

MATERNAL AND CHILD HEALTH

**STUDENT BOOK
SENIOR 4**

ASSOCIATE NURSING PROGRAM

First Edition

Copyright

© 2024 Rwanda Education Board

All rights reserved.

This book is the property of Government of Rwanda

Credit should be given to REB when the source of this book is quoted.

FOREWORD

Dear Student,

The Rwanda Basic Education Board is pleased to introduce this textbook of Maternal and Child Health of the Associate Nursing Program. This resource is crafted to support competence-based teaching and learning, ensuring a uniform approach to mastering the Maternal and Child Health. Our educational philosophy is designed to help you realize your full potential at each level of your education, equipping you to integrate effectively into society and seize career opportunities.

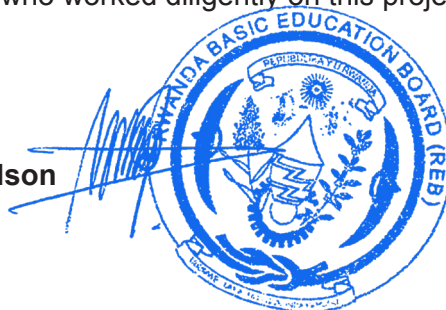
The Rwandan government emphasizes the alignment of educational materials with the syllabus to enhance your learning experience. Instructional materials, activities, and engagement play a crucial role in shaping how well you learn. This textbook focuses on activities that promote idea development and discovery, whether done individually or in groups.

In a competence-based curriculum, learning is an active process where knowledge, skills, and attitude and values are developed through practical activities and real-life scenarios. To fully benefit from this textbook, you should:

- Engage in activities and laboratory experiments to build your skills.
- Share information through presentations, discussions, and collaborative work.
- Take ownership of your learning and draw insights from your activities.

I extend my gratitude to all those who contributed to the creation of this book, including the Ministry of Health, University of Rwanda, and other institutions. Special thanks go to the dedicated faculty members, nurses, midwives, teachers, illustrators, and designers who worked diligently on this project.

Dr. MBARUSHIMANA Nelson
Director General, REB



Acknowledgements

I would like to express my deep gratitude to everyone who contributed to the development of this student book. The project would not have succeeded without the support of numerous stakeholders. I extend special thanks to the Ministry of Health for leading the development process. My appreciation also goes to the Health Workforce development staff/MoH, REB staff, University of Rwanda, College of Medicine and Health Sciences, Staff from Health Private training institutions, Teaching hospitals, Level Two Teaching hospitals, district hospitals, National Council of Nurses and Midwives (NCNM), and Secondary schools having Associate Nursing program. Additional thanks are due to the Ministry of Health, the Ministry of Education, and the Clinton Health Access Initiative (CHAI) for their financial support.



Ms. MURUNGI Joan

Head of Curriculum, Teaching, and Learning Resources Department / REB

Table of Contents

FOREWORD	iii
ACKNOWLEDGMENT	iv
UNIT 1: NORMAL PREGNANCY	1
1.1 Key concepts used in pregnancy	1
1.2 Gametogenesis	3
1.3 Fertilization.....	9
1.4.Implantation	17
1.5 Embryological and fetal development.....	21
1.6 Development of Placenta and functions	27
1.7 Fetal circulation.....	31
1.8 Characteristics of a normal pregnancy	34
1.8.1 Physical and physiological characteristics of a normal pregnancy	34
1.8.2 Psychological characteristics of a normal pregnancy	35
1.9 The pelvis.....	36
1.9.1 Anatomy background of pelvis	36
1.9.2 Types of pelvis	37
1.9.3 Pelvis in relation to pregnancy and child birth.....	38
1.9.4 Pelvic diameters.....	41
1.10 The fetal skull.....	44
1.10.1 Divisions of the fetal skull.....	45
1.10.2 Bones of the vault	45
1.10.3 Regions of landmarks' diameters.....	46
1.10.4 Sutures and fontanelles	47
1.10.5 Diameters of the fetal skull.....	48
UNIT 2: ANTENATAL CARE	52
2.1 Key Concepts used in antenatal care	53
2.1.1 Antenatal Care	53
2.1.2 Focused Antenatal Care (FANC)	53
2.1.3 Health Promotion	53
2.1.4 Health education	53
2.1.5 Health screening.....	53

2.1.6 Disease Prevention.....	54
2.1.7 Booking	54
2.1.8 History taking	54
2.2 Principles, objectives and components of Focused Antenatal Care	55
2.3 The diagnosis of pregnancy	57
2.4 Comprehensive assessment of a pregnant woman.....	61
2.4.1 Introduction to Booking and history taking	61
2.4.2 History taking:	62
2.5 Physical examination	71
2.6 Leopold's manoeuver.....	74
2.7 Calculation of gestational age based on the last menstruation period and pregnancy wheel.....	86
2.8 Physiological changes during pregnancy: Changes in the female reproductive system during pregnancy.....	88
2.9 Physiological changes in pregnancy on endocrine system	89
2.10 Changes in the cardiovascular and respiratory systems	91
2.11 Changes in the urinary and Gastro-intestinal system	92
2.12 The basic laboratory investigations during antenatal care.....	95
2.13 Common laboratory investigations to rule out medical conditions during antenatal care.	95
2.14 Danger signs of pregnancy.....	97
2.15 Management of minor pregnancy complications	98
2.16 Preventive measures during pregnancy.....	99
2.17 Anemia in pregnancy	100
2.18 Nutrition during pregnancy.....	104
UNIT 3: INTRODUCTION TO LABOR MONITORING	107
3.1. Concepts of normal labour.....	107
3.2. Signs preceding labor, types and onset of labour	110
3.2.1. Signs preceding labour	110
3.2.2 Types of labour	110
3.2.3. Onset of labor	112
3.3. Factors affecting labour and Mechanism of labour	112
3.4. Assessment of a woman in labour: General history taking, vital signs and physical examination	116

3.5. Assessment of a woman in labour: Obstetrical history taking.....	117
3.6 Assessment of a woman in labour: Obstetrical examination	118
3.6.1 Use of partograph.....	121
UNIT 4: MANAGEMENT OF THE FIRST STAGE OF LABOUR	125
4.1. Stages of labor.....	125
4.2. Care during the first stage of labour.....	127
4.3 Labor Support	130
4.4 Obstetric danger signs	134
UNIT 5:INTRODUCTION TO MANAGEMENT OF THE SECOND AND THIRD STAGES OF LABOUR.....	137
5.1. Management of the second stage of labour	138
5.1.1 Introduction to the second stage of labour.....	138
5.1.2. Mechanism of labour during the second stage.....	140
5.1.3. Factors affecting the second stage of labour	142
5.1.4. Nursing Management of the woman during the second stage of labour	144
5.1.5. Assessing foetal wellbeing during the second stage of labour.....	148
5.1.6. Recognising foetal compromise during second stage of labour	151
5.1.7. Duration of the second stage of labour	153
5.1.8. Reducing risks during second stage of labour	156
5.2 Management of third stage of labour	158
5.2.1 Introduction to the third stage of labour	158
5.2.2. Administration of uterotonic drugs.....	161
5.2.3. Cord clamping and cutting	163
5.2.4 Controlled cord traction	166
5.2.5 Delivery of the placenta	168
5.2.6 Uterine massage.....	171
UNIT 6: IMMEDIATE CARE OF A NEWBORN	176
6.1. Concept of immediate care and components of essential newborn care.	177
6.2 APGAR score assessment.....	180
6.3. Requirements, aims and importance of the assessment of the newborn immediately after birth.	183
6.4 Anthropometric measurements	185

6.5 Vital signs measurements of the newborn	187
6.6 Head and neck assessment.....	189
6.7 Chest and lungs assessment	193
6.8 Abdomen, back and genitalia assessment.....	194
6.9 Assessment of the limbs	196
6.10 Assessment of the skin	198
6.11 Reflexes assessment	201
6.12 Helping the Baby Breathe (HBB)	204
6.13 Breastfeeding.....	207
REFERENCES	217

Key Unit competence: Identify the characteristics of a normal pregnancy.

Introductory activity 1.0

A 21 years old woman was admitted in consultation room at the health center complaining of nausea and vomiting in early hours of the morning, frequent urination, fatigue, loss of appetite, abdominal pain and not able to carry out normal daily activities. During interview, she reported to be married 4 months ago, living with a husband and missed her periods 6 weeks ago. On head-to-toe examination, breasts were tender and full.

After reading and understanding the above scenario, based on your experiences interpret the above case.

1.1 Key concepts used in pregnancy

Learning Activity 1.1

Pregnancy begins from the conception when the egg and sperm fuse together and fertilization takes place. The fertilized egg becomes a zygote. Then, it initiates organized development of a biological entity known as embryo, with a human nuclear genome or altered human nuclear genome that has the potential to develop up to, or beyond, the stage at which the primitive vein appears, and has not yet reached 8 weeks of development since the first mitotic division to become a fetus. The zygote that was formed after fertilization travels through the oviduct to the uterus, which is a hollow muscular organ that plays a remarkable role in pregnancy by stretching and expanding. The outer layer of the embryo begins to merge with the endometrium (inner membrane of the uterus), and thereafter (after getting pregnant) there is a formation of an organ which attaches to the uterus called placenta that provides oxygen and nutrients to the growing baby and remove waste products from the baby's blood.

Based on the above passage, explain the following terms:

- | | |
|------------------|-------------|
| a. Pregnancy | d. Placenta |
| b. Fertilization | e. Embryo |
| c. Uterus | f. Fetus |

The normal pregnancy starts from the conception, formation of the embryo and fetus, progressive growth of uterus from the pelvic organ to become an abdominal organ under the influence of hormones.

a. Pregnancy

Pregnancy is the time during which one or more fetus develop inside the women's uterus. It usually last about 40 weeks or nine months from the Last Menstrual Period. Pregnancy can occur by sexual intercourse or assisted reproductive technology. It always happens when a sperm fertilizes an egg after it's released from the ovary during ovulation. The fertilized egg then travels down into the uterus, where implantation occurs. A successful implantation results in pregnancy.

b. Fertilization

Human fertilization also known as conception is the fusion of the genetic material of the haploid sperm cell and the secondary oocyte to form the zygote. This process takes approximately 12 to 24 hours and normally occurs in the ampulla of the uterine tube.

c. Uterus

The uterus is a hollow muscular organ located in the female pelvis between the bladder and rectum. It has three muscular layers, the internal layer (endometrium), the middle muscular layer of the uterine wall (myometrium) and the outer layer (perimetrium). Once the egg has left the ovary it can be fertilized and implant itself in the lining of the uterus. The main function of the uterus is to nourish the developing fetus prior to birth.

d. Placenta

The placenta is an organ that develops from trophoblasts in uterus during pregnancy. This structure provides oxygen and nutrients to the growing baby and removes wastes products from the baby's blood. The placenta attaches to the wall of the uterus and the baby's umbilical cord arises from it.

e. Embryo

The embryo in human is defined as the developing organism from the fourth day after fertilization to the end of the eighth week and undergoes early stages of growth and differentiation.

f. Fetus

The fetus is an unborn baby that develops and grows inside the uterus (womb). The baby is referred to as a fetus from 8 weeks of gestation (pregnancy) until birth.

Self-assessment 1.1

1. Differentiate the embryo from fetus as human development stages.
2. Describe the Characteristics of Embryo & Fetus
3. Where does the placenta develop from during the embryonic stage?

1.2 Gametogenesis

Learning Activity 1.2

A couple who has been married for over 2 years but have failed to reproduce offspring was received in consultation. The woman is 40 years old and the husband 52 years old. They both weigh 96kg. The husband is a truck driver and always exposed to the heat from the engine of the truck... He smokes 2 packets of cigarettes per day, at home, they reside near to an industrial plant that produces pesticides, which pollute the nearby water source and their small vegetable farm. The wife complained of irregular cycles for the past 3 years. The wife states that before marriage, she has been using contraceptives pills but stopped after her marriage. They came in consultation to seek solutions for their problem.

1. With your knowledge and understanding of S3 biology, what do you think are the possible causes for the delay in conception?
2. What advice can you give to them based on your knowledge and understanding of S3 biology.

In preparation for fertilization, germ cells undergo gametogenesis, which includes meiosis, to reduce the number of chromosomes and differentiation to complete their maturation.

The process of differentiation of a spermatogonium into a spermatid is known as spermatogenesis. It is a complex, temporal event whereby primitive, totipotent stem cells divide to either renew themselves or produce daughter cells that become specialized testicular spermatozoa over a span of weeks. Spermatogenesis involves both mitotic and meiotic proliferation, as well as extensive cell remodeling.

Spermatogenesis can be divided into three major phases: (1) proliferation and differentiation of spermatogonia, (2) meiosis, and (3) spermiogenesis, a complex metamorphosis that transforms round spermatids arising from the final division of meiosis into a complex structure called the spermatozoon. In humans, the process of spermatogenesis starts at puberty and continues throughout the entire lifespan of the individual.

It takes place in the lumen of the seminiferous tubules. In fact, 90% of the testis volume is determined by the seminiferous tubules and their constituent germ cells at various stages of development. Once the gonocytes have differentiated into fetal spermatogonia, an active process of mitotic replication is initiated very early in embryonic development. This appears to be under FSH control and develops the baseline number of precursor cells of the testicle.

Proliferation and Differentiation of Spermatogonia

Within the seminiferous tubule, germ cells are arranged in a highly ordered sequence from the basement membrane to the lumen. Spermatogonia lie directly on the basement membrane, followed by primary spermatocytes, secondary spermatocytes, and spermatids as they progress toward the tubule lumen. The tight junction barrier supports spermatogonia and early spermatocytes within the basal compartment and all subsequent germ cells within the luminal compartment.

Spermatocytogenesis

The purpose of spermatogenesis is to produce genetic material necessary for the replication of the species through mitosis and meiosis. Spermatocytogenesis takes place in the basal compartment. Primary spermatocytes enter the first meiotic division to form secondary spermatocytes. Prophase of the first meiotic division is very long, and the primary spermatocyte has the longest lifespan. Secondary spermatocytes undergo the second meiotic division to produce spermatids. Secondary spermatocytes are short-lived (1.1 to 1.7 days).

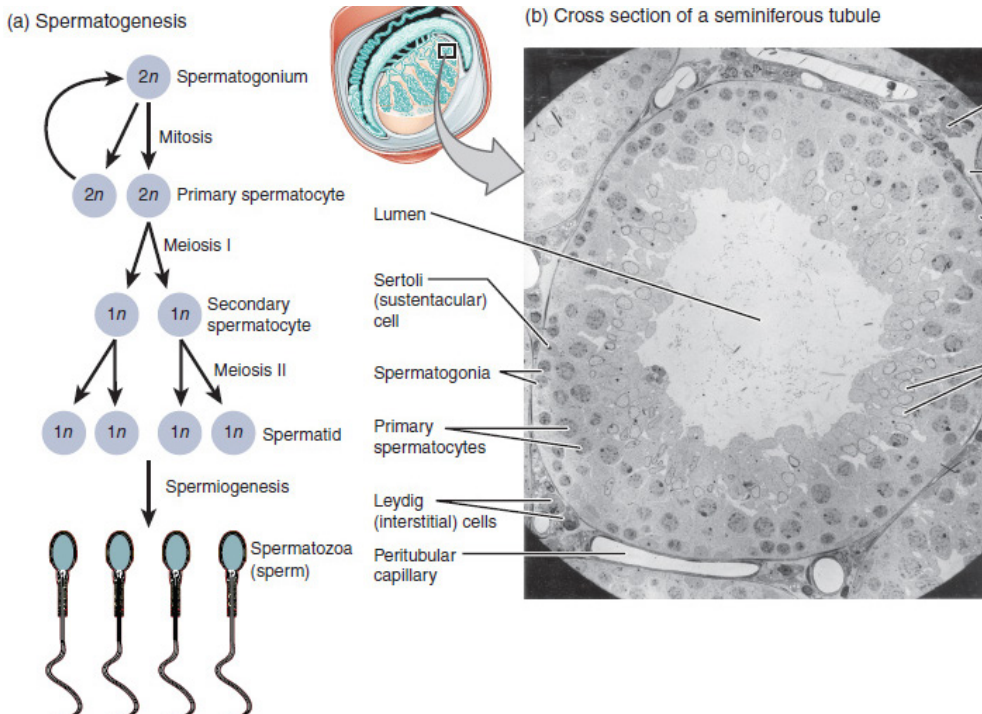


Figure 1. 1: (a) Mitosis of a spermatogonial stem cell, (b) A cross-section of a seminiferous tubule

Mitosis

MITOSIS

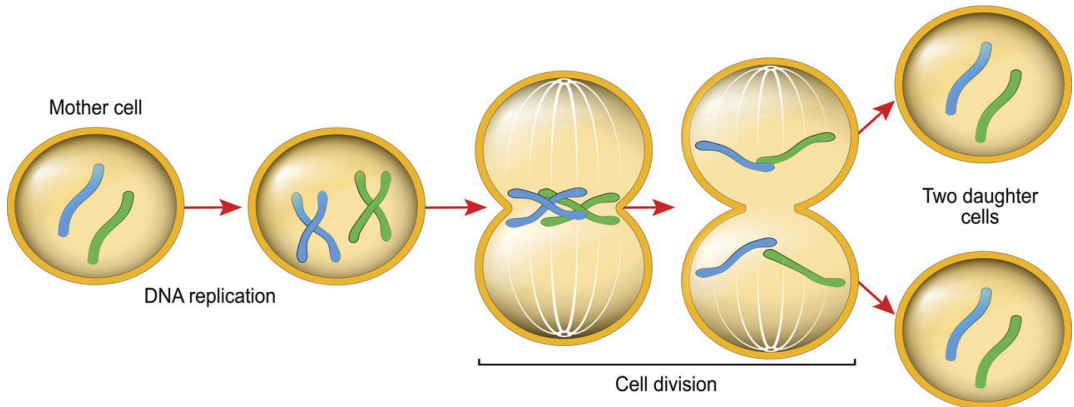


Figure 1. 2: Mitosis

Mitosis involves proliferation and maintenance of spermatogonia. It is a precise, well-orchestrated sequence of events involving duplication of the genetic material (chromosomes), breakdown of the nuclear envelope, and equal division of the chromosomes and cytoplasm into two daughter cells. DNA is also spatially organized into loop domains on which specific regulatory proteins interact during cellular replication. The mitotic phase involves spermatogonia (types A and B) and primary spermatocytes (spermatocytes I). Developing germ cells interconnected by intracellular bridges produce the primary spermatocyte through a series of mitotic divisions. Once the baseline number of spermatogonia is established after puberty, the mitotic component will proceed in order to continue to provide precursor cells and to start the process of differentiation and maturation.

Meiosis

Cell division (meiosis)

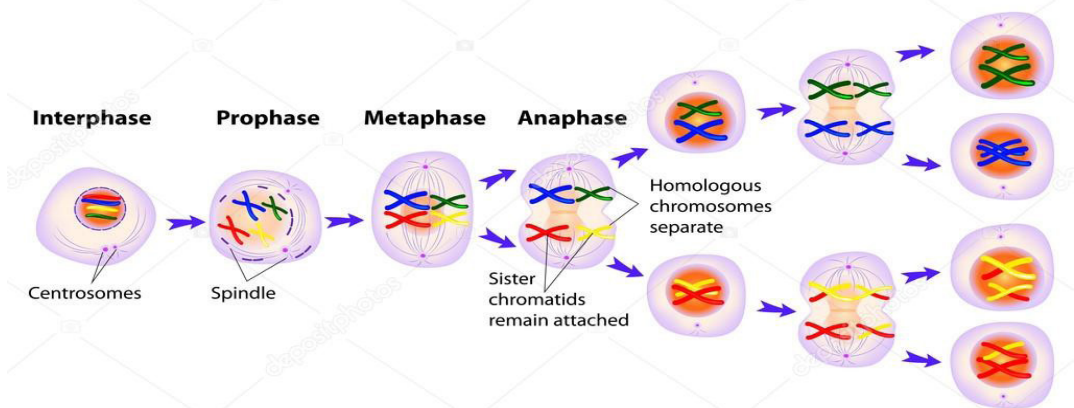


Figure 1. 3: Meiosis

Meiosis is a complex process with specific regulatory mechanisms of its own. The process commences when type B spermatogonia lose their contact with the basement membrane to form preleptotene primary spermatocytes. Thus, each primary spermatocyte can theoretically yield four spermatids, although fewer actually result, because some germ cells are lost due to the complexity of meiosis. The primary spermatocytes are the largest germ cells of the germinal epithelium. Meiosis is characterized by prophase, metaphase, anaphase, and telophase. In this, two successive cell divisions yield four haploid spermatids from one diploid primary spermatocyte. As a consequence, the daughter cells contain only half of the chromosome content of the parent cell. After the first meiotic division (reduction division), each daughter cell contains one partner of the homologous chromosome pair, and they are called secondary spermatocytes. These cells rapidly enter the second meiotic division (equational division), in which the chromatids then separate at the centromere to yield haploid early round spermatids. Meiosis assures genetic diversity and involves primary and secondary spermatocytes, which give rise to spermatids.

