capsules)
Erythromycin	500mg capsules for oral use	Common regimen: 500mg 6 hourly for 7 days = 28 capsules/case
Gentamicin (aminoglycoside)	IV 2ml vial	Common regimen is 80mg 12 hourly IV for 7 days = 14 doses of 80mg/case
Nitrofurantoin	50mg capsule	Use as 100mg 12 hourly for 7 days. Use antenatally for treatment of urinary tract infections
2. Antiretrovirals		
Nevirapine	Mother: tablets 200mg Newborn: oral suspension 50mg/5ml	Single 200mg oral tablet at time of labour for mother and for newborn 2mg/kg as single dose in first 72 hours (average baby 3.5kg = 7mg = <1ml/case)
Efavirenz + emtricitabine + tenofovir 30mg	Tablet 600mg + 200mg + 300mg	Co-formulated tablets in blister packs. 1 tablet once daily
Lamivudine + nevirapine + zidovudine (AZT)	Tablet 150mg + 200mg + 300mg	Co-formulated tablets in blister packs. 1 tablet twice daily
Lamivudine + nevirapine + stavudine tablet	Tablet 150mg + 200mg + 30mg	Co-formulated tablets in blister packs. 1 tablet twice daily
Lamivudine + stavudine	Tablet 300mg + 300mg	Co-formulated tablets in blister packs
Lamivudine + zidovudine	Tablet 150mg + 300mg	Co-formulated tablets in blister packs. 1 tablet twice daily
Tenofovir tablet	300mg	1 tablet once daily (used in conjunction with other antiretroviral medicines)
3. Anti-TB		

Drug	Dosage	Notes
Isoniazid	Tablet, 100mg	5mg/kg once daily – maximum dose: 300mg/day
Pyrazinamide	Tablet, 400mg	25mg/kg once daily – maximum dose: 2g/day
Rifampicin Tablet	Tablet, 150mg and 300mg	600mg monthly on an empty stomach
Ethambutol	Tablet 100mg and 400mg	15mg/kg once daily – maximum dose: 120mg/day
Kanamycin	1g in vial	Complementary list medicine for treatment of MDR TB
Ofloxacin	Tablet 200mg and 400mg	Complementary list medicine for treatment of MDR TB
4. Respiratory drugs		
Prednisolone	Tablet 5mg	Initial dose: 20-70mg/day Maintenance dose: 5-15mg/day. Single daily dose in the morning with food.
Terbutaline inhaler, 100mg	100mcg/metered dose	One inhalation as required. Not more than 4 inhalations should be required in any 24-hour period. The duration of action of a single dose is up to 6 hours.
Salbutamol Inhaler	100mcg/metered dose per puff	2 to 4 inhalations every 10-30 minutes in symptomatic treatment of asthma attack
Hydrocortisone	Tablet 10mg	60-80mg every 4-6 hours for 24 hours then gradually reduce the dose over several days
Salbutamol Nebulizer	2.5mg, 5mg – solution for inhalation	5mg in 2.5ml to be administered via a nebuliser in severe asthma attack
5. Antiemetics		
Metoclopramide	Tablet 10mg or injection, 5mg/ml in 2ml	15mg-30mg/day in 3 divided doses 6 hourly
Ondansetron	Tablet, 4mg	4mg or 8mg BD
Promethazine	Tablet, 25mg	25-75mg/day in 3 divided doses or once at night
Prochlorperazine	5 to 10mg tablet or IV/IM	Prevention: 5-10mg two or three times a day Treatment: 20mg immediately
Cyclizine	50mg tablet or injection	50mg orally, which may be repeated up to three times a day or 50mg IM or IV up to three times daily
6. Antimalarials		
Quinine	Tablets of 300mg IV Quinine dihydrochloride 300mg/ml = 2ml ampoule	Oral – 600mg 8 hourly for up to 10 days IV – 20mg/kg initially (estimate 1200mg) then 10mg/kg 8 hourly (estimate 600mg) for 48 hours then usually switch to oral
Sulfadoxine pyrimethamine	Tablets of 500mg + 25mg	2 or 3 presumptive treatment doses given during antenatal period where chloroquine resistance is noted or as the preferred national regimen
Aetesunate-amodiaquine	Tablets 100mg + 270mg	Co-formulated tablets in blister packs. 2 tablets once daily for 3 days
Aetemether Lumetantrine	Tablets 20mg + 120mg	Co-formulated tablets in blister packs. The treatment is administered twice daily for 3 days

Drug	Dosage	Notes
7. Antacids		
Magnesium Trisilicate	Tablet, 500mg	1 or 2 tablets to be chewed four times a day
Omeprazole	Capsule, 10mg and 20mg	20mg once a day in the morning for 3 days
Ranitidine	Tablet, 150mg or Injection, 25mg/ml in 2ml	150 BD, or 300mg at bedtime
8. Thyroid medication		
Carbimazole	Tablet 40mg	20-60mg, taken as two to three divided doses. The dose should be titrated against thyroid function
Propylthiouracil	Tablet 50mg	50-150mg once a day
Levothyroxine	Tablet 100mg	100-200mg once a day
9. Antiepileptics		
Lamotrigine	Tablet 100mg	100mg or 400mg each day depending upon severity
Levetiracetam	Tablet 500mg	1,000mg and 3,000mg each day depending on severity
Primidone	100-125mg titrated oral doses	One tablet twice daily
Topiramate	Tablet 200mg	200-400mg in two divided dose
Carbamazepine	Tablet 100mg and 200mg	0.8-1.2g daily in divided doses
10. Antihypertensives		
Labetalol	Labetalol tablets for oral use 100mg Labetalol for injection 5mg/ml 20ml ampoules	Oral 100-200mg 12 hourly tablets 10-20mg IV if hydralazine not available or not effective Maintenance dose 40mg/hour IV for 24 hours
Nifedipine	Sustained-release tablets 5mg or 10mg	5-10mg given orally in pre-eclampsia, may need to repeat Then 20-100mg daily in two divided doses; assume for 30 days maximum
Methyldopa	250mg tablets	Dose 2-3 tablets daily, on average, up to a maximum of 4g/day
11. Anti-diabetic drugs		
Insulin Injection	40 iu/ml in 10ml vial in 10ml OR 100iu/ml in 10ml vial	SC/IM/IV according to individual requirements
Metformin	Tablet, 500mg	500mg 3 times a day with food or 850mg BD with or after food
12. Anti-anaemia drugs		
Folic acid	Tablet 1mg or 5mg	Dosage is 1 tablet/day each of ferrous sulphate and folic acid unless in one combined tablet
Ferrous sulphate	Tablet 200mg	Ferrous sulphate minimum need 60mg/day with 450 micrograms folic acid. Ferrous sulphate 200mg tablets contain 65mg elemental iron