Ovum

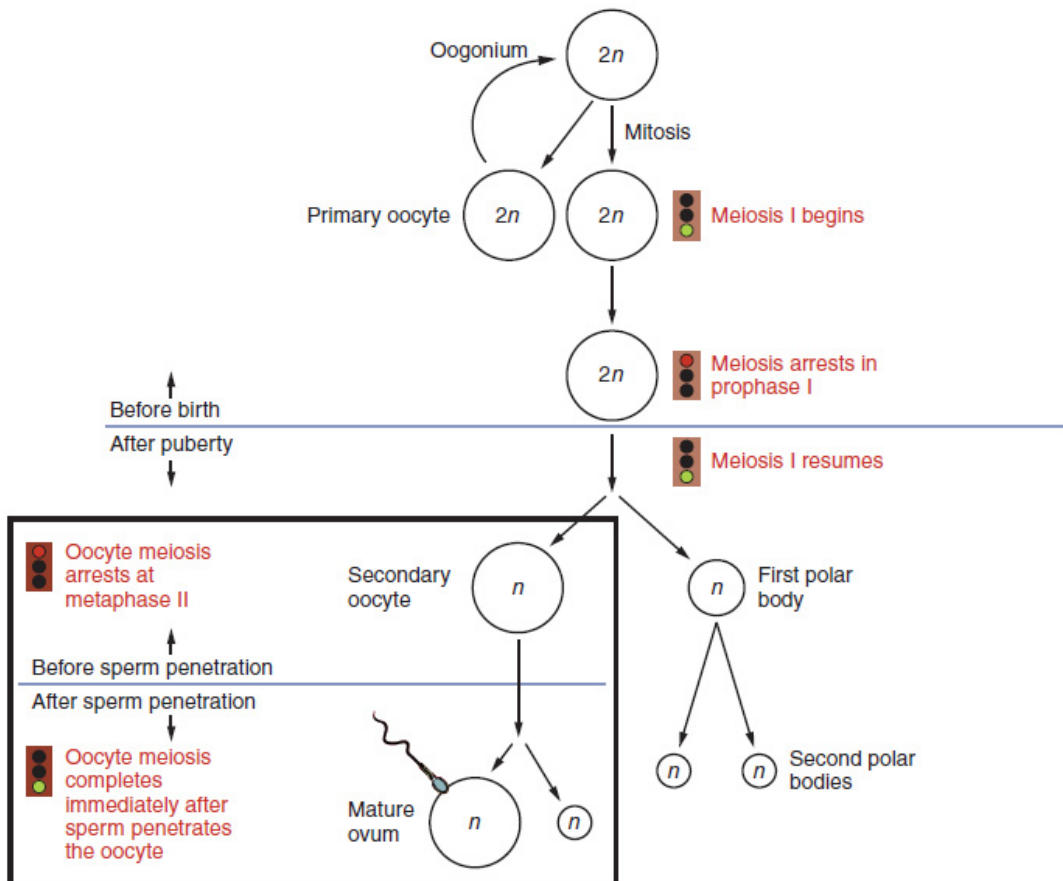


Figure 1. 4: Oogenesis

The unequal cell division of oogenesis produces one to three polar bodies that later degrade, as well as a single haploid ovum, which is produced only if there is penetration of the secondary oocyte by a sperm cell.

Meiosis occurs in the female in the ovarian follicles and produces an egg, or ovum. Each month one ovum matures with a host of surrounding supportive cells. At ovulation the ovum is released from the ruptured ovarian follicle. High estrogen levels increase the motility of the uterine tubes so their cilia are able to capture the ovum and propel it through the tube toward the uterine cavity. An ovum cannot move by itself. Two protective layers surround the ovum. The inner layer is a thick, acellular layer, the zona pellucida. The outer layer, the corona radiata, is composed of elongated cells.

Ova are considered fertile for about 24 hours after ovulation. If not fertilized by a sperm, the ovum degenerates and is resorbed.

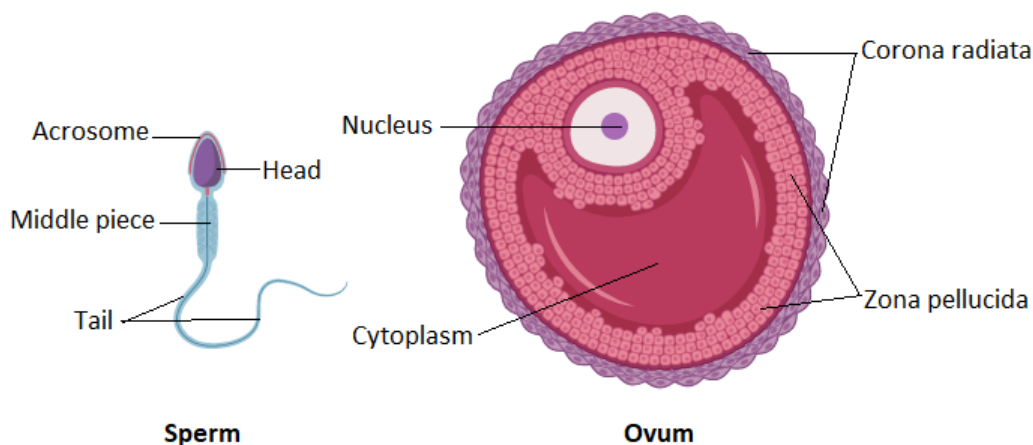


Figure 1. 5: Ovum

Sperm

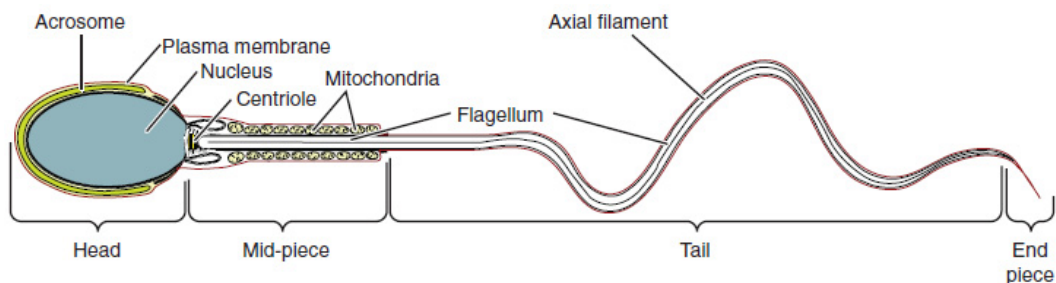


Figure 1. 6: Sperm

Ejaculation during sexual intercourse normally propels about a teaspoon of semen containing as many as 200 to 500 million sperm, into the vagina. The sperm swim propelled by the flagellar movement of their tails. Some sperm can reach the site of fertilization within 5 minutes, but average transit time is 4 to 6 hours. Sperm remain viable within the woman's reproductive system for an average of 2 to 3 days. Most sperm are lost in the vagina, within the cervical mucus, or in the endometrium, or they enter the uterine tube that contains no ovum. As the sperm travel through the female reproductive tract, enzymes are produced to aid in their capacitation. Capacitation is a physiologic change that removes the protective coating from the heads of the sperm. Small perforations then form in the acrosome (a cap on the sperm) and allow enzymes (e.g., hyaluronidase) to escape. These enzymes are necessary for the sperm to penetrate the protective layers of the ovum before fertilization.

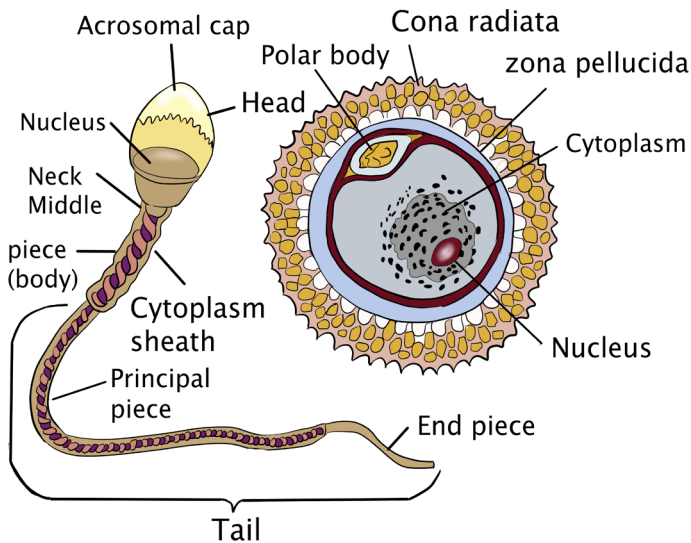


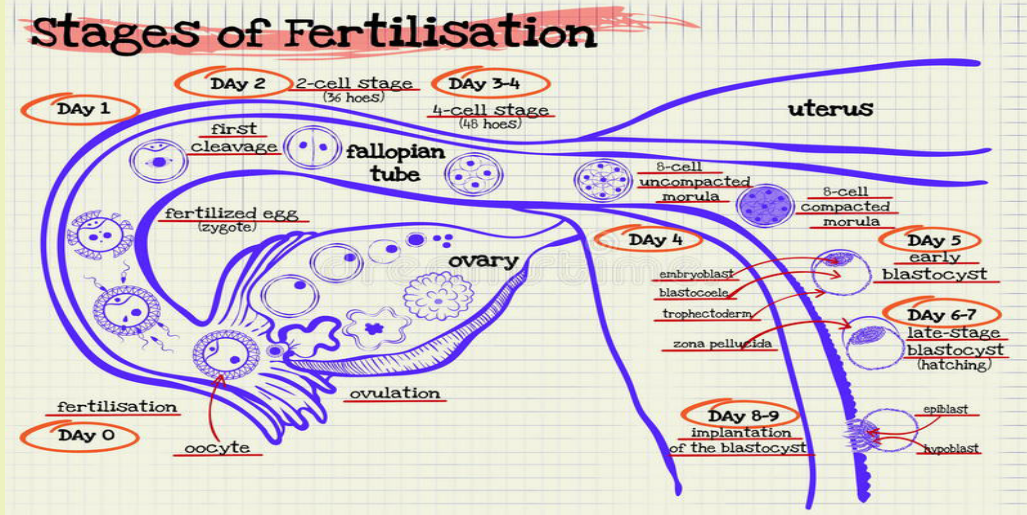
Figure 1. 7: Sperm and Ovum

Self-assessment 1.2

1. Describe the process of gametogenesis
2. Differentiate between spermatogenesis and oogenesis
3. What are the differences between meiosis and mitosis?

1.3 Fertilization

Learning Activity 1.3



Using the diagram above:

1. Explain the process and stages of fertilization.
2. What is capacitation?

Fertilization occurs as a result of the female gamete, or oocyte, merging with the male gamete, or spermatozoon. It is more commonly known as conception.

After the point of fertilization, the fused product of the female and male gamete is referred to as a zygote or fertilized egg. For species that undergo internal fertilization, such as humans, the fusion of male and female gametes usually occurs following the act of sexual intercourse. However, the advent of artificial insemination and in vitro fertilization have made achieving pregnancy possible without engaging in sexual intercourse. This approach may be undertaken as a voluntary choice or due to infertility.

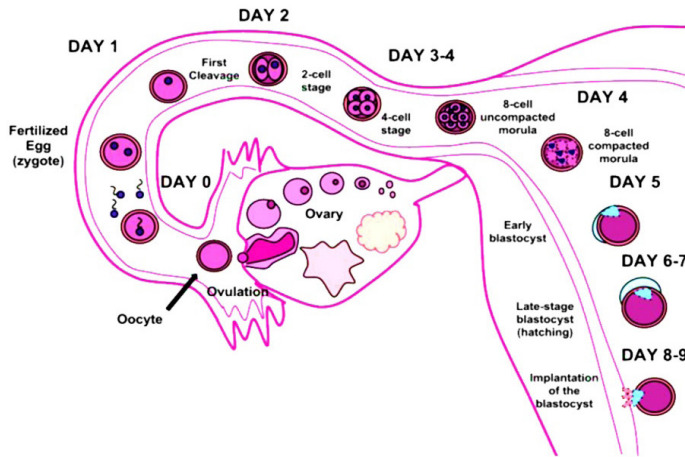


Figure 1. 8: Fertilization

The process of fertilization occurs in several steps and the interruption of any of them can lead to failure. At the beginning of the process, the sperm undergoes a series of changes, as freshly ejaculated sperm is unable or poorly able to fertilize.

The sperm must undergo capacitation (process where sperm undergoes changes to the plasma membrane, resulting in the removal of the glycoprotein coat and increased flagellation), in the female's reproductive tract over several hours, which increases its motility and destabilizes its membrane. By destabilizing the membrane, the sperm prepares for the acrosome reaction, the enzymatic penetration of the egg's tough membrane, the zona pellucida. The sperm and the egg cell (which has been released from one of the female's two ovaries) unite in one of the two fallopian tubes.

The fertilized egg, known as a zygote, then moves toward the uterus, a journey that can take up to a week to complete until implantation occurs. Through fertilization, the egg is activated to begin its developmental process (progressing through meiosis II), and the haploid nuclei of the two gametes come together to form the genome of a new diploid organism.

Nondisjunction during the completion of meiosis or problems with early cell division in the zygote to blastula stages can lead to problems with implantation and pregnancy failure.

Fertilization takes place in the ampulla (outer third) of the uterine tube. When a sperm successfully penetrates the membrane surrounding the ovum, both sperm and ovum are enclosed within the membrane, and the membrane becomes impenetrable to other sperm; this process is termed the zona reaction.

The second meiotic division of the secondary oocyte is then completed, and the nucleus of the ovum becomes the female pronucleus. The head of the sperm enlarges to become the male pronucleus, and the tail degenerates. The nuclei fuse, and the chromosomes combine, restoring the diploid number (46). Conception is said to have taken place.

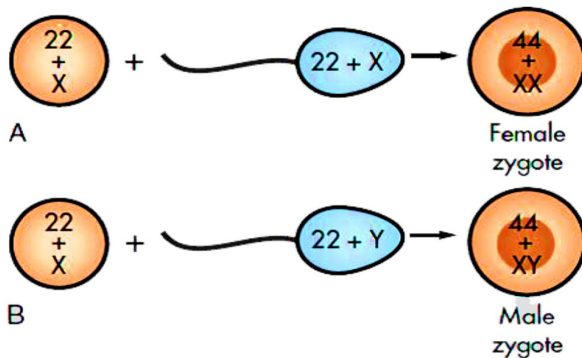
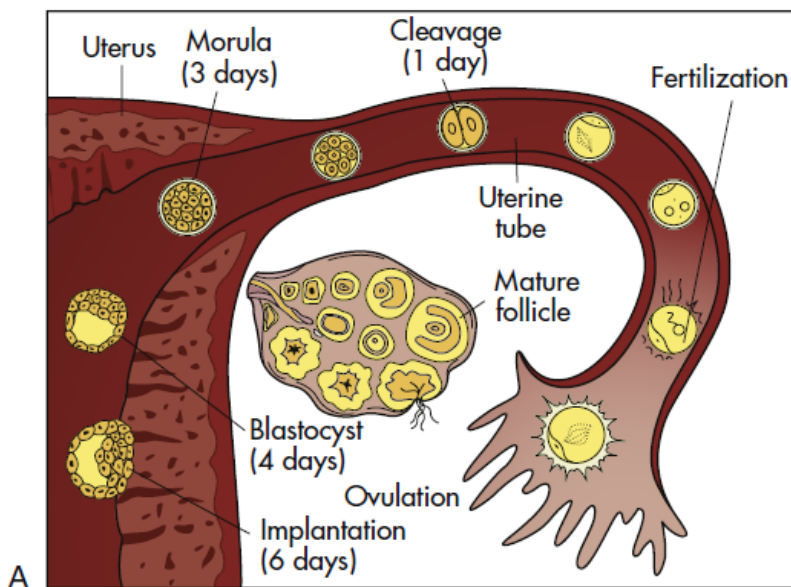


Figure 1. 9: Fertilization

A, Ovum fertilized by X-bearing sperm to form female zygote.

B, Ovum fertilized by Y-bearing sperm to form male zygote.

Mitotic cellular replication, called cleavage, begins as the zygote travels the length of the uterine tube into the uterus. This transit takes 3 to 4 days. Because the fertilized egg divides rapidly with no increase in size, successively smaller cells, blastomeres, are formed with each division. A 16-cell morula, a solid ball of cells, is produced within 3 days and is still surrounded by the protective zona pellucida.



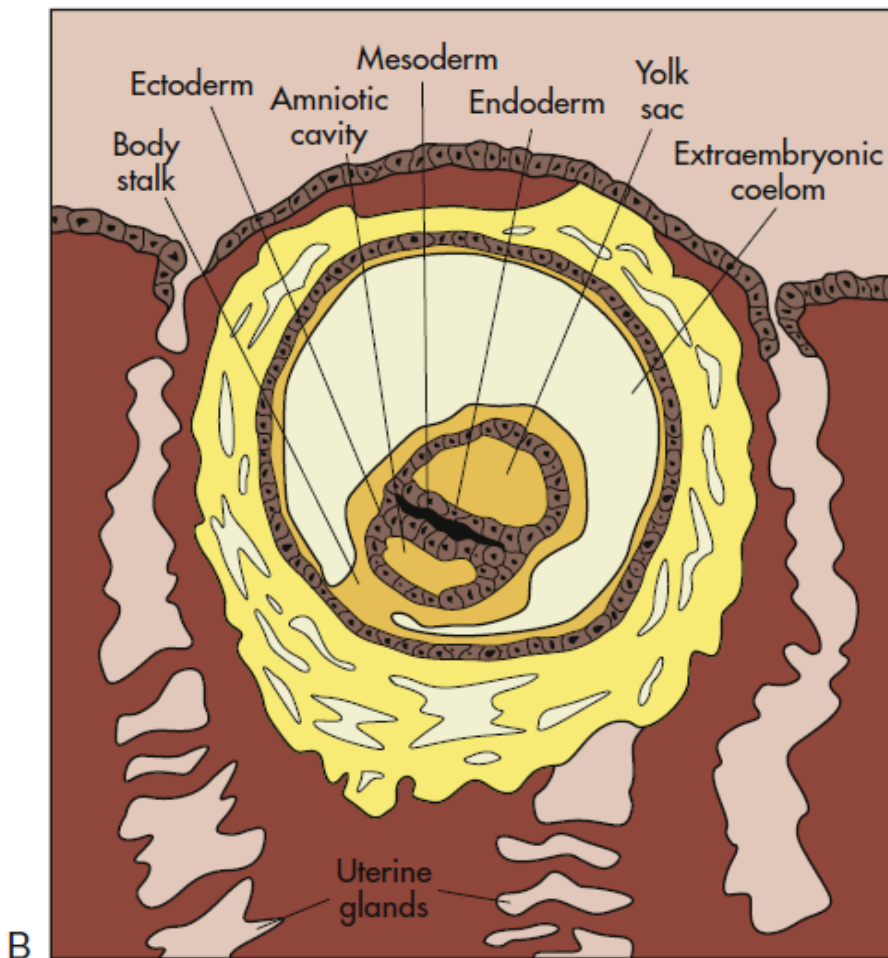


Figure 1. 10: First weeks of human development

A, Follicular development in the ovary, ovulation, fertilization, and transport of the early embryo down the uterine tube and into the uterus, where implantation occurs.

B, Blastocyst embedded in endometrium. Germ layers forming.

Further development occurs as the morula floats freely within the uterus. Fluid passes through the zona pellucida into the intercellular spaces between the blastomeres, separating them into two parts, the trophoblast (which gives rise to the placenta) and the embryoblast (which gives rise to the embryo). A cavity forms within the cell mass as the spaces come together, forming a structure called the blastocyst cavity. When the cavity becomes recognizable, the whole structure of the developing embryo is known as the blastocyst. Stem cells are derived from the inner cell mass of the blastocyst. The outer layer of cells surrounding the blastocyst cavity is the trophoblast. The trophoblast differentiates into villous and extravillous trophoblast.

Simultaneous to implantation, the embryo continues developing. The cells of the embryoblast differentiate into two types of cells: the epiblast (closest to the trophoblasts) and the hypoblast (closest to the blastocyst cavity). These two layers of cells form a flat disc known as the bilaminar embryonic disc through a process of gastrulation (three layers). The first appearance of these layers collectively are known as the primitive streak, around day 15.

ECTODERM: this is the start of tissue that covers most surfaces of the body. the epidermis layer of the skin, hair and nails and the nervous system

MESODERM: The mesoderm forms the muscle, skeleton, dermis of the skin, connective tissue, the urogenital glands, blood vessels, blood and lymph cells.

ENDODERM: They form the epithelial lining of the digestive, respiratory, urinary systems and glandular cells of organs such as the liver and pancreas.

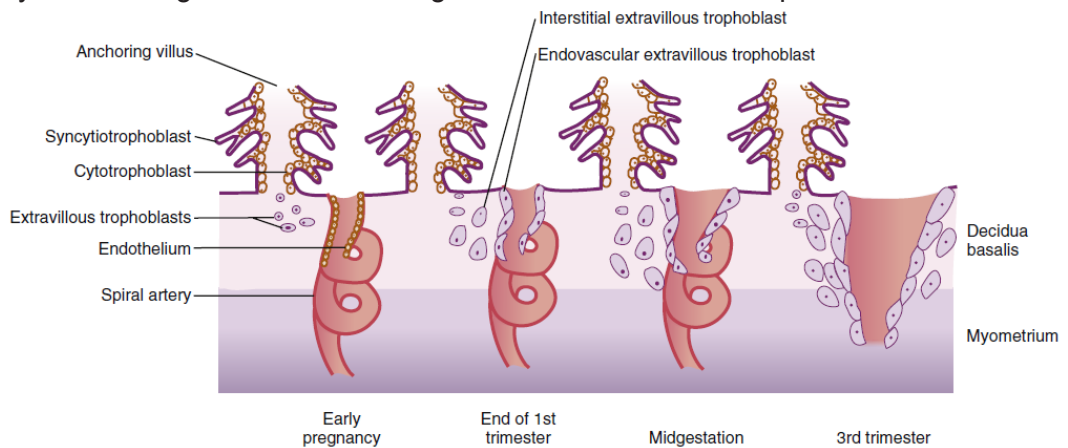


Figure 1. 11: Extravillous trophoblasts are found outside the villus and can be subdivided into endovascular and interstitial categories. Endovascular trophoblasts invade and transform spiral arteries during pregnancy to create low-resistance blood flow that is characteristic of the placenta. Interstitial trophoblasts invade the decidua and surround spiral arteries.

Factors that may affect fertilization and implantation

Fertilization failure

Altered Oviductal

Fluid Components

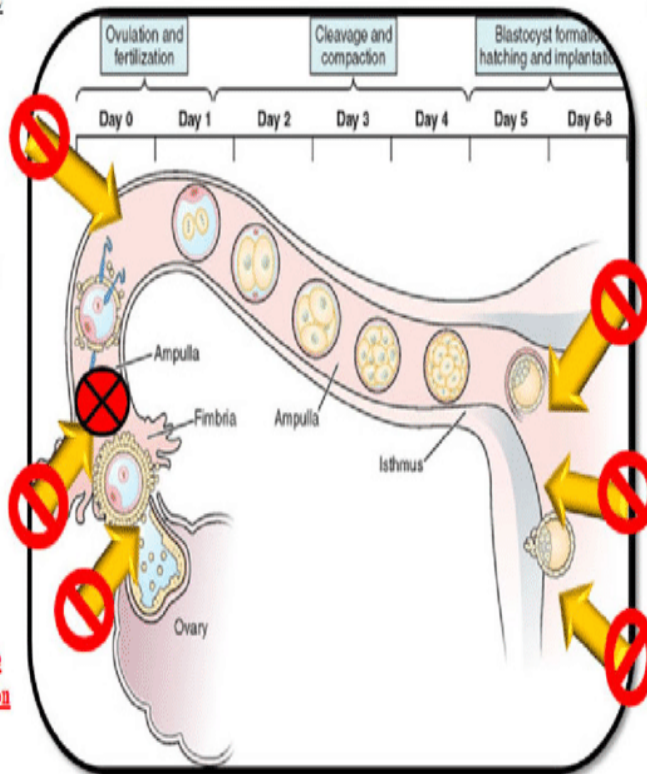
Growth factors, Hormones, Proteases, Antioxidants, Defense agents, Glycosidases, Proteoglycans, Heat shock proteins, Cytokines, Glycoproteins.

Defective Sperm

Capacitation and Acrosomal Reaction

Fallopian tubal Blockage

Ripened egg may not be released through ovulation



Implantation failure

Altered Uterine secretions

Components

Growth factors, Hormones, Cytokines, Chemokines, Proteases, Anti-proteases, Glycoproteins

Altered Adhesion molecules profile

Selectins, Integrins, Cadherins, Trophinin and Heparin-binding epidermal growth factor (HBEFG)

Defective Endometrium

Receptivity

Figure 1. 12: Factors affecting fertilization and implantation

Other factors include:

Age

Female age is the most important factor affecting fertility. Women are born with all the eggs they will ever have and the number of eggs available decreases each day from birth onwards. In young women the decline is fairly gradual (only a few eggs are 'lost' each day), but as women approach their mid to late 30s, the decrease gets much steeper (many more eggs are 'lost' each day). In addition to this decrease in the number of eggs available, the quality of the eggs also declines as women get older. This reduction in both the quantity and quality of available eggs means that older women are less likely to get pregnant and, if they do get pregnant, they are more likely to have a miscarriage. Male fertility may also decrease with age although to a much lesser degree.

Previous Pregnancy

Couples are more likely to get pregnant if they have previously achieved a pregnancy together (irrespective of whether or not that pregnancy resulted in the birth of a baby) compared to couples that have never been pregnant.

Duration of subfertility

The longer couples have been trying to get pregnant, the less likely they are to be successful. If a couple have been trying to get pregnant for less than 3 years they are almost twice as likely to get pregnant than couples who have been trying for more than 3 years.

Timing and Frequency of Sexual Intercourse

Most women have a 28-day menstrual cycle: this means there are 28 days between the start of one period and the start of the next period. Ovulation (when an egg is released from the ovary) occurs around day 14 of a 28-day cycle. Whether or not that egg gets fertilised by a sperm depends on the day(s) in the cycle in which intercourse occurs. The chance of getting pregnant is low at the beginning of the cycle and starts to increase from about day 8 onwards. Women are most likely to get pregnant if they have sex 2 days before they ovulate (i.e. on day 12 of 28-day cycle).

Once ovulation has occurred, the chance of getting pregnant decreases dramatically: sperm need to be present in the female genital tract prior to ovulation to maximise the chances of getting pregnant. The reason for this is that once ovulation has occurred, levels of the hormone progesterone increase and this causes cervical mucus to become thick and sticky which prevents sperm from being able to swim through it to get to the egg to fertilise.

Couples that have regular sex a week are most likely to get pregnant because this frequency ensures that a good volume of fresh sperm will be present in the female reproductive tract at the time of ovulation. If couples are only having sex once a week, the chance of getting pregnant is less because there will be less fresh sperm present in the female genital tract at the time of ovulation.

Lifestyle Factors

Weight

Overweight women who have irregular periods are less likely to release an egg each month (ovulate) than women with regular periods. This means the chances of getting pregnant are reduced. Losing weight, even as little as 5-10% of the total body weight, may restore a regular menstrual cycle thereby increasing the chance of getting pregnant.

Women who are overweight take longer to get pregnant than women who are not, even if their periods are regular. Being overweight is also associated with an increased risk of miscarriage and of problems during pregnancy and delivery. Losing weight has been shown to improve fertility and increase the chance of getting pregnant.

No one diet has been shown to be better than any other but group exercise programmes that involve both exercise and dietary advice leads to more pregnancies than weight loss advice alone.

Men who are overweight may have suboptimal sperm and therefore reduced fertility.

Being underweight can also affect female fertility as it may mean that an egg is not released each month. Being underweight is also associated with problems during pregnancy. Gaining weight is likely to improve fertility.

Smoking

Women who smoke are 3 times more likely to experience a delay in getting pregnant than non-smokers. Even passive smoking can be harmful. Smoking reduces a woman's ovarian reserve (so her ovaries will have fewer eggs in them than a woman of the same age who does not smoke) and damages the cilia inside the fallopian tube (which are important for transporting the egg and/or embryo along the fallopian tube into the uterus). In men, smoking may reduce sperm quantity and quality.

Caffeine

There is no clear association between caffeine consumption and infertility

Alcohol

Some studies report that drinking more than 5 units of alcohol a week may reduce female fertility but others state that low to moderate alcohol consumption may be associated with higher pregnancy rates than non-drinkers. Once pregnant, excessive alcohol consumption may lead to birth defects and developmental delay. The Royal College of Obstetricians and Gynaecologists and the Department of Health recommend that women trying to get pregnant should avoid alcohol because there is no 'safe' limit.

In men, excessive alcohol may lead to difficulties maintaining an erection, impaired ejaculation and reduced sperm quality.

Over-the-counter and recreational drugs

Non-steroidal anti-inflammatory drugs such as ibuprofen can interfere with ovulation. Aspirin may interfere with implantation. Recreational drugs such as marijuana and cocaine may interfere with ovulation and/or the function of the fallopian tube. The fallopian tube is important for transporting the egg from the ovary where it is released, to the womb (uterus) where an embryo will hopefully implant. Fertilisation occurs in the fallopian tube. Anabolic steroids, which are abused by some body-builders, inhibit the production of sperm and this may be permanent even if the drug is stopped.

Medical Conditions

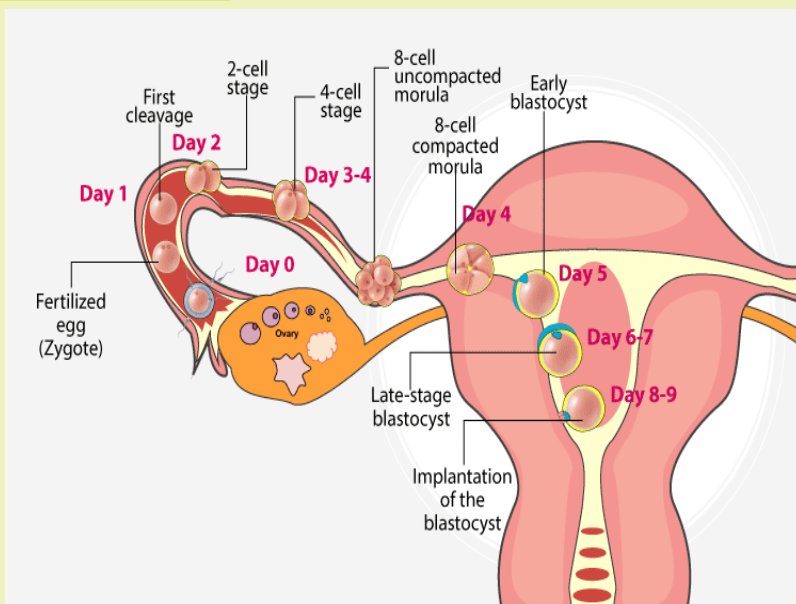
Some women may have medical conditions that can affect their fertility. These may or may not be known about when starting to try for a family. Some of these conditions may be more general, for example thyroid disease and vitamin D deficiency whilst others may be more specific, for example, polycystic ovary syndrome and endometriosis.

Self-assessment 1.3

1. Where precisely does the fertilization normally take place?
2. List the sequence of development of a fertilized egg from zygote to embryo.

1.4. Implantation

Learning Activity 1.4



Based on your knowledge and understanding of biology what is implantation?

At the end of the first week, the blastocyst comes in contact with the uterine wall and adheres to it, embedding itself in the uterine lining via the trophoblast cells. Thus begins the process of implantation, which signals the end of the pre-embryonic stage of development. Implantation can be accompanied by minor bleeding. The blastocyst typically implants in the fundus of the uterus or on the posterior wall.

However, if the endometrium is not fully developed and ready to receive the blastocyst, the blastocyst will detach and find a better spot. A significant percentage (50–75 percent) of blastocysts fail to implant; when this occurs, the blastocyst is shed with the endometrium during menses. The high rate of implantation failure is one reason why pregnancy typically requires several ovulation cycles to achieve.

When implantation succeeds and the blastocyst adheres to the endometrium, the superficial cells of the trophoblast fuse with each other, forming the syncytiotrophoblast, a multinucleated body that digests endometrial cells to firmly secure the blastocyst to the uterine wall. In response, the uterine mucosa rebuilds itself and envelops the blastocyst. The trophoblast secretes human chorionic gonadotropin (hCG), a hormone that directs the corpus luteum to survive, enlarge, and continue producing progesterone and estrogen to suppress menses. These functions of hCG are necessary for creating an environment suitable for the developing embryo. As a result of this increased production, hCG accumulates in the maternal bloodstream and is excreted in the urine. Implantation is complete by the middle of the second week. Just a few days after implantation, the trophoblast has secreted enough hCG for an at-home urine pregnancy test to give a positive result.

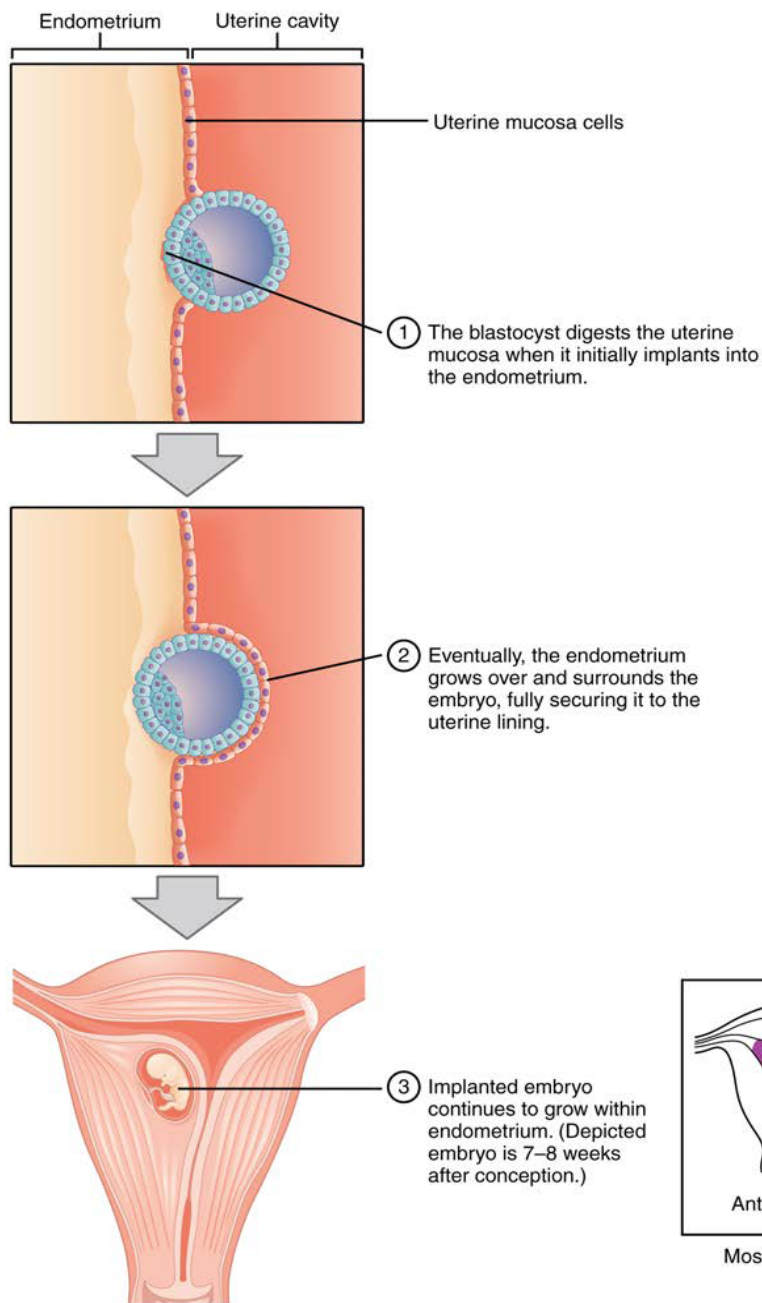


Figure 1. 13: Implantation

Most of the time an embryo implants within the body of the uterus in a location that can support growth and development. However, in one to two percent of cases, the embryo implants either outside the uterus (an ectopic pregnancy) or in a region of uterus that can create complications for the pregnancy. If the embryo implants in the inferior portion of the uterus, the placenta can potentially grow over the opening of the cervix, a condition call placenta previa.

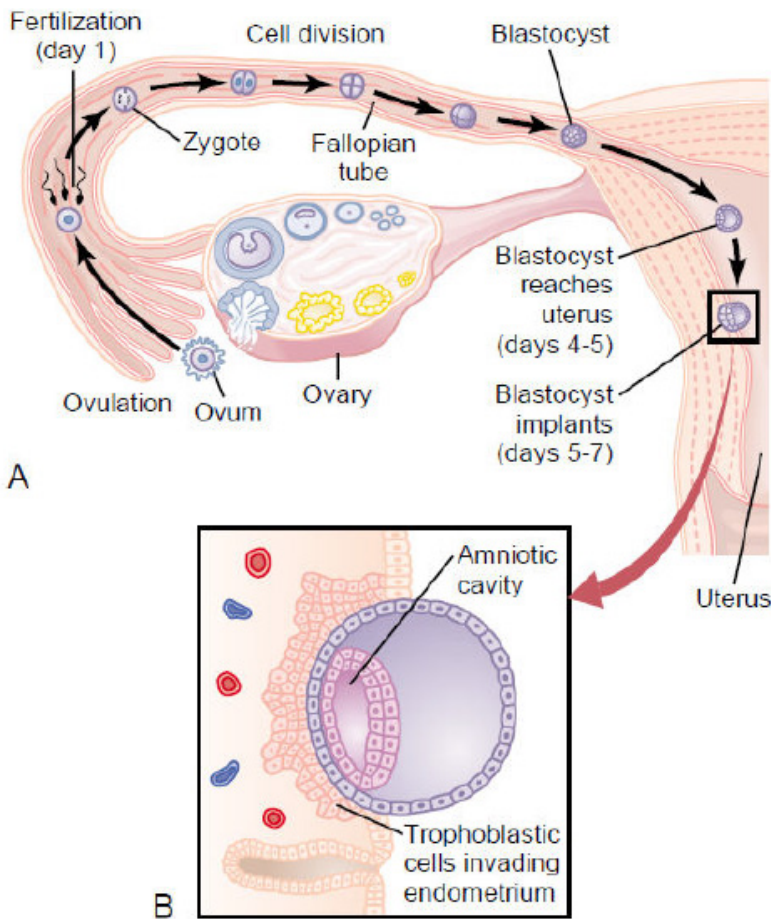


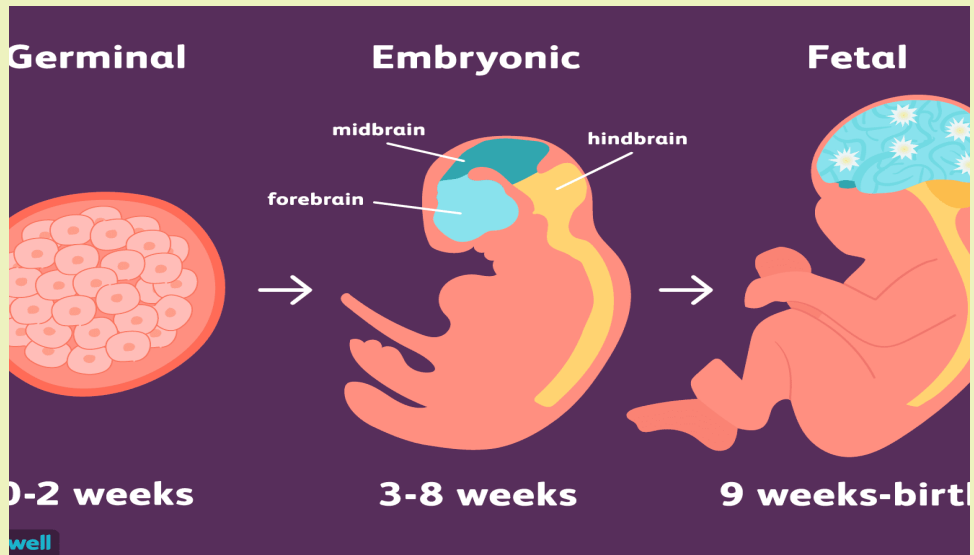
Figure 1. 14: Fertilization and implantation

Self-assessment 1.4

1. How do you know that an embryo has been successfully implanted?
2. Differentiate implantation bleeding and normal menstrual bleeding.