Drug	Dosage	Notes
13. Antifungals		
Nystatin	Tablets 100,000 units Pessaries 100,000 units	Oral candidosis: 4 times daily for 1 month Vaginal candidosis: 1 pessary at night for up to 2 weeks
Clotrimazole	Pessary	
Fluconazole	Tablet 50mg, 100mg and 200mg	50-200mg once daily for 7-14 days
14. Antidepressants		
Citalopram	Tablet 20mg	20mg once day
Fluxoetine	Tablet 20mg	20mg once day
Sertraline	Tablet 50mg	50mg once a day
15. Antipsychotics		
Haloperidol	Tablet 5mg, 2mg/ml oral solution	2-10mg/day in 2 divided doses. Dose may be gradually increased to 20mg/day if necessary
Olanzapine	Tablet 10-20mg	15mg once a day
Risperidone	Tablet 1mg	2mg in 2 divided doses. May be increased to 6mg/day in 2 divided doses if needed
Clozapine	Tablet 12.5mg	
16. Obstetric emergencies		
Magnesium sulphate	4g magnesium sulphate IV (slowly, over 5-10 minutes)	For seizure (fit) in eclampsia: Initially: 4g magnesium sulphate IV (slowly, over 5-10 minutes) Followed by: 1g/hour for minimum of 24 hours, using syringe driver. If syringe driver pump not available, follow-up dose also given as 5g IM every 4 hours for at least 24 hours after last seizure
Calcium Gluconate	1g IV	1g Iv slowly followed by 4g daily by continuous infusion
Diazepam	Tablet, 5mg 5mg/ml in 2ml ampoule	10mg IV slowly, if necessary repeat. Diazepam may also be useful in cases of neonatal convulsions
Hydralazine	Powder for reconstitution for injection, 20mg ampoules, IV or IM	Stat dose 5-10mg IV repeat if necessary (maximum 20mg)
17. Anticoagulants		
Heparin (Low molecular weight)	Injection, 1000 iu/ml or 5000iu/ml	Prophylaxis: 5000 IU every 12 hours Treatment: SC 15,000 IU 12 hourly. Daily lab monitoring is essential and dose adjusted accordingly
Warfarin	Tablets 1,2 and 3mg	Baseline prothrombin time (INR) should be determined before initial dose and checked regularly. Usual dose 3-9mg daily

Drug	Dosage	Notes
18. Analgesics		
Paracetamol	Tablets 500mg	1g 4-6 hourly, no more than 4g in a 24hr period. Use as analgesic antenatally and postnatally and with fever, e.g. in sepsis, malaria
Ibuprofen	Tablets 200mg	1.2-1.8g daily in 3-4 divided doses
Pethidine	50mg/ml 1-ml ampoules for injection	50-100mg IM injection 3 hourly up to 400mg/24 hours
Morphine	10mg IM/IV	IM/IV 10-20mg given 4-6 hourly up to 150mg/24 hours
19. Corticosteroids		
Dexamethasone, Betamethasone	Dexamethasone and betamethasone 1ml ampoules of 4mg/1ml for injection	Betamethasone 12mg IM 2 doses 24 hours apart OR Dexamethasone 6mg IM 4 doses 12 hours apart. A single course of antenatal corticosteroids should be considered routine for preterm delivery If gestational age less than 34 weeks
20. Other drugs		
Vitamin A	Tablets 200,000 units	In antenatal period, up to 10,000 units can be given daily in areas with vitamin A deficiency Postnatal recommendation of 200,000 units once in some countries
Aciclovir	Tablet 200mg	400mg 3 times per day for 7 days
Mebendazole	Tablet 500mg	Once off dose during pregnancy. Dose also given as 100mg twice daily for 3 days. Not routinely recommended
21. Neonatal drugs		
Vitamin K	Phytomenadione (vitamin K1) (Konakion® MM paediatric, Roche) 10mg/ml in 0.2ml ampoules	0.1ml IM at or shortly after birth. 1mg may be given by IM and this prevents vitamin K deficiency bleeding in virtually all babies.
Tetracycline	Tetracycline hydrochloride 1% eye ointment	At birth, 1 application of ointment to each eye. Generic amount

Appendix 8: List of Reviewers

The contents of this manual were reviewed by many people from different disciplines and different countries. The content was first developed and discussed as part of a multi-country workshop with 46 participants from 10 countries. In addition, colleagues from Ghana, Togo and Afghanistan provided invaluable inputs during demonstration workshops. Our sincere thanks to all. In particular, the Emergency Obstetric and Quality of Care Unit would like to thank the following individuals for reviewing sections of the manual.

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