1.5 Embryological and fetal development.

Learning Activity 1.5



1. From the knowledge and understanding gained in biology Describe the embryological stages of development.
2. What is amniotic fluid? Discuss its functions in pregnancy.

Embryological and fetal periods of development.

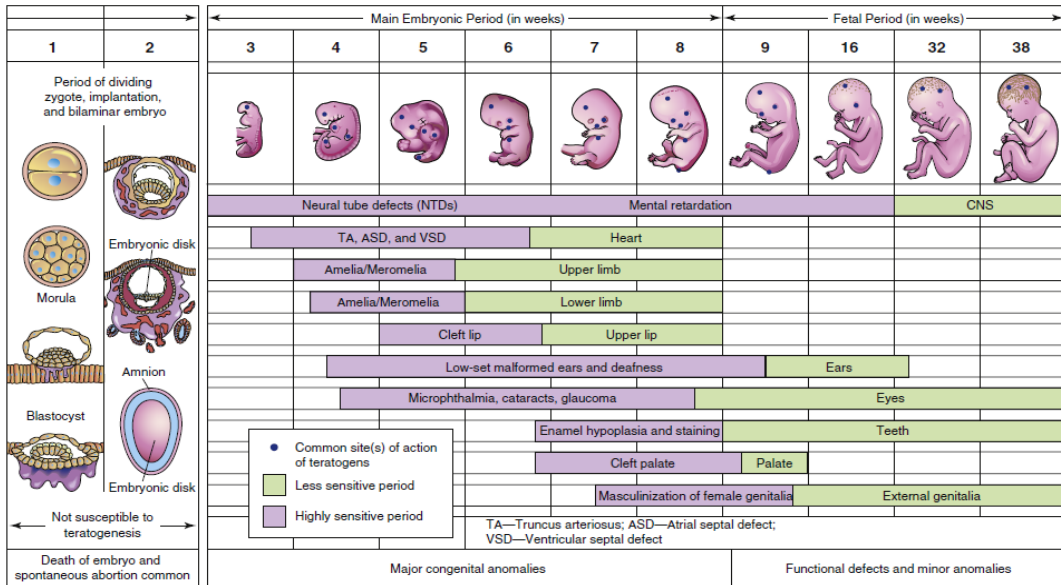


Figure 1. 15: Embryological and fetal periods of development

a. Development of the embryo

The stage of the **embryo** lasts from day 15 until approximately 8 weeks after conception, when the embryo measures 3 cm from crown to rump. This embryonic stage is the most critical time in the development of the organ systems and the main external features. Developing areas with rapid cell division are the most vulnerable to malformation caused by environmental **teratogens** (substances or exposure that causes abnormal development). At the end of the eighth week, all organ systems and external structures are present, and the embryo is unmistakably human.

b. Membranes

At the time of implantation, two fetal membranes that will surround the developing embryo begin to form. The **chorion** develops from the trophoblast and contains the chorionic villi on its surface. The villi burrow into the decidua basalis and increase in size and complexity as the vascular processes develop into the placenta. The chorion becomes the covering of the fetal side of the placenta.

The inner cell membrane, the **amnion**, develops from the interior cells of the blastocyst. The cavity that develops between this inner cell mass and the outer layer of cells (trophoblast) is the amniotic cavity.

c. Amniotic fluid

Amniotic fluid is present at the formation of the amniotic sac. This is a thin-walled sac that contains the fetus during pregnancy. Amniotic fluid is a clear alkaline and slightly yellowish liquid contained within the amniotic sac. It is derived from maternal circulation across placental membranes and exuded from the fetal surface. The fetus contributes to the amniotic fluid through metabolism in small quantities of urine and fluids from its lung. Amniotic fluid is made up of 98% water and electrolytes, along with peptides, carbohydrates, and signaling molecules. The remaining 2% is made up of lipids and hormones.

Function

Amniotic fluid serves a number of purposes during pregnancy, primarily to protect the fetus from harm. The functions of the amniotic fluid include:

- **Acting as a cushion:** This protects the fetus from injury should the mother's abdomen be the subject of trauma or a sudden impact.
- **Protecting the umbilical cord:** Amniotic fluid flows between the umbilical cord and fetus.
- **Protecting from infection:** Amniotic fluid has antibacterial properties.
- **Containing essential nutrients:** These include proteins, electrolytes, immunoglobulins, and vitamins that assist in the development of the fetus.
- **Allowing for the fetus to move:** Amniotic fluid also allows the developing fetus to move around in the womb, which in turn allows for proper development and growth of the musculoskeletal system, gastrointestinal system, and pulmonary system.
- **Maintaining temperature:** Amniotic fluid assists in keeping a constant steady temperature around the fetus throughout pregnancy, protecting the baby from heat loss.

d. Umbilical cord

By day 14 after conception, the embryonic disk, the amniotic sac, and the yolk sac are attached to the chorionic villi by the connecting stalk. During the third week the blood vessels develop to supply the embryo with maternal nutrients and oxygen. During the fifth week the embryo has curved inward on itself from both ends, bringing the connecting stalk to the ventral side of the embryo. The connecting stalk becomes compressed from both sides by the amnion and forms the narrower umbilical cord.

Two arteries carry blood from the embryo to the chorionic villi, and one vein returns blood to the embryo.

e. Yolk sac

When the amniotic cavity and amnion are forming, another blastocyst cavity forms on the other side of the developing embryonic disk. This cavity becomes surrounded by a membrane, forming the yolk sac. The yolk sac aids in transferring maternal nutrients and oxygen, which have diffused through the chorion, to the embryo.

SUMMARY OF EMBRYOLOGICAL AND FETAL DEVELOPMENT

Embryo

0–4 weeks

- Blastocyst implants
- Primitive streak appears
- Conversion of bilaminar disc into trilaminar disc
- Some body systems laid down in primitive form
- Primitive central nervous system forms (neurulation)
- Primitive heart develops and begins to beat
- Covered with a layer of skin
- Limb buds form
- Optic vessels develop
- Gender determined

4–8 weeks

- Very rapid cell division
- More body systems laid down in primitive form and continue to develop
- Spinal nerves begin to develop
- Blood is pumped around the vessels
- Lower respiratory system begins to develop
- Kidneys begin to develop
- Skeletal ossification begins developing
- Head and facial features develop
- Early movements
- Embryo visible on ultrasound from 6 weeks

Fetus

8–12 weeks

- Rapid weight gain
- Eyelids meet and fuse
- Urine passed
- Swallowing begins
- Distinguishing features of external genitalia appear
- Fingernails develop
- Some primitive reflexes present 12–16 weeks
- Rapid skeletal development – visible on X-ray
- Lanugo appears
- Meconium present in gut
- Nasal septum and palate fuse
- External genitalia fully differentiate into male or female by week 12
- Fetus capable of sucking thumb

16–20 weeks

- Constant weight gain
- ‘Quickening’ – mother feels fetal movements
- Fetal heart heard on auscultation
- Vernix caseosa appears
- Skin cells begin to be renewed
- Brown adipose tissue (BAT) forms

20–24 weeks

- Most organs functioning well
- Eyes complete
- Periods of sleep and activity
- Ear apparatus developing
- Responds to sound
- Skin red and wrinkled
- Surfactant secreted in the lungs from week 20

24–28 weeks

- Legally viable and survival may be expected if born
- Eyelids open
- Respiratory movements

28–32 weeks

- Begins to store fat and iron
- Testes descend into scrotum
- Lanugo disappears from face
- Skin becomes paler and less wrinkled 32–36 weeks
- Weight gain 25 g/day
- Increased fat makes the body more rounded
- Lanugo disappears from body
- Hair on fetal head lengthens
- Nails reach tips of fingers and toes
- Ear cartilage soft
- Plantar creases visible.

36 weeks to birth

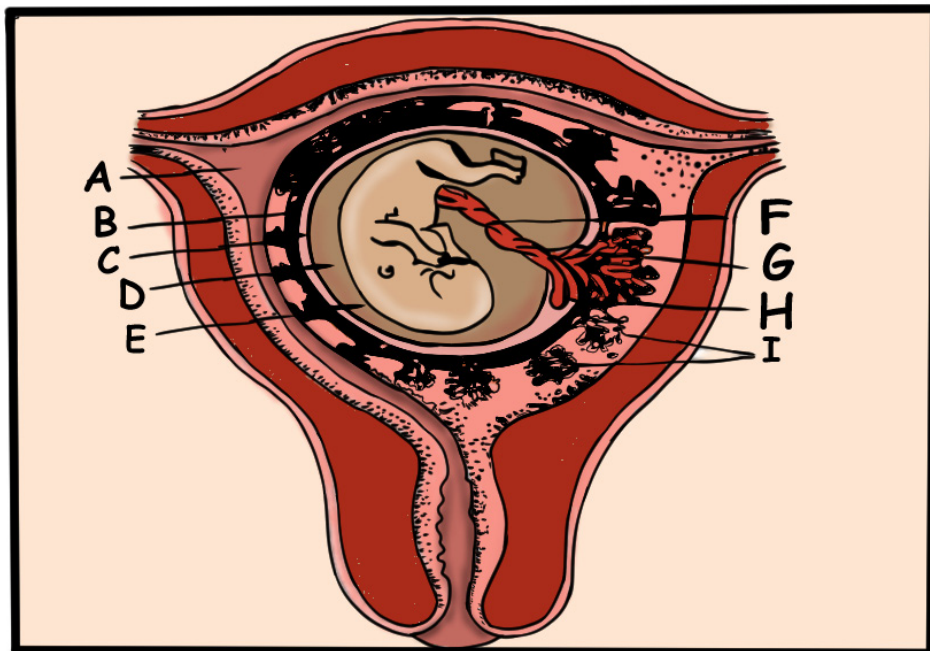
- Birth is expected
- Body round and plump
- Skull formed but soft and pliable

Self-assessment 1.5

1. Describe the Amnion and chorion and their specific characteristics.
2. How many arteries and vein does the umbilical cord contain.

1.6 Development of Placenta and functions

Learning Activity 1.6



On the above diagram, show the structure of foetal membranes and the placenta

Development of placenta:

The human placenta develops from the trophoblast (TE), the outer layer of the pre-implantation embryo, which forms at 5 days' post fertilization. At this stage, the pre-implantation embryo (termed a blastocyst) is segregated into two lineages: the inner cell mass (ICM) and the trophoblast.

Structure

The placenta begins to form at implantation. During the third week after conception the trophoblast cells of the chorionic villi continue to invade the decidua basalis. As the uterine capillaries are tapped, the endometrial spiral arteries fill with maternal blood.

The placenta functions as a means of metabolic exchange. Exchange is minimal at this time because the two cell layers of the villous membrane are too thick. Permeability increases as the cytotrophoblast thins and disappears; by the fifth month, only the single layer of syncytium is left between the maternal blood and the fetal capillaries.

Placenta at term

At term the placenta is discoid in shape, about 20 cm in diameter and 2.5 cm thick at its centre and weighing approximately 470 g, which is directly proportional to the weight of the fetus. The weight of the placenta may be affected by physiological or active management of the third stage of labour owing to the varying amounts of fetal blood retained in the vessels. The placenta is no longer routinely weighed in clinical practice; however, some maternity units may do so as part of clinical trials and research activities.

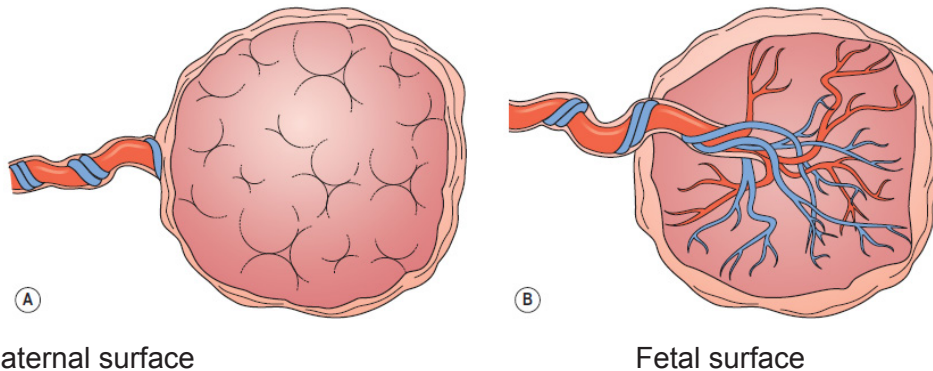


Figure 1. 16: Placenta

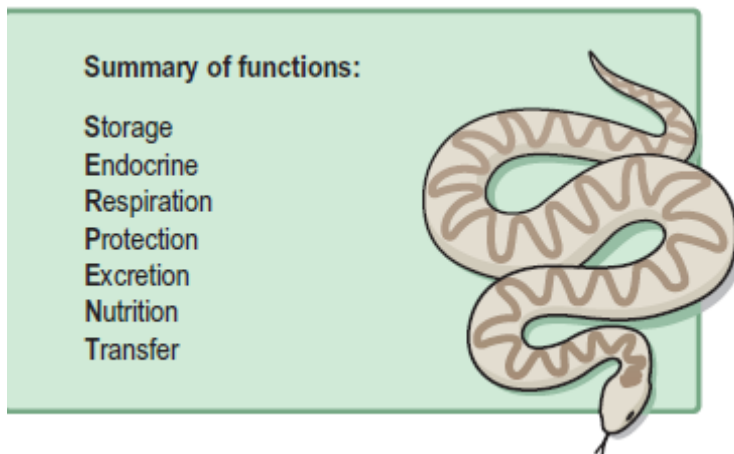
The maternal surface of the placenta (i.e. the basal plate) is dark red in colour due to maternal blood and partial separation of the basal decidua. The surface is arranged in up to 40 cotyledons (lobes), which are separated by sulci (furrows), into which the decidua dips down to form septa (walls). The cotyledons are made up of lobules, each of which contains a single villus with its branches. Sometimes deposits of lime salts may be present on the surface, making it slightly gritty. This has no clinical Significance.

The fetal surface of the placenta (i.e. the chorionic plate) has a shiny appearance due to the amnion covering it.

Branches of the umbilical vein and arteries are visible, spreading out from the insertion of the umbilical cord, which is normally in the centre. The amnion can be peeled off the surface of the chorion as far back as the umbilical cord, whereas the chorion, being derived from the same trophoblastic layer as the placenta, cannot be separated from it.

Functions

The placenta performs a variety of functions for the developing fetus which can be determined by the mnemonic SERPENT



Storage

The placenta metabolizes glucose, stores it in the form of glycogen and reconverts it to glucose as required. It can also store iron and the fat-soluble vitamins.

Endocrine

The many and varied endocrine functions of the placenta are complex, requiring maternal and fetal input. Both types of trophoblasts produce steroidal hormones (oestrogens and progesterone) in addition to many placental protein hormones necessary for pregnancy.

Steroid hormones

There are three important oestrogens: oestrone, oestradiol and oestriol. Both maternal and fetal adrenal production provide precursors for oestrogen production by the placenta.

Protein hormones

Human chorionic gonadotrophin (hCG) is produced under the influence of placental gonadotrophic releasing hormone (GnRH) by the trophoblasts.

Respiration

Gaseous exchange to and from the fetus occurs as a result of diffusion. Transfer of gases is assisted by a slight maternal respiratory alkalosis in pregnancy. The fetal hemoglobin level is high in utero to facilitate transport of gases. The fetal hemoglobin also has a high affinity for oxygen.

Protection

The placenta provides a limited barrier to infection. Few bacteria can penetrate with the exception of the treponema of syphilis and the tubercle bacillus. However, many types of virus can penetrate the placental barrier, such as human immunodeficiency virus (HIV), hepatitis strains, human cytomegalovirus (CMV) and rubella. In addition to this, some parasitic and protozoal diseases, such as malaria and toxoplasmosis, will cross the placenta.

The placenta filters substances of a high molecular weight therefore some drugs and medicines may transfer to the fetus.

Immunoglobulins will be passed from mother to fetus transplacentally in late pregnancy, providing about 6–12 weeks' naturally acquired passive immunity to the baby. In the case of Rhesus disease, if sensitization occurs and fetal blood cells enter the maternal circulation, responding antibodies produced by the mother may cross the placenta and destroy fetal surface antigens and consequently fetal cells, causing haemolysis, hydrops fetalis and potential fetal demise.

Excretion

The main substance excreted from the fetus is carbon dioxide. Bilirubin will also be excreted as red blood cells are replaced relatively frequently. There is very little tissue breakdown apart from this and the amounts of urea and uric acid excreted are very small.

Nutrition

The fetus requires nutrients for its ongoing development, such as amino acids and glucose which are required for growth and energy, calcium and phosphorus for bones and teeth, and iron and other minerals for blood formation. These nutrients are actively transferred from the maternal to the fetal blood through the walls of the villi.

The placenta is able to select those substances required by the fetus, even depleting the mother's own supply in some instances. Water, vitamins and minerals also pass to the fetus. Fats and fat-soluble vitamins (A, D and E) cross the placenta only with difficulty and mainly in the later stages of pregnancy. Some substances, including amino acids, are found at higher levels in the fetal blood than in the maternal blood.

Transfer of substances

Substances transfer to and from the fetus by a variety of transport mechanisms, as stated below:

- Simple diffusion of gases and lipid soluble substances.

- Water pores transfer water-soluble substances as a result of osmotic and potentially hydrostatic forces.
- Facilitated diffusion of glucose using carrier proteins.
- Active transport against concentration gradients of ions, calcium (Ca) and phosphorus (P).
- Endocytosis (pinocytosis) of macromolecules

Self-assessment 1.6

1. A natural cleavage plane between the placenta and the uterine wall is formed when the cotyledons of the maternal surface of the placenta extend into the:
 - a. Myometrium
 - b. Uterine wall
 - c. Decidua's basalis
 - d. Amniotic membrane
2. Which of the following is the portion of the placenta that is contributed by the embryo?
 - a. Chorion
 - b. Yolk sac
 - c. Amnion
 - d. Allantois
3. Which of the following blood vessels transports blood rich in oxygen and nutrients to the fetus?
 - a. Ductus arteriosus
 - b. Ductus venosus
 - c. Umbilical vein
 - d. Umbilical artery
4. What are the nutritive and protective functions of the placenta?

1.7 Fetal circulation

Learning Activity 1.7

Blood circulation in fetuses is done to avail oxygen and nutrients for body use and remove waste products. Based on the competences developed in senior 3, please brainstorm on how fetal circulation is done.

The placenta is the source of oxygenation, nutrition and elimination of waste for the fetus. There are several temporary structures in addition to the placenta and the umbilical cord that enable the fetal circulation to occur.

These include:

- The ductus venosus, which connects the umbilical vein to the inferior vena cava.
- The foramen ovale, which is an opening between the right and left atria.
- The ductus arteriosus, which leads from the bifurcation of the pulmonary artery to the descending aorta.
- The hypogastric arteries, which branch off from the internal iliac arteries and become the umbilical arteries when they enter the umbilical cord. The fetal circulation takes the following course:

Oxygenated blood from the placenta travels to the fetus in the umbilical vein. The umbilical vein divides into two branches – one that supplies the portal vein in the liver, the other anastomosing with the ductus venosus and joining the inferior vena cava. Most of the oxygenated blood that enters the right atrium passes across the foramen ovale to the left atrium, which mixes with a very small amount of blood returning from the lungs from where it passes into the left ventricle via the bicuspid valve, and then the aorta. The head and upper extremities receive approximately 50% of this blood via the coronary and carotid arteries, and the subclavian arteries respectively. The rest of the blood travels down the descending aorta, mixing with deoxygenated blood from the right ventricle via the ductus arteriosus.

Deoxygenated blood collected from the head and upper parts of the body returns to the right atrium via the superior vena cava. Blood that has entered the right atrium from the superior vena cava enters at a different angle to the blood that enters from the inferior vena cava and heads towards the foramen ovale. Hence there are two distinct blood flows entering the right atrium. Most of the lesser oxygenated blood entering the right atrium from the superior vena cava passes behind the flow of highly oxygenated blood going to the left atrium and enters the right ventricle via the tricuspid valve. There is a small amount of blood mixing where the two blood flows meet in the atrium. From the right ventricle a little blood travels to the lungs in the pulmonary artery, for their development. Most blood, however, passes from the pulmonary artery through the ductus arteriosus into the descending aorta. This blood, although low in oxygen and nutrients, is sufficient to supply the lower body of the fetus. It is also by this means that deoxygenated blood travels back to the placenta via the internal iliac arteries, which lead into the hypogastric arteries, and ultimately into the umbilical arteries. This circulation means that the fetus has a well oxygenated and perfused head, brain and upper body compared to its lower extremities.

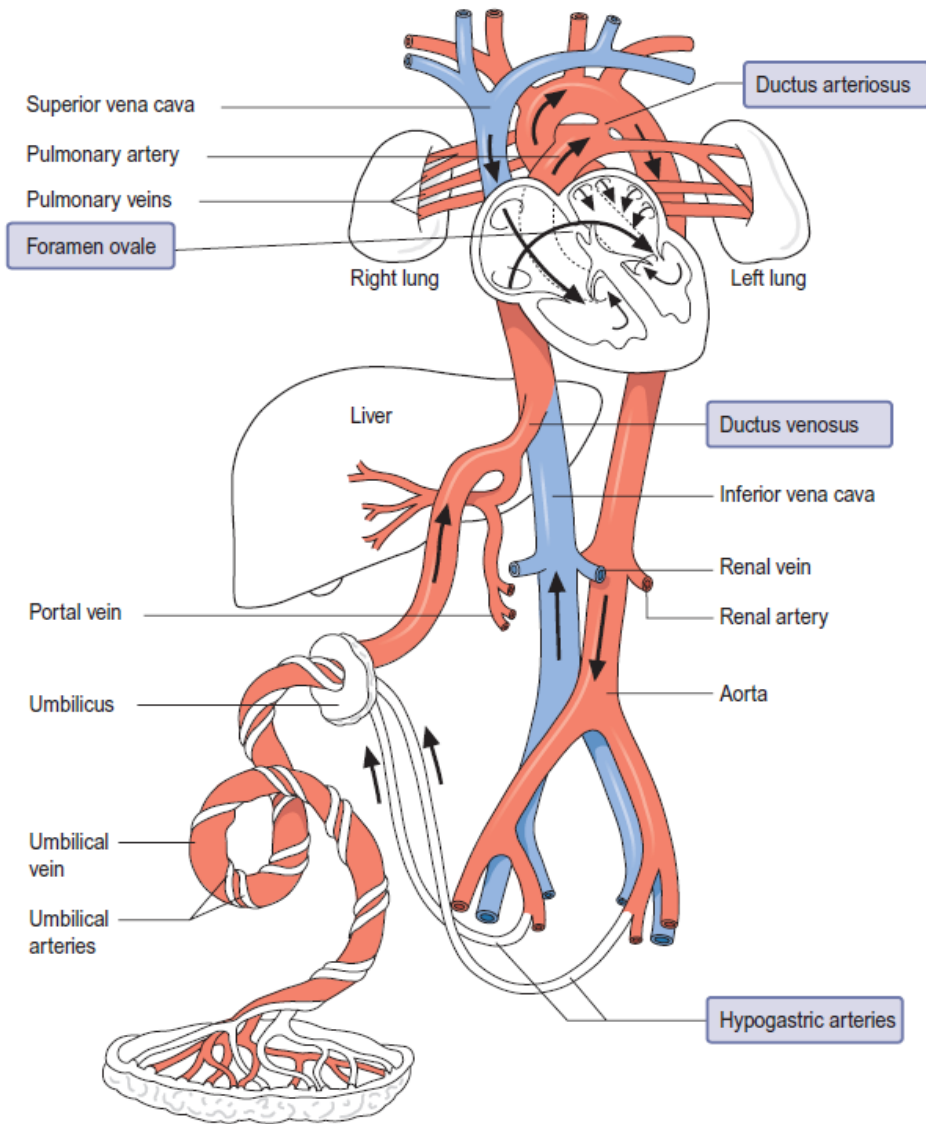


Figure 1. 17: Fetal circulation

Self-assessment activity 1.7

1. Differentiate ductus venosus from ductus arteriosus
2. What are temporary structures formed during intra-uterine life?

1.8 Characteristics of a normal pregnancy

Learning Activity 1.8

A 27 years old married lady is accompanied by her husband to the health center to get medical care. She presents the signs and symptoms of nausea and vomiting every morning in the last 4 days, pain in lower abdomen and nausea, mood changes and selection of food. She also reported to have missed her periods for the last two months. She states that she treated herself for malaria last three months

Use the knowledge of S3 biology on the topic of pregnancy to recall the signs of pregnancy in woman who is pregnant.

Pregnancy is a time of profound physical, physiological and psychological change. In addition to the reproductive organs, all maternal physiologic systems make adaptations needed to support the developing fetus and, at the same time, maintain maternal homeostasis.

1.8.1 Physical and physiological characteristics of a normal pregnancy

Some pregnant women experience a lot of physical changes and others only a few.

- Aches and pain (possibly in your lower abdomen and in your joints)
- Morning sickness which may be nausea or actual vomiting, and does not just happen in the morning
- Food cravings and aversions
- Heartburn and indigestion
- Constipation
- A need to urinate more often
- Skin change and itching and possibly skin tags.
- Larger and tender breasts.

Pregnancy and its changes is a normal physiological process that happens in all mammalian in response to the development of the fetus. These changes happen in response to many factors; hormonal changes, increase in the total blood volume, weight gain, and increase in fetus size. All these factors have a physiological impact on all systems of the pregnant woman; musculoskeletal, endocrine, reproductive system, cardiovascular, respiratory, gastrointestinal system, and renal changes.

1.8.2 Psychological characteristics of a normal pregnancy

Pregnancy is always associated with changes in the psychological functioning of pregnant women. It is usually associated with ambivalence, frequent mood changes, varying from anxiety, fatigue, exhaustion, sleepiness, depressive reactions to excitement. During pregnancy, changes include body appearance, affectivity and sexuality, whereas the position and role of women attains a new quality. Even thoughts of pregnancy can bring about numerous worries about its course and outcome, and especially of the delivery itself, which may be so intense that they acquire a feature of phobia (which may be the reason for avoiding pregnancy).

Pregnancy as a stressful event: Pregnancy is identified as a potent stressor that can seriously affect the psychic status of pregnant women, perinatal outcome, but also psychic functioning of the new-born individual. Appropriate relationship of partners and support of the society play an important role in overcoming stress during pregnancy.

Conclusion: Pregnancy is an event that involves numerous somatic and psychological changes. However, pregnancy can also be a potent stressor. Existence of prenatal maternal stress may lead to different perinatal complications that may have long-term consequences on the newborn. In prevention of maternal stress emphasis has to be put on partner's emotional support, as well as empathy of the social environment. However, in certain cases, professional psychotherapeutic support is necessary, in form of short supportive treatment. Preventive measures should include adequate psychological support during pregnancy, especially the first one, provided for all pregnant women, but also for those women that plan to get pregnant in the near future.

Self-assessment 1.8

Discuss the psychological characteristics of pregnancy

1.9 The pelvis

Learning Activity 1.9

A 16 years old boy who study science subjects including biology in S3 comes home for holiday and realizes that his mother who is 30 weeks pregnant had an accident which affected her pelvic bone thereby leading to unsteady gait when walking as the pregnancy progresses. During interview with the mother states that she feels more pain on her back as the pregnancy progress and difficulty to stand straight. The child is concerned with the long-term effects that this gait deviation will have on his mother's vertebra column especially now that the mother is pregnant.

1. Based on your knowledge and understanding of biology in S3 What is pelvis?
2. Which body part do you think might be an underlying cause of this gait pattern?

1.9.1 Anatomy background of pelvis

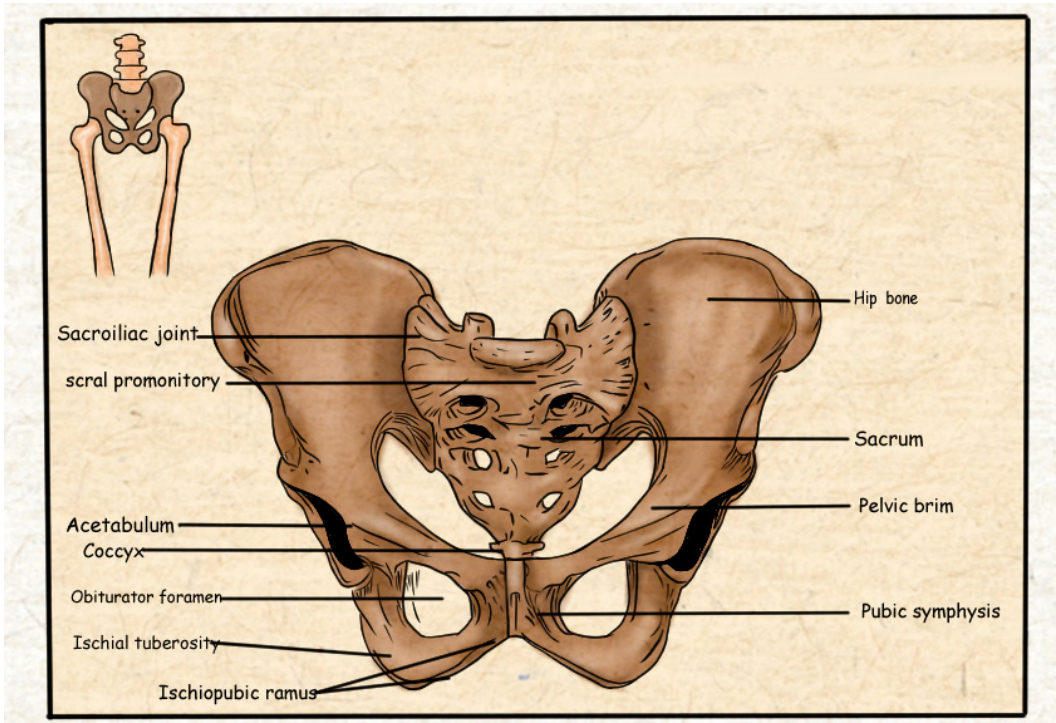


Figure 1. 18: Pelvis

- The pelvis is the region found between the trunk and lower limbs.
- In females, the pelvis is wider and lower than that of their male counterpart, making it more suited to accommodate a fetus during both pregnancy and delivery.

- It protects and supports the pelvic contents, provides muscle attachment and facilitates the transfer of weight from trunk to legs in standing, and to the ischial tuberosities in sitting.
- The cross-sectional anatomy of the female pelvis shows five bones: two hip bones, sacrum, coccyx, and two femurs. The joints are supported by some of the strongest ligaments in the body which become laxer during pregnancy leading to increased joint mobility and less efficient load transfer through the pelvis.
- The pelvic outlet at the base of the pelvis is narrower in its transverse diameter when compared with the pelvic inlet; it comprises the pubic arch, ischial spines, sacrotuberous ligaments, and coccyx.
- Four pairs of abdominal muscles combine to form the anterior and lateral abdominal wall and may be termed the abdominal corset.
- Transversus abdominis lies deep to the internal abdominal oblique and external abdominal oblique with the rectus abdominis central, anterior and superficial abdominal oblique, external oblique and transversus abdominis insert into an aponeurosis joining in the midline at the linea alba. The deep abdominal muscles, together with the pelvic floor muscles, multifidus, and diaphragm, can be considered as a complete unit and may be termed the lumbopelvic cylinder. This provides support for the abdominal contents and maintains intraabdominal pressure.
- Organs of the female reproductive system present in the pelvis are subdivided into internal and external genitalia.

1.9.2 Types of pelvis

The pelvis is a group of bones located in the lower part of torso, between the lower back and thighs. The shape of the pelvis often differs between males and females.

There are four main types of pelvis:

- a. Gynecoid. This is the most common type of pelvis in females and is generally considered to be the typical female pelvis. Its overall shape is round, shallow, and open.
- b. Android. This type of pelvis bears more resemblance to the male pelvis. It's narrower than the gynecoid pelvis and is shaped more like a heart or a wedge.
- c. Anthropoid. An anthropoid pelvis is narrow and deep. Its shape is similar to an upright egg or oval.
- d. Platypelloid. The platypelloid pelvis is also called a flat pelvis. This is the least common type. It's wide but shallow, and it resembles an egg or oval lying on its side.

Table 1. 1: Types of pelvis

Features	Gaynacoid	Android	Antropaid	Platypelloid
Brim	Round	Heart shaped	Long oval	Kidney shaped
Fore- pelvis	Genrous	Narrow	narrowed	Wide
Side walls	Straight	convergent	divergent	Divergent
istical spines	Blunt	Prominent	blunt	Blunt
sciatic notch	Rounded	Narrow	wide	Wide
sub- pubic angle	90°	< 90°	>90°	>90°
Incidence	50%	20%	25%	5%

Pelvis shape can vary greatly among females around the world.

1.9.3 Pelvis in relation to pregnancy and child birth

The term pelvis is applied to the skeletal ring formed by the innominate bones and the sacrum, the cavity within and even the entire region where the trunk and the lower limb meet. The pelvis is divided by an oblique plane which passes through the prominence of the sacrum, the arcuate line (the smooth rounded border on the internal surface of the ilium), the pectineal line (a ridge on the superior ramus of the pubic bone) and the upper margin of the symphysis pubis, into the true and the false pelvis.

a. **THE TRUE PELVIS:** The true pelvis is the bony canal through which the fetus must pass during birth. It is divided into a brim, a cavity and an outlet.

i. **The pelvic brim:**

The superior circumference forms the brim of the true pelvis; the included space being called the inlet. The brim is round except where the sacral promontory projects into it.

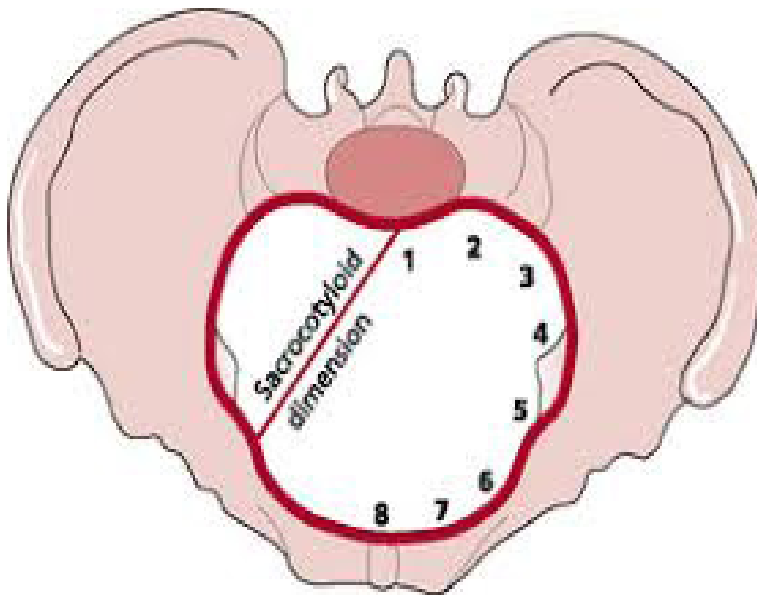


Figure 1. 19: Pelvic landmarks

There are fixed points on the pelvic brim that are known as its landmarks. Commencing posteriorly, there are:

- Sacral promontory (1)
- Sacral ala or wing (2)
- Sacroiliac joint (3)
- Ilipectineal line, which is the edge formed at the inward aspect of the ilium (4)
- Ilipectineal eminence, which is a roughened area formed where the superior ramus of the pubic bone meets the ilium (5).
- Superior ramus of the pubic bone (6)
- Upper inner border of the body of the pubic bone (7)
- Upper inner border of the symphysis pubis (8)

ii. The pelvic cavity:

The cavity of the true pelvis extends from the brim superiorly to the outlet inferiorly. The anterior wall is formed by the pubic bones and symphysis pubis and its depth is 4 cm. The posterior wall is formed by the curve of the sacrum which is 12 cm in length. Because there is such a difference in these measurement, the cavity forms a curved canal.

The cavity contains the pelvic colon, rectum, bladder and some of the reproductive organs. The rectum is placed posteriorly, in the curve of the sacrum and coccyx, the bladder is anterior behind the symphysis pubis.

iii. The pelvic outlet:

The lower circumference of the true pelvis is very irregular, the space enclosed by it is called the outlet. Two outlets are described: the anatomical and the obstetrical. The anatomical outlet is formed by the lower borders of each of the bones together with the sacrotuberous ligament. The obstetrical outlet is of greater practical significance because it includes the narrow pelvic strait through which the fetus must pass. The obstetrical outlet is the space between the narrow pelvic strait and the anatomical outlet. This outlet is diamond-shaped.

b.THE FALSE PELVIS: It is bounded posteriorly by the lumbar vertebrae and laterally by the iliac fossae, and in front by the lower portion of the anterior abdominal wall. The false pelvis varies considerably in size according to the flare of the iliac bones. However, the false pelvis has no significance in midwifery.

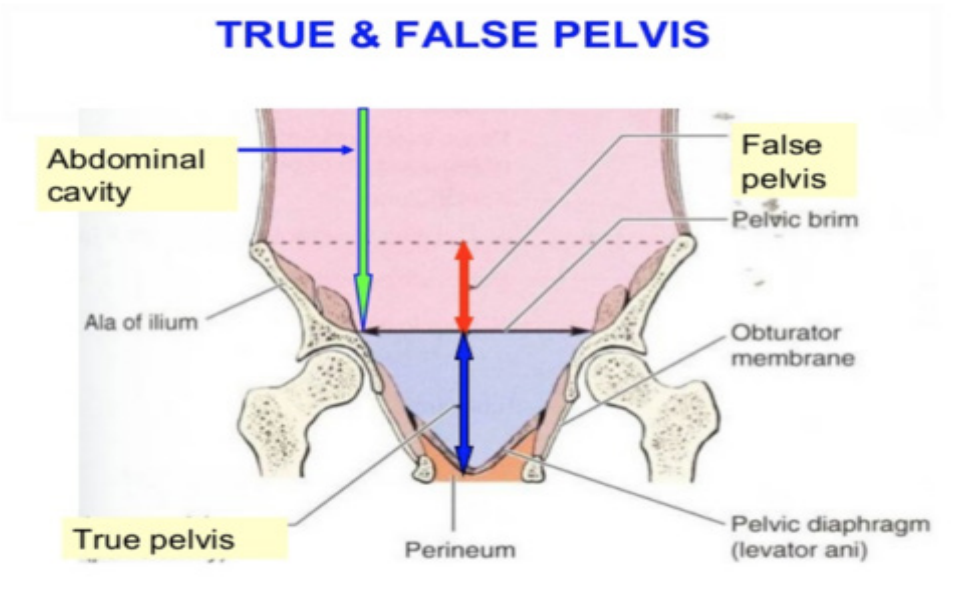


Figure 1. 20: True and False pelvis

Table 1. 2: Differences between the Female and Male Pelvis

	Female pelvis	Male pelvis
Pelvic weight	Bones of the pelvis are lighter and thinner	Bones of the pelvis are thicker and heavier
Pelvic inlet shape	Pelvic inlet has a round or oval shape	Pelvic inlet is heart-shaped
Lesser pelvic cavity shape	Lesser pelvic cavity is shorter and wider	Lesser pelvic cavity is longer and narrower
Subpubic angle	Subpubic angle is greater than 80 degrees	Subpubic angle is less than 70 degrees
Pelvic outlet shape	Pelvic outlet is rounded and larger	Pelvic outlet is smaller

1.9.4 Pelvic diameters

Pelvis	Diameter (cm)		
	Anteroposterior	Transverse	Oblique
Pelvic Inlet	11	13	12
Pelvic Cavity	12	12	12
Pelvic Outlet	13	11	-

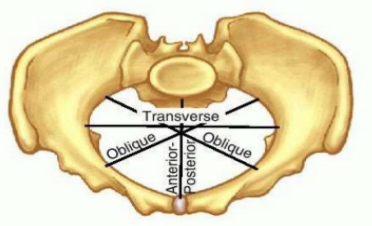


Figure 1. 21: Principal diameters

Knowledge of the diameters of the normal female pelvis is essential in the practice of midwifery because contraction of any of them can result in malposition or malpresentation of the presenting part of the fetus.

Diameters of the pelvic inlet

The brim has four principal diameters: the anteroposterior diameter, the transverse diameter and the two oblique diameters. The anteroposterior or conjugate diameter extends from the midpoint of the sacral promontory to the upper border of the symphysis pubis. Three conjugate diameters can be measured: the anatomical (true) conjugate, the obstetrical conjugate and the internal or diagonal conjugate. The anatomical conjugate, which averages 12 cm, is measured from the sacral promontory to the uppermost point of the symphysis pubis. The obstetrical conjugate which averages 11 cm, is measured from the sacral promontory to the posterior border of the upper surface of the symphysis pubis.

This represents the shortest anteroposterior diameter through which the fetus must pass and is hence of clinical significance to midwives. The obstetrical conjugate cannot be measured with the examining fingers or any other technique.

The diagonal conjugate is measured anteroposteriorly from the lower border of the symphysis to the sacral promontory.

The transverse diameter is constructed at right-angles to the obstetric conjugate and extends across the greatest width of the brim; its average measurement is about 13 cm. Each oblique diameter extends from the iliopectineal eminence of one side to the sacroiliac articulation of the opposite side; its average measurement is about 12 cm.

Each takes its name from the sacroiliac joint from which it arises, so the left oblique diameter arises from the left sacroiliac joint and the right oblique from the right sacroiliac

joint. Another dimension, the sacrocotyloid, passes from the sacral promontory to the iliopectineal eminence on each side and measures 9–9.5 cm. Its importance is concerned with posterior positions of the occiput when the parietal eminences of the fetal head may become caught.

Diameters of the cavity

The cavity is circular in shape and although it is not possible to measure its diameters exactly, they are all considered to be 12 cm.

Diameters of the outlet

The outlet, which is diamond-shaped, has three diameters: the anteroposterior diameter, the oblique diameter and the transverse diameter. The anteroposterior diameter extends from the lower border of the symphysis pubis to the sacrococcygeal joint. It measures 13 cm; as the coccyx may be deflected backwards during labour, this diameter indicates the space available during birth. The oblique diameter, although there are no fixed points, is said to be between the obturator foramen and the sacrospinous ligament. The measurement is taken as being 12 cm. The transverse diameter extends between the two ischial spines and measures 10–11 cm. It is the narrowest diameter in the pelvis. The plane of least pelvic dimensions is said to be at the level of the ischial spines.

Orientation of the pelvis

In the standing position, the pelvis is placed such that the anterior superior iliac spine and the front edge of the symphysis pubis are in the same vertical plane, perpendicular to the floor.

If the line joining the sacral promontory and the top of the symphysis pubis were to be extended, it would form an angle of 60° with the horizontal floor. Similarly, if a line joining the centre of the sacrum and the Centre of the symphysis pubis were to be extended, the resultant angle with the floor would be 30° . The angle of inclination of the outlet is 15° . When in the recumbent position, the same angles are made as in the vertical position; this fact should be kept in mind when carrying out an abdominal examination.

Pelvic planes

Pelvic planes are imaginary flat surfaces at the brim, cavity and outlet of the pelvic canal at the levels of the lines described above.

Axis of the pelvic canal

A line drawn exactly half-way between the anterior wall and the posterior wall of the pelvic canal would trace a curve known as the curve of Carus. The midwife needs to become familiar with this concept in order to make accurate observations on vaginal examination and to facilitate the birth of the baby.

Table 1. 3: Summary of pelvic diameters

Pelvis	Diameter (cm)		
	Anteroposterior	Transverse	Oblique
Pelvic Inlet	11	13	12
Pelvic Cavity	12	12	12
Pelvic Outlet	13	11	-

Self-assessment activity 1.9

1. What is the narrowest diameter for the fetus to pass through?
2. Which of the following statements is false? In each case, say why it is incorrect.
 - a. The female bony pelvis is broader and flatter than the male pelvis.
 - b. The pelvic inlet is narrower than the pelvic outlet.
 - c. The iliac crest is an important landmark in measuring the progress of the fetus down the birth canal.
 - d. The sutures in the fetal skull are strong hard joints that hold the skull bones rigidly in place.
 - e. A newborn baby's pulse can be seen beating in the anterior fontanel.

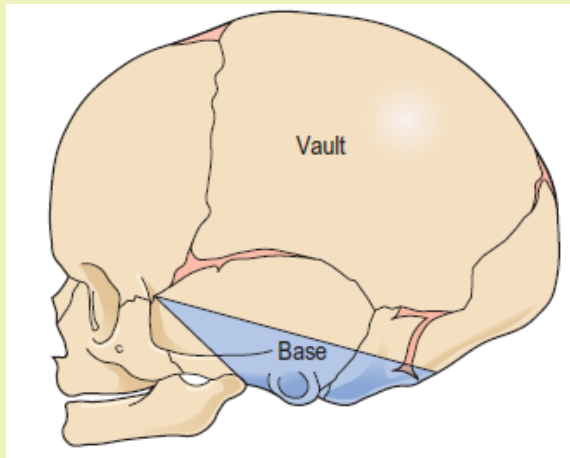
3. Match the terms with the appropriate explanation

Column A	Column B
Ilium	Joint between the parietal bones in the fetal skull
Frontal bones	Paired bones forming the front of the skull
Sagittal suture	Hip bone in the pelvis
Sacrum	The top of the fetal skull between the two fontanel
Vertex	Fused vertebrae at the back of the bony pelvis

1.10 The fetal skull

Learning Activity 1.10

Study the following structure of the fetal skull, a bony structure that protects the brain:



1. Describe the above structure
2. Predict how the fetal skull protects the brain in fetuses.

The fetal head is large in relation to the fetal body compared with the adult. Additionally, it is large in comparison with the maternal pelvis and is the largest part

of the fetal body to be born. Adaptation between the skull and the pelvis is necessary to allow the head to pass through the pelvis during labour without complications. The bones of the vault are thin and pliable, and if subjected to great pressure damage to the underlying delicate brain may occur.

1.10.1 Divisions of the fetal skull

The skull is divided into the vault, the base and the face. The vault is the large, dome-shaped part above an imaginary line drawn between the orbital ridges and the nape of the neck. The base comprises bones that are firmly united to protect the vital centres in the medulla oblongata. The face is composed of 14 small bones that are also firmly united and non-compressible.

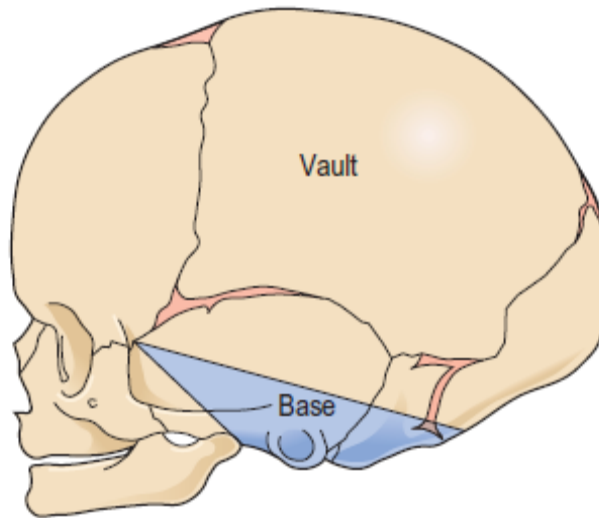


Figure 1. 22: Fetal skull

1.10.2 Bones of the vault

The bones of the vault are laid down in membrane. They harden from the centre outwards in a process known as ossification. Ossification is incomplete at birth, leaving small gaps between the bones, known as the sutures and fontanelles. The ossification centre on each bone appears as a protuberance. Ossification of the skull is not complete until early adulthood. The bones of the vault consist of:

The occipital bone, which lies at the back of the head. Part of it contributes to the base of the skull as it contains the foramen magnum, which protects the spinal cord as it leaves the skull. The ossification centre is the occipital protuberance.

- The two parietal bones, which lie on either side of the skull. The ossification centre of each of these bones is called the parietal eminence.

- The two frontal bones, which form the forehead or sinciput. The ossification centre of each bone is the frontal eminence. The frontal bones fuse into a single bone by eight years of age.
- The upper part of the temporal bone on both sides of the head forms part of the vault.

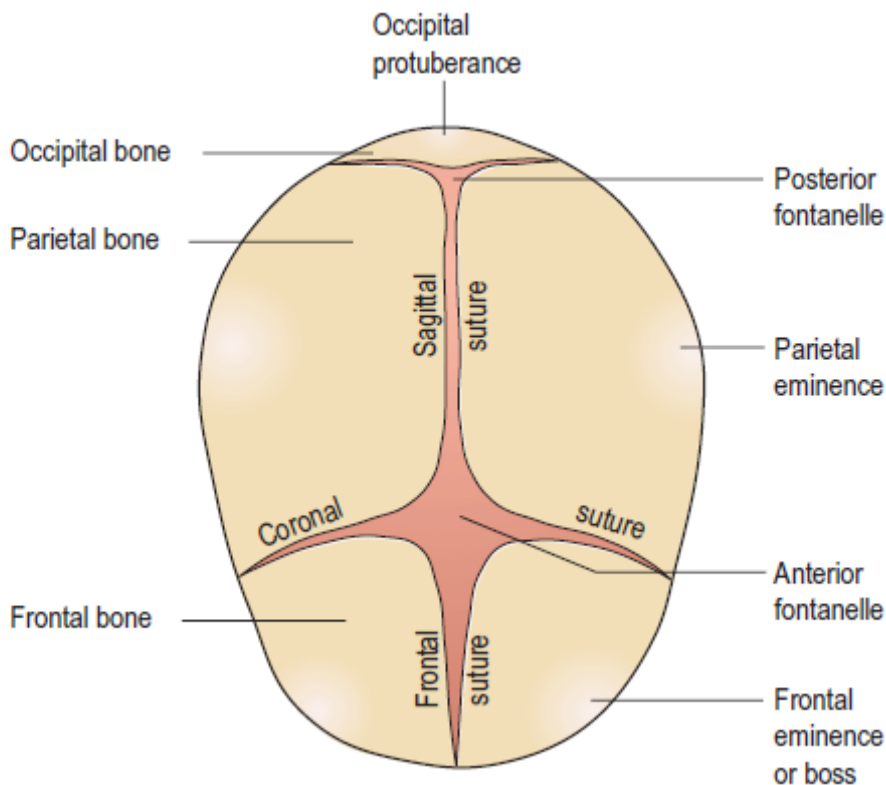


Figure 1. 23: Bones of the vault

1.10.3 Regions of landmarks' diameters

The skull is further separated into regions, and within these there are important landmarks. These landmarks are useful to the midwife when undertaking a vaginal examination as they help ascertain the position of the fetal head. The occiput region lies between the foramen magnum and the posterior fontanelle. The part below the occipital protuberance (landmark) is known as the sub-occipital region.

The vertex region is bounded by the posterior fontanelle, the two parietal eminences and the anterior fontanelle.

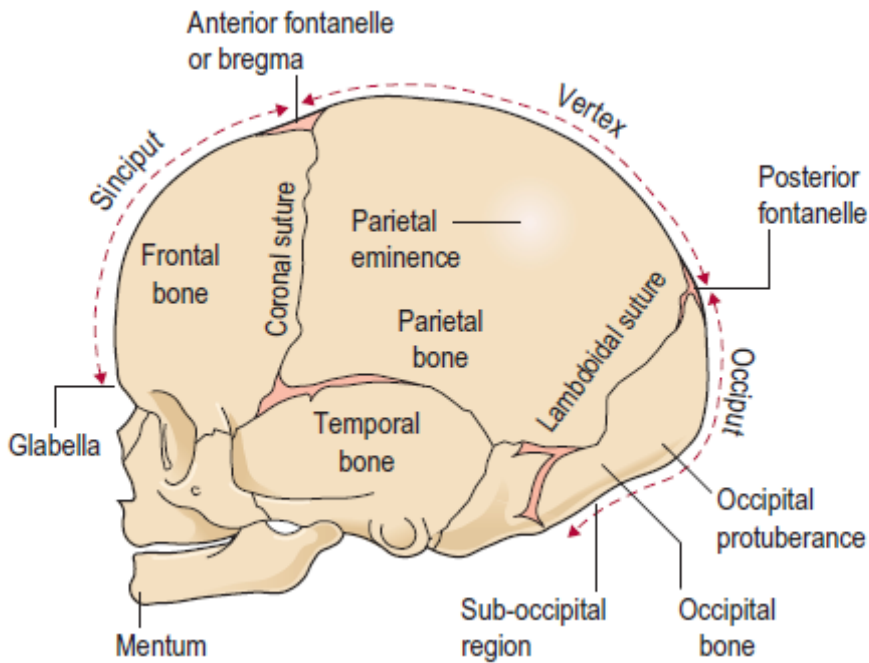


Figure 1. 24: Regions of landmarks' diameters

The forehead /sinciput region extends from the anterior fontanelle and the coronal suture to the orbital ridges.

The face extends from the orbital ridges and the root of the nose to the junction of the chin or mentum (landmark) and the neck. The point between the eyebrows is known as the glabella.

1.10.4 Sutures and fontanels

The sutures are the cranial joints formed where two bones meet. Where two or more sutures meet, a fontanelle is formed. The sutures and fontanelles described below permit a degree of overlapping of the skull bones during labour, which is known as moulding.

- The lambdoidal suture separates the occipital bone from the two parietal bones.
- The sagittal suture lies between the two parietal bones.
- The coronal suture separates the frontal bones from the parietal bones, passing from one temple to the other.

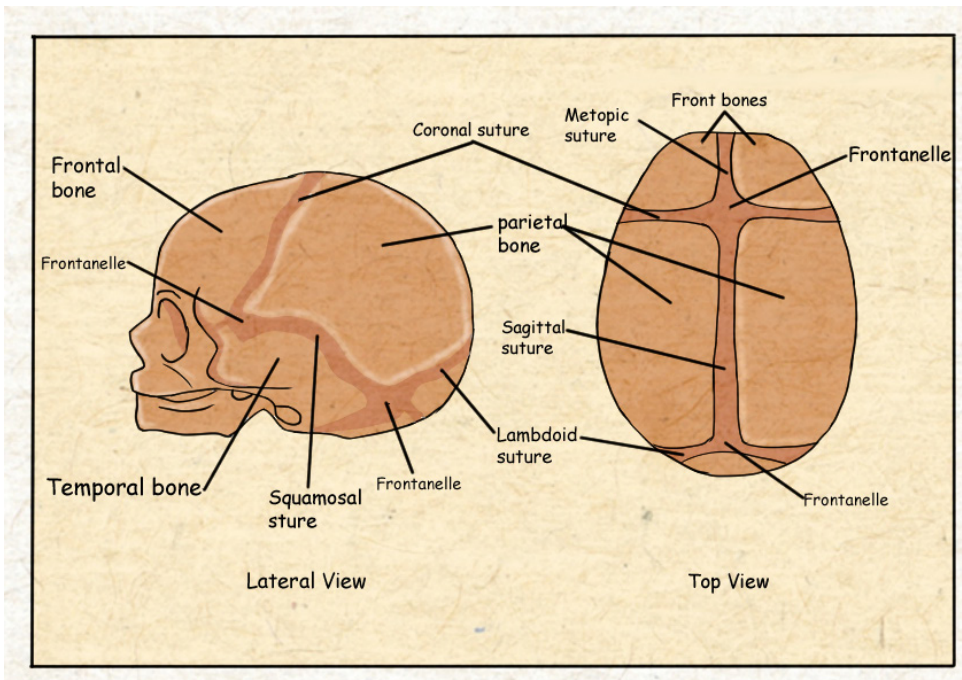


Figure 1. 25: Sutures of the skull and fontanelles

1.10.5 Diameters of the fetal skull

Knowledge of the diameters of the skull alongside the diameters of the pelvis allows the midwife to determine the relationship between the fetal head and the mother's pelvis. There are six longitudinal diameters.

The longitudinal diameters are:

- The sub-occipito bregmatic (SOB) diameter (9.5 cm) measured from below the occipital protuberance to the centre of the anterior fontanelle or bregma.
- The sub-occipitofrontal (SOF) diameter (10 cm) measured from below the occipital protuberance to the centre of the frontal suture.
- The occipitofrontal (OF) diameter (11.5 cm) measured from the occipital protuberance to them glabella.
- The mentovertical (MV) diameter (13.5 cm) measured from the point of the chin to the highest point on the vertex.
- The sub-mentovertical (SMV) diameter (11.5 cm) measured from the point where the chin joins the neck to the highest point on the vertex
- The sub-mentobregmatic (SMB) diameter (9.5 cm) measured from the point where the chin joins the neck to the centre of the bregma (anterior fontanelle).

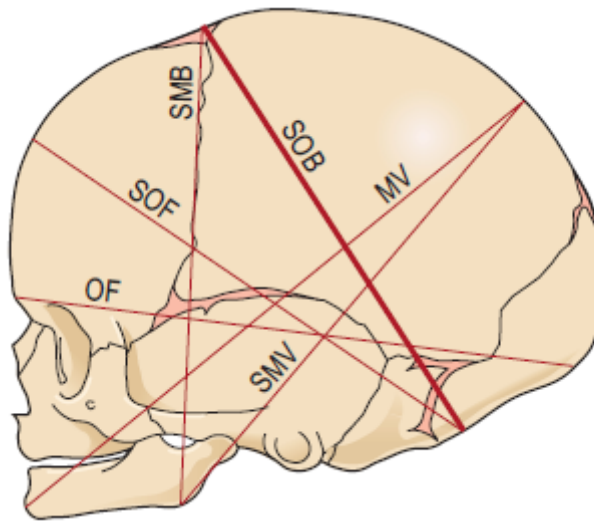


Figure 1. 26: Diameters of the fetal skull

Presenting diameters

Some presenting diameters are more favourable than others for easy passage through the maternal pelvis and this will depend on the attitude of the fetal head. This term attitude is used to describe the degree of flexion or extension of the fetal head on the neck. The attitude of the head determines which diameters will present in labour and therefore influences the outcome. The presenting diameters of the head are those that are at right-angles to the curve of Carus of the maternal pelvis. There are always two: a longitudinal diameter and a transverse diameter. The presenting diameters determine the presentation of the fetal head, for which there are three:

1. Vertex presentation. When the head is well flexed the sub-occipitobregmatic diameter (9.5 cm) and the biparietal diameter (9.5 cm) present.

As these two diameters are the same length the presenting area is circular, which is the most favourable shape for dilating the cervix and birth of the head. The diameter that distends the vaginal orifice is the sub-occipitofrontal diameter (10 cm). When the head is deflexed, the presenting diameters are the occipitofrontal (11.5 cm) and the biparietal (9.5 cm). This situation often arises when the occiput is in a posterior position. If it remains so, the diameter distending the vaginal orifice will be the occipitofrontal (11.5 cm).

2. Face presentation. When the head is completely extended the presenting diameters are the submentobregmatic (9.5 cm) and the bitemporal (8.2 cm). The sub-mentovertical diameter (11.5 cm) will distend the vaginal orifice.

3. Brow presentation. When the head is partially extended, the mentovertical diameter (13.5 cm) and the bitemporal diameter (8.2 cm) present. If this presentation persists, vaginal birth is unlikely.

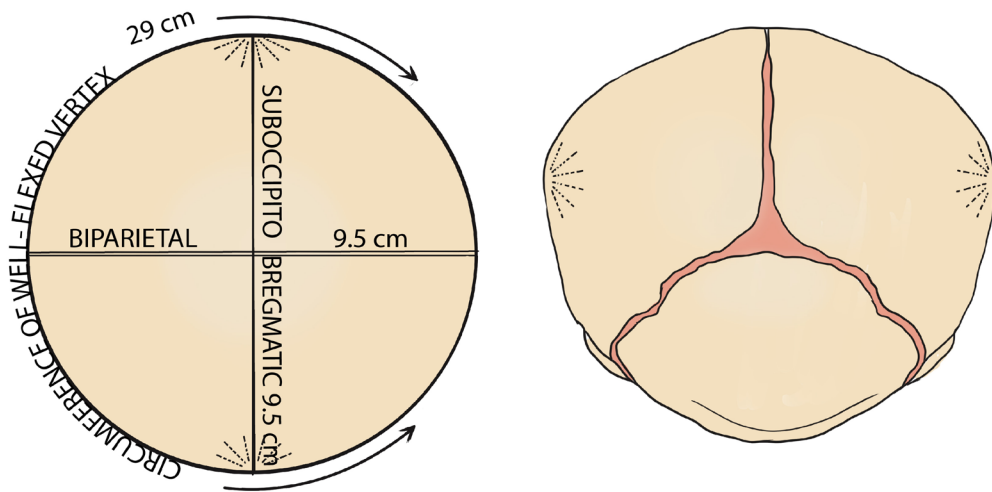


Figure 1. 27: Presenting diameters

Self-assessment activity 1.10

1. Explain the role of the sutures and fontanelles during child birth
2. State the six longitudinal diameters of the fetal skull.
3. Identify the three major types of head presentation of the fetus?

End unit assessment 1

1. What is fertilization?
2. How long does the process of fertilization take? And at which portion of the fallopian tube does fertilization take place.
3. What is the main function of the uterus during pregnancy?
4. Describe the major phases of spermatogenesis?
5. Describe the process of capacitation

6. Give the differences between spermatogenesis and oogenesis
7. Define the following terms:
 - Trophoblast
 - Embryoblast
 - Blastocyst
8. Describe the factors that can affect fertilization
9. Explain the term “implantation”, what condition favors successful implantation
10. What are the functions of the amniotic fluid during pregnancy?
11. In relation to embryology and fetal development, explain which organs form at 4-8 weeks of pregnancy
12. What is a placenta? And how does it form in embryological stage
13. Describe the functions of the placenta
14. What are the differences between the female and male pelvis.
15. List eight fixed points on the pelvic brim?
16. What is the primary role of the female pelvis?
17. Which type of pelvis is adequate for a normal child birth and why?
18. What is the largest part of the fetal fetus?
19. Explain the sutures and bones of the fetal head and the role they play in childbirth.
20. What are the temporary structures in addition to the placenta and umbilical cord that enables fetal circulation?
21. Describe the physical and physiological characteristics of a normal pregnancy
22. In a table format, show the different types of pelvis and their characteristics
23. Among the four types of pelvis which is more adaptable to child birth and why?
24. What are the divisions of the pelvis?
25. What are the functions of the female pelvis?
26. List the land marks of the pelvic brim, cavity and outlet and relate their relevance to child birth
27. List the bones and sutures that make up the fetal head.

Key Unit competence: Demonstrate the ability to manage a pregnant woman during antenatal period

Introductory activity 2.0

A 34 years old married housewife visited the health center complaining to be pregnant. Since her pregnancy, it is her first time to visit the health center. During interview with the nurse, the woman reported to have missed her periods 7 months ago, has increased appetite for cassava and rice only. She did not attend any clinic earlier because of the fear of witchcraft to take her pregnancy away. She has been using traditional medicines given by her mother in law from the beginning of the pregnancy. She is experiencing, chills, headache, inability to carry out daily living activities and she does not know her HIV status.

After reading and understanding the above case:

1. How can you interpret the case?
2. What advice can you offer to women in this case?

Antenatal care (ANC) is an umbrella term used to describe the medical and nursing/ midwifery procedures and care that are carried out during pregnancy. It is the care a woman receives throughout her pregnancy and is important in helping to ensure a healthy pregnancy state and safe childbirth.

During the prenatal period, health care providers play important role in educating women about healthy pregnancy behaviors, danger signs of complications, breastfeeding and family planning; identify and treat pregnancy-related conditions; refer mothers to specialized care when necessary; encourage the use of a skilled birth attendant; and minimize the risk of mother-to-child transmission of HIV. In addition, the ANC provides an opportunity to screen for and treat other chronic conditions and non-communicable diseases.

2.1 Key Concepts used in antenatal care

Learning Activity 2.1

Using the school book of Maternal and Child Health, read the information related to the antenatal care and take short notes on the difference between:

1. Antenatal care and focused antenatal care,
2. Health promotion, health education, health screening and disease screening

2.1.1 Antenatal Care

Antenatal care (prenatal care) is the care given to pregnant women from the time conception is confirmed until the beginning of labour. The nurse provides her with accessible and relevant information to help her make informed choices throughout the pregnancy.

2.1.2 Focused Antenatal Care (FANC)

FANC is personalized care provided to a pregnant woman which emphasis on the woman overall health status, her preparation for childbirth, and readiness for complications.

2.1.3 Health Promotion

Health promotion refers to any activity that aims to achieve better health in a community or a country.

2.1.4 Health education

It is the effective transmission of accurate, useful, health-related information to community members; it enables individuals and groups to develop their knowledge of health issues, and increase their self-reliance and competence to solve their own health problems through their own initiatives. A major determinant of good or ill health is the knowledge people have about health issues, their beliefs, attitudes and behaviour, and their desire to bring about positive behaviour change in their lives.

2.1.5 Health screening

Health screening is the routine testing of individuals to see if they are at risk of developing a health problem. Health screening is an important health promotion activity that you will conduct as part of your antenatal care service. For example, you will take the temperature, blood pressure and pulse of every pregnant woman at every antenatal visit to see if she may be developing a health problem that could harm her or her baby.

2.1.6 Disease Prevention

It is any action taken to prevent a disease from developing. For example, giving pregnant women iron supplements as a routine part of antenatal care is an action to prevent the development of **anaemia**, a condition in which the body makes too few red blood cells because the woman's diet does not contain enough iron.

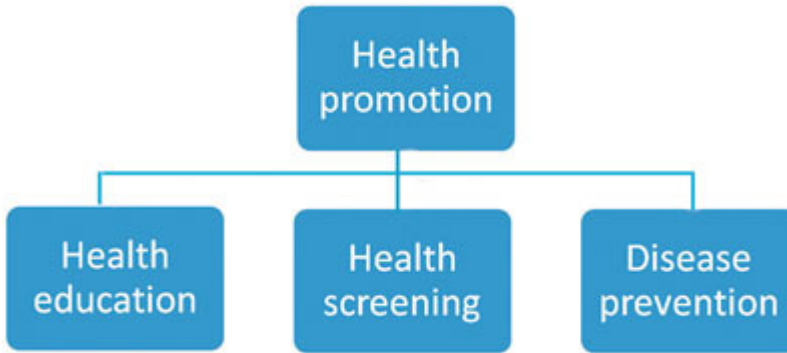


Figure 2. 1: Health promotion at the community level

2.1.7 Booking

An Antenatal Booking Appointment is the APPOINTMENT where the woman enters the maternity care pathway, characterized by information giving and detailed history taking to help the woman choose the most appropriate Antenatal care pathway.

2.1.8 History taking

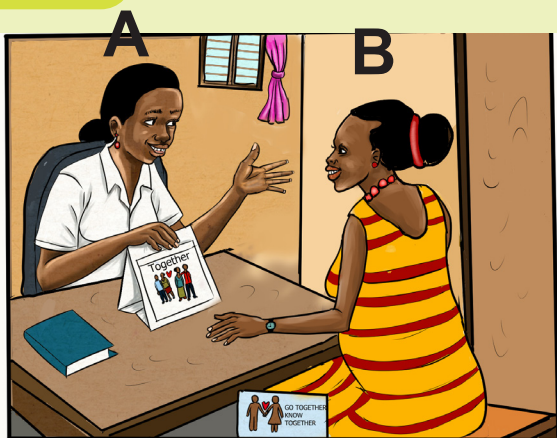
History taking is the process of collecting information to assess the past and present obstetrical, medical and surgical problems in order to detect risk factors for the patient and her fetus.

Self-assessment 2.1

What is history taking and state the purpose for taking history.

2.2 Principles, objectives and components of Focused Antenatal Care

Learning Activity 2.2



1. On the above chart, describe the person A and B, and what you think, they are doing
2. From the above chart, identify the importance of communication

Focused antenatal care (FANC) is a personalized care provided to a pregnant woman which emphasizes on the women's overall health status, her preparation for child birth and readiness for complications or it is timely, friendly, simple safe services to pregnant women.

Principles of FANC are as follow:

- a. Developing a trusting relationship with the woman
- b. Providing a holistic approach to the woman's care that meets her individual needs
- c. Making a comprehensive assessment of the woman's health and social status
- d. Promoting an awareness of the public health issues for the woman and her family
- e. Exchange the information with the woman and her family
- f. Enabling them to make informed choices about pregnancy and birth
- g. Be an advocate for the woman and her family during her pregnancy
- h. Supporting her to choose care appropriate for her own needs and those of her family
- i. Identifying potential risk factors and taking appropriate measures to minimize them
- j. Timely share information with relevant agencies and professionals
- k. Accurate documentation of assessment, plans, care and evaluation

- l. Recognizing complications of pregnancy and appropriately referring women to the obstetric team or relevant health professionals
- m. Preparing the woman and her family to meet the challenges of labour and birth, and facilitating the development of birth plan
- n. Facilitating the woman to make an informed choice about methods of infant feeding and giving appropriate and sensitive advice to support her decision
- o. Offering parenthood education within a planned programme or on individual basis

Major goals/objectives of the FANC are as follow:

- a. Promote and maintain the physical, mental, and social health of mother and baby by providing education on nutrition, personal hygiene, and birthing process;
- b. Detect and manage complications during pregnancy, whether medical, surgical, or obstetrical;
- c. Develop birth preparedness and complication readiness plan;
- d. Help prepare mother to breastfeed successfully, experience normal puerperium, and take good care of the child physically, psychologically, and socially.

Components of FANC are as follow:

- a. Blood pressure measurement,
- b. Collection of a blood sample,
- c. Collection of a urine sample,
- d. Tetanus vaccination,
- e. Provision of insecticide treated net for malaria prevention,
- f. Deworming treatment,
- g. Iron-folic acid supplements

COMMUNICATION IN MATERNITY

The nurse requires many skills to provide optimal antenatal care. Fundamentally the ability to communicate effectively and sensitively. Listening skills involve focusing on what the woman is saying and how she is saying it, considering the content and tone. In addition non-verbal communication.

Importance of communication in antenatal care

Communication skills are critical to the delivery of high-quality maternity services. It is impossible to ensure the provision of the best possible care, using available resources to their fullest, without accurate and complete communication with women, their families and multi-professionals.

Table 2. 1: ANC schedule for the new model of eight contacts

Contact	Weeks
1 st Contact	As soon as the woman suspects she is pregnant: up to 12 weeks
2 nd Contact	20 weeks
3 rd Contact	26 weeks
4 th Contact	30 weeks
5 th Contact	34 weeks
6 th Contact	36 weeks
7 th Contact	38 weeks
8 th Contact	40weeks

Self-assessment 2.2

1. Discuss the principles of FANC
2. What are the components of antenatal care?

2.3 The diagnosis of pregnancy

Learning Activity 2.3

A 22 years' young lady, visited health care facility complaining of nausea, tiredness, loss of appetite, she vomited two time in morning, and she stated not having her menstrual period last month.

What do you think would be the problem and which advice can you give to her?

Most women are diagnosed with pregnancy after a missed menstrual cycle and a **positive urine or serum HCG**. The pregnancy is diagnosed as viable with serial exams and normal pregnancy development, a normal dating ultrasound, or positive fetal heart tones by Doppler.

Women who are aware of their bodies must begin to suspect that they are pregnant within the first few days of pregnancy. But for most, the first sign is missing a period. Other symptoms include nausea and vomiting, breast tenderness and fullness, urinary frequency, and fatigue.

Traditionally, diagnosis has been based on history, and physical examination. Issues that may confuse the diagnosis of an early pregnancy are an atypical last menstrual period, contraceptive use, and history of irregular periods. Spotting or light bleeding is common in early pregnancy between six and seven weeks which may further complicate the assessment.

SIGNS AND SYMPTOMS OF PREGNANCY

1. PRESUMPTIVE SIGNS

Presumptive signs and symptoms of pregnancy are those signs and symptoms that are usually noted by the client, which impel her to seek care. These signs and symptoms are not proof of pregnancy but they will make the health provider and woman suspicious of pregnancy.

a. Amenorrhea (Cessation of Menstruation)

Amenorrhea is one of the earliest clues of pregnancy. The majority of clients have no periodic bleeding after the onset of pregnancy

Other causes for amenorrhea must be ruled out, such as:

- Menopause.
- Stress (severe emotional shock, tension, fear ...)
- Chronic illness (tuberculosis, endocrine disorders, or central nervous system abnormality).
- Anemia.

b. Nausea and Vomiting (Morning Sickness)

Usually occurs in early morning during the first weeks of pregnancy. It is usually spontaneous and subsides in 6 to 8 weeks or by the twelfth to sixteenth week of pregnancy. Nausea and vomiting are unreliable signs of pregnancy since they may result from other conditions.

c. Frequent Urination

Frequent urination is caused by pressure of the expanding uterus on the bladder.

It subsides as pregnancy progresses and the uterus rises out of the pelvic cavity. The uterus returns during the last weeks of pregnancy as the head of the fetus presses against the bladder. Frequent urination is not a definite sign since other factors can be apparent (such as tension, diabetes, urinary tract infection, or tumors).

d. Breast changes

In early pregnancy, changes start with a slight, temporary enlargement of the breasts causing a sensation of weight, fullness, and mild tingling.

As pregnancy continues the patient may notice Darkening of the areola--the brown part around the nipple. Enlargement of Montgomery glands--the tiny nodules or sebaceous gland within the areola. Increased firmness or tenderness of the breasts More prominent and visible veins due to the increased blood supply. Presence of colostrum (thin yellowish fluid that is the precursor of breast milk). This can be expressed during the second trimester and may even leak out in the latter part of the pregnancy.

e. Vaginal changes

CHADWICK'S SIGN: The vaginal walls have taken on a deeper colour caused by the increased vascularity because of increased hormones. It is noted at the sixth week when associated with pregnancy. It may also be noted with a rapidly growing uterine tumor or any cause of pelvic congestion.

f. Quickening (FIRST FETAL MOVEMENT FELT BY THE MOTHER)

This is the first perception of fetal movement within the uterus. It usually occurs toward the end the fifth month because of spasmodic flutter.

- A multigravida can feel quickening as early as 16 weeks.
- A primigravida usually cannot feel quickening until after 18 weeks.

g. Skin changes

Striae gravidarum (stretch marks). These are marks noted on the abdomen and/or buttocks.

These marks may be seen on a patient with Cushing's disease or a patient with sudden weight gain.

- Linea nigra

This is a black line in the midline of the abdomen that may run from the sternum or umbilicus to the symphysis pubis.



Figure 2. 2 Linea nigra

This appears on the primigravida by the third month and keeps pace with the rising height of the fundus. The entire line may appear on the multigravida before the third month.

- Chloasma

This is called the “Mask of Pregnancy.” It is a bronze type of facial coloration seen more on dark-haired women. It is seen after the sixteenth week of pregnancy.

2. PROBABLE SIGNS OF PREGNANCY

Probable signs of pregnancy are those signs commonly noted by the health providers upon examination of the client. These signs include: **uterine changes; abdominal changes; cervical changes; basal body temperature; a positive pregnancy test and fetal palpation.**

a. Uterus grows - the abdomen gets larger

- **Position:** By the twelfth week, the uterus rises above the symphysis pubis and it should reach the xiphoid process by the 36th week of pregnancy.
- **Size:** The uterine increases in width and length approximately five times its normal size. Its weight increases from 50 grams to 1,000 grams.
- **Hegar’s Sign:** This is softening of the lower uterine segment just above the cervix. When the uterus is compressed between examining fingers
- **Ballottement:** Ballottement is when the lower uterine segment or the cervix is tapped by the examiner’s finger which is left in place during the procedure. The fetus floats upwards, then sinks back and a gentle tap is felt on the finger .it is done at 16th to 20th weeks

b. Abdominal Changes

This corresponds to changes that occur in the uterus. As the uterus grows, the abdomen gets larger. Abdominal enlargement alone is not a sign of pregnancy. Enlargement may be due to uterine or ovarian tumors, or edema.

c. Cervical changes

- **Goodell’s sign:** The cervix is normally firm, like the cartilage at the end of the nose. Goodell’s sign occurs when there is marked softening of the cervix. This is present at the 6th week of pregnancy.
- **Formation of a mucous plug:** This is due to hyperplasia of the cervical glands as a result of increased hormones. It serves to seal the cervix of the pregnant uterus and to protect it from contamination by bacteria in the vagina. The mucous is expelled at the end of pregnancy near or at the onset of labour.
- **Braxton-Hick’s contractions:** This involves painless uterine contractions occurring throughout pregnancy. It usually begins at about the 12th week of pregnancy and becomes progressively stronger. These contractions will, generally, cease with walking or other forms of exercise.

3. POSITIVE SIGNS OF PREGNANCY

Positive signs of pregnancy are those signs that are definitely confirmed as a pregnancy. They include **fetal heart sounds, ultrasound scanning of the fetus, palpation of the entire fetus, palpation of fetal movements, and actual delivery of an infant.**

Self-assessment 2.3

1. List positive signs of pregnancy
2. Describe the chloasma of pregnancy

2.4 Comprehensive assessment of a pregnant woman

Learning Activity 2.4

A 30 years' pregnant woman for the first time visited the health center for focused antenatal consultation (FANC) at 12 weeks, during interview, you realized it was her first antenatal contact, she stated that she does not have problem but she wants to know the condition of her baby and pregnancy.

In your opinion, suggest reasons why it is important to check the wellbeing of mother and baby during pregnancy.

2.4.1 Introduction to Booking and history taking

The booking assessment shapes the direction of a woman 'antenatal pathway. it is where her risk status is determined and appropriate referral made. The information gathered regarding the woman's obstetric, medical and social history and current pregnancy enables the nurse to assess her status. If a risk factor is identified, the woman should be referred to the doctor who will discuss a plan of care for her based on identified problem.

A comprehensive assessment is done from head to toe with the woman's consent.

The initial assessment (Booking visit)

The purpose of this unit is to initiate the development of a trusting relationship that facilitates positive engagement of the woman with the maternity service. This is the most important element of ANC. Whilst, it is crucial that risk assessment and identification of clinical relevant information is obtained, none of these can be undertaken if the woman does not feel able to communicate with the nurse.

Objectives for the initial assessment

- To assess levels of health by taking a detailed history and to offer appropriate screening tests.
- To ascertain baseline recordings of blood pressure, urinalysis, blood values, uterine growth and fetal development to be used as a standard for comparison as the pregnancy progresses.
- To identify risk factors by taking accurate details of past and present history, obstetrics, medical, family and personal history.
- To provide an opportunity for the woman and her family to express and discuss any concerns they might have about the current pregnancy and previous pregnancy loss, labour, birth or puerperium.
- To give public health advice and that pertaining to pregnancy in order to maintain the health of the mother and the healthy development of the fetus.
- To build the foundation for a trusting relationship in which the woman and midwife are partners in care.
- To make appropriate referral where additional healthcare or support needs have been identified

First impressions

The initial observation and assessment of a woman at the start of first meeting is very important. The observation should be carried sensitively enhancing the woman to experiences of pregnancy birth.

Observation of physical characteristics is also important. Posture and gait can indicate back problems or previous trauma to the pelvis; the woman may be lethargic, which could be an indication of extreme tiredness, anemia, malnutrition or depression.

2.4.2 History taking:

This is the process of collecting all relevant information from a pregnant woman which will build the bases for monitoring her pregnancy.

Points to consider while taking history

- Ensure privacy (respectful maternity care)
- Ensure quiet and calm atmosphere
- Make the woman comfortable and relaxed
- Maintain confidentiality
- Establish rapport
- Record all information on the patient's file

- High light abnormal findings

History to be taken include:

A. Personal and preliminary data

- Woman full names
- Age
- Date and place of birth
- Address and phone number
- Ethnic or racial appartenance
- Profession and that of the partner or employment history
- Religion
- Marital status and number of years married

B. Chief complains: the major health problem or concern, and its time course (e.g. abdominal pain for past 4 hours).

C. History of present illness

After determining the chief concern for a visit, the next step is to inquire about the history of the present illness (HPI). This is often a misnomer—for example, the reason for a visit of “I need my Pap test and birth control pills” leads to an HPI that addresses how the woman is managing her contraception and her satisfaction with her current method (and possibly to a discussion of screening recommendations). A chief concern that begins with abnormal uterine bleeding leads to the more traditional assessment of the history of the woman’s current symptoms. A common mnemonic for the questions asked about a health problem is OLD CARTS (Onset, Location/radiation, Duration, Character, Aggravating factors, Relieving factors, Timing, and Severity). These questions can be followed by “What has changed now that made you come in?” or “How did you decide it was time to come in?”

D. Social history

The social history, like the sexual history, brings up topics that may be embarrassing or even threatening to some women. Ask these questions in a quiet, professional tone, and respect the woman’s need to avoid certain answers. Providing information “why” the information is needed often reassures the woman and may help the midwife feel comfortable asking for it. Obviously if there is no reason for eliciting sensitive information, asking it should be omitted. Relationship questions should be asked in a pattern that allows women to reveal relationships that are more complicated than “single” or “married with children.”

Table 2. 2 Elements assessed in social history

1. Relationship status With a partner (male or female) Married Single Widowed, separated, or divorced	2. Diet Eating habits, history of eating disorders Diet recall Any food restrictions— allergies, vegetarian or vegan, religious, cultural limitations	3. Substance use Caffeine Tobacco Alcohol Marijuana Illicit drugs Use of others' prescriptions	4. Employment/student status
5. Hazardous exposures at work or home	6. Physical activity, types and frequency	7. Seat belt use	8. Guns or weapons in home

E. General health status

General health should be discussed and good habits reinforced, giving further advice when required e.g exercise puts added demands on the cardiovascular and respiratory systems, however mild exercise should be continued.

Smoking: women may be ready to cut down or give up smoking. The midwife has a role or duty to help women to set goals throughout their pregnancy and help them to cut down their smoking, strategies to help them cut down includes:

- Doing something else;
- Delaying having a cigarette or drinking water can help them cut down on smoking.

Babies born to women who smoke are frequently smaller, have respiratory tract problems at birth and in their first year, have higher rates of prematurity, still birth and low birth weight. There is also increased risk of asthma and otitis media in these babies for women who are more addicted should stick smoking earlier in the day, stop last thing at night, they should be referred to appropriate organizations for help.

- **Alcohol:** alcohol is less common but can affect the baby. There is no conclusive evidence of adverse effects on the fetus at a consumption level below 10 units per week, but it is recommended that women do not exceed one to two unites once a week.

F. Menstrual history

An accurate menstrual history is taken to determine the expected date of delivery (EDD). This will enable the midwife to predict a birth date and subsequently calculate gestational age at any point in the pregnancy abdominal assessment of uterine size can be during ANC consultation.

The duration of pregnancy could also be based on the **Naegle's rule** which is based on the mythical normal woman who has a 28 days cycle and ovulates two weeks before the start of her next menstrual period i.e. on day 14. The rule is to add seven days to the first day of the last menstrual period and count back three months to reach the expected date of delivery or confinement or EDC.

The EDD is calculated by **adding 9 calendar months** if the last month of menstruation is \leq to 3 or moins 3 if month \geq to 4 and adding **7 days** to the date of the 1st day of the woman's last menstrual period (LMP) this method assumes that:

- The woman takes regular note of regularity and length of time between periods
- Conception occurred 14 days after the 1st day of the last period; this is true only if the woman has a regular 28 days' cycle.
- The last period of bleeding was true menstruation but implantation of the ovum may cause slight bleeding.

Example on calculation of EDD

Calculating from "sure" dates by Naegele's Rule

Cycle of 28days=LMP: 9 June 2014

EDD = 9+7days/6- 3/

EDD: 16 March 2015

NB: Gestational age in weeks of pregnancy can be calculated by using Mac Donald formula which use the fundus height

The formula is Fundus height in cm *8 divides by 7. For example, if the fundus height is 24 cm, gestational age is $24\text{cm} \times 8 = 192 = 27$ week's gestation.

7

The features to note are:

- Normality of last menstrual period; an implantation bleed may occur at about the time of the expected period (i.e. 10-14 days after ovulation). This is almost always much lighter and shorter than a normal period. If an implantation bleed is mistaken for a time period, the gestational age calculation would be behind by about four weeks.
- Cycle interruption: a calculation adjustment is needed in those women who have not re-established regular cycles after pregnancy, lactation or the contraceptive pills. However, as the differences in gestational age between the two methods increase, ultrasound becomes the more accurate method for predicting the EDD.
- The calculation is difficult if the woman does not know the date of her last menstraual period, where cycles are irregular, or a normal cycle has not resumed since taking the oral contraceptives pill. if the woman has a good

idea of when conception occurred ,the EDD can be calculated by adding **38 weeks** to this date ,or subtracting **7 days from 9 months**.

- Women should be asked to note the date when fetal movement are first felt. Primigradae normally become aware of fetal movement between 18-20weeks while multigradae recognize the sensation a little earlier, between 16-18weeks. This may be used to estimate the expected date of delivery.

G. Family history

Certain conditions are genetic in origin others are familial or related to ethnicity and some are associated with the physical or social environment in which the family lives. The family history may reveal factors that increase the risk of blood disorder, maternal medical complications or fetal abnormalities; e.g. Twins, Diabetes mellitus, Hypertension, hereditary diseases like asthma.

Table 2. 3 Family History (Three Generations)

1. Parents and siblings	2. Chronic disorders	3. Genetic problems
Living or dead	Heart disease—especially coronary artery disease	Birth defects
Age at death	Diabetes	Mental handicaps
Cause of death	Cancer: especially breast, reproductive, or colon	Behavioral conditions

H. Past medical history

Past current medical disorders and associated medications may threaten the mother and fetus e.g. Diabetes mellitus, Epilepsy, Rheumatics fever, Renal diseases.

During pregnancy both the mother and fetus may be affected by a medical condition or a medical condition may be altered by the pregnancy, if untreated there may be serious consequences for the woman’s health. Other conditions including asthma, epilepsy, infections, and psychiatric disorders may require treatment, which may adversely affect fetal development. Major medical complications such as diabetes and cardiac conditions require the involvement and support of a medical specialist

- Urinary stasis and reflex occur during pregnancy. A urinary tract infection (UTI) can easily develop into pyelonephritis, which, untreated may lead to kidney damage and cause preterm labour, between 30 and 50% of women will be asymptomatic if it is untreated;

- Pregnancy predisposes to deep vein thrombosis and thus pulmonary embolism, women of increasing weight and maternal age, those who are obese and those with a history of thromboembolic disorders are most at risk;
- Essential hypertension predisposes to pregnancy induced hypertension, which can result in reduced placental function, intrauterine growth retardation, abruption placenta, fetal compromise or death. Effect on the mother includes congestive heart failure, intracerebral hemorrhage, acute renal failure, disseminated intravascular coagulation (DIC) or death as a result of any of above (Hallak 1999).
- Pregnancy and concomitant disease (Can be exacerbated by the pregnancy or complicate it) especially Diabetes, Heart disease, Hypertension, Neuromuscular disorders
- Medications and allergies to medications Should be identified and recorded
- Any current ongoing illness, e.g. diabetes, malaria
- Past history containing physiological and pathological data

Example: Past medical/surgical history including major illnesses, any previous surgery/operations

I. Past surgical history

- General surgical procedures;
- Gynecological surgical procedures;
- Myomectomy scar may increase risk of uterine rupture;
- Conisation or cervical cerclage of the cervix and therapeutic abortion may increase the risk of cervical incompetence and premature labour.

J. Past obstetric history/ General OB/GYN Assessment

Like histories in general, many complications of pregnancy have a tendency to recur; it is for this reason that the previous obstetric history holds a wealth of valuable relevant information:

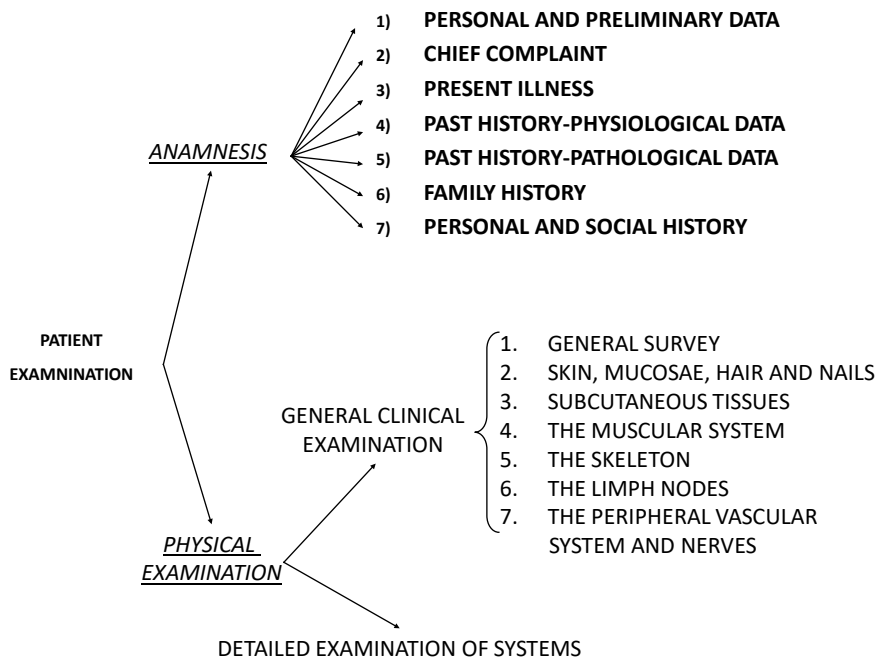
Collect Subjective data

- Prenatal history
- Past pregnancies
- Gynecologic history including LPM

Obstetric History Concerns

- Gravida/para (G/P) status
- Number of living children?

- Number of dead children, when, how and on which pregnancy
- Complications with previous pregnancies or deliveries?
- History of preterm delivery?
- Gestational age?
- History of elective or spontaneous abortion?
- Has patient delivered vaginally after a cesarean section?
- When was, and what was length of last labor?
- With regard to current pregnancy, what is estimated date of confinement (EDC)?
- Has patient received adequate, limited (three or fewer visits), or no prenatal care?
- Any problem with pregnancy identified? If so, what?
- Diagnostic tests like ultrasound done? If so, what were results?
- Is patient taking any medications for obstetric or non-obstetric reasons?
- If so, which medication(s), what dose(s), and compliant schedule(s)?
- Drug or alcohol abuse suspected? If so, which substance(s), frequency of use, date of last use? Patient smoking?
- Pregnancy weight gain normal, or patient malnourished or obese?
- Is patient having contractions? If so, when did they begin, and what are their frequency and duration?
- Antenatal complications e.g. pre-eclampsia, premature labour, iso-immunisation;
- Induction of labour and indication; Assisted vaginal delivery;
- Caesarean section- indications, type of section and complication if any;
- Third stage complications: post-partum hemorrhage and/or manual removal of placenta;
- Neonatal outcome, e.g. intrauterine growth restriction, macrosomia, congenital anomaly, perinatal death or morbidity. On the other hand, one or more totally normal pregnancies is the best prognostic factors for a successful outcome in subsequent pregnancies.



The final question in the history taking should be some variant of “Is there anything else I should have asked you today?” or, alternatively, “Is there anything else I should know or that you want to share with me?”

Table 2.4: Factors that may require additional antenatal support or referral to an obstetrician/physician or other health professional

Initial assessment
<ul style="list-style-type: none"> • Age less than 18 years or over 40 years • Grande multiparity • Vaginal bleeding at any time during pregnancy • Unknown expected date of birth • Late booking

Past obstetric history

- Stillbirth or neonatal death
- Baby small or large for gestational age
- Congenital abnormality
- Rhesus isoimmunization
- Pregnancy induced hypertension
- Two or more terminations of pregnancy
- Three or more spontaneous miscarriages
- Previous preterm labour
- Previous caesarian section or uterine surgery
- Ante- or Postpartum hemorrhage
- Multiple pregnancy

Maternal health

- Previous history of deep vein thrombosis or pulmonary Embolism
- Chronic illness (example: epilepsy, severe asthma, renal disease)
- Hypertension, cardiac disease
- History of infertility
- Family history of diabetes or genetic disorders
- Type I or Type II diabetes
- Substance abuse (drugs, alcohol or smoking)
- Psychological or psychiatric disorders

Examination at the initial assessment

- Blood pressure 140/90 mmHg or above
- Maternal obesity or underweight according to BMI
- Blood disorders

Self-assessment 2.4

What are the important points to note before taking history?

2.5 Physical examination

Learning Activity 2.5

Watch the Video on physical examination of a pregnant woman and discuss what you have seen in your groups.

<https://www.youtube.com/watch?v=kSRR1HT1ENA>

This is a systematic assessment of the pregnant woman from head to toe. Prior to conducting the physical examination of a pregnant, her consent and comfort are primary considerations. Observation of physical characteristics is important.

A thorough examination is made at the first visit. This is divided into a general examination and an obstetric examination.

The general examination should include:

- a. General appearance:** Namely, the nutritional status, whether weak or sick looking. Note the gait and if she walks with a limp.
- b. Height:** You may note that any woman below 150 cm in height is likely to have cephalo-pelvic disproportion (CPD).
- c. Weight:** That is, a pregnant woman on average gains 2kg every month. The total weight gain by the end of pregnancy is about 10-20 kg. Excessive weight gain indicates accumulation of fluid in the tissues (Oedema). Lack of increase in weight or loss may mean malnutrition. Obesity may lead to an increased risk of gestational diabetes.
- d. Blood pressure:** Blood pressure is taken in order to ascertain normality and provide a baseline reading for comparison throughout pregnancy. Systolic blood pressure does not alter significantly in pregnancy, but diastolic falls in mid pregnancy and rises to near non-pregnant levels at term. The systolic recording may be falsely elevated if a woman is nervous or anxious, if a small cough is used on a large arm, the arm is unsupported or if the bladder is full. The woman should be comfortably seated or resting in lateral position on the couch for the measurement. Brachial artery pressure is highest when the subject is sitting and lower when in recumbent position.

e. **Other vital signs** (temperature, pulse and respiration).

HEAD TO TOE ASSESSMENT

1. HEAD (HEENT):

- **Hair:** check for malnutrition, hygiene, any injury
- **Face:** the face will indicate:
 - The general health of the woman nourished and content, or malnourished,
 - Pallor of the conjunctiva indicates anemia,
 - Jaundice is early recognized by the yellow conjunctiva.
 - Edema of the face is a serious sign of pre-eclampsia. Also check for symmetry.
- **Mouth:**
 - Stomatitis indicates vitamin B deficiency,
 - Check tongue pallor.
 - The gums are sensitive during pregnancy because of hormonal changes,
 - Dental caries are a potential source of infection
- **Ears:** check for any symmetry, discharge or other abnormality
- **Nose:** symmetry, discharges, tumors

2. NECK:

- Swollen glands, stiffness, and thyroid enlargement.
- Veins turgescence

3. CHEST:

- Symmetry of the breasts
- Breathing movement (inspection and auscultation) or abnormalities
- Breast examination: the breasts may be examined to note pregnancy changes, a useful aid in diagnosis of pregnancy and to note any features such as the presence of lumps or abnormal discharges from the nipples. The breasts are likely to feel tender in the first trimester; palpate gently with the flat of the hand to feel for any lumps. Check if the nipple is protractile. Educate the woman on how to examine the breasts by herself
- The heart and the lungs will be checked and any deviations noted (auscultation for rate and rhythm).
- The back is examined for spinal deformities, back tenderness and costal vertebral angle tenderness (CVAT) for kidney infection

4. UPPER LIMBS:

check for symmetry, pallor of the palm of hands and nails, edema

5. ABDOMEN:

- The abdomen is examined to ascertain whether the uterus is palpable and, if so, if its size is compatible with the estimated period of gestation
- Assess the shape, the size, previous scar, fetal movements, striae gravidarum, linea negra.

6. LOWER LIMBS:

The lower limbs are examined for:

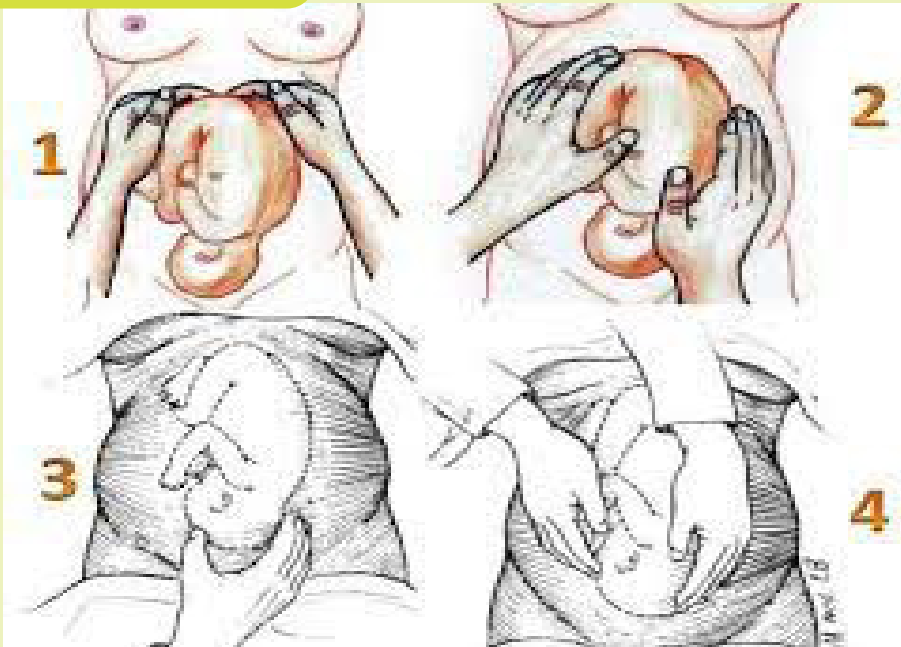
- Feet and knee reflexes. If BP is high, protein in urine or woman has headache, visual changes or epigastric pain (patellar reflex)
- Checking for symmetry
- Physiological oedema occurs after rising in the morning and worsens during the day; it is often associated with daily activities or hot weather. At visits later in pregnancy the midwife should observe for oedema and ask the woman about symptoms. Often the woman may notice that her rings feel tighter and her ankles are swollen. Pitting oedema in the lower limbs can be identified by applying gentle fingertip pressure over the tibial bone: a depression will remain when the finger is removed. If oedema reaches the knees, affects the face or is increasing in the fingers it may be indicative of hypertension of pregnancy if other markers are also present.
- Homan's signs are checked in order to diagnose any thrombophlebitis (more specific in post-partum period)
- Checking varicose veins. These are more likely to occur during pregnancy and are a predisposing cause of deep vein thrombosis. The woman should be asked if she has any pain in her legs. Reddened areas on the calf may be due to varicosities, phlebitis or deep vein thrombosis. Areas that appear white as if deprived of blood could be caused by deep vein thrombosis. The woman should be asked to report any tenderness that she feels either during the examination or at any time during the pregnancy. Referral should be made to medical colleagues as appropriate. Support stockings will help alleviate symptoms although not prevent varicose veins occurring.

Self-assessment 2.5

Using mannequin in simulation lab, demonstrate steps of physical examination of pregnant woman.

2.6 Leopold's manoeuver

Learning Activity 2.6



What do you see on the picture above?

The Leopold maneuvers are used to palpate the gravid uterus systematically. This method of abdominal palpation is of low cost, easy to perform, and non-invasive. It is used to determine **the position, presentation, and engagement of the fetus in utero**.

1. Abdominal examination

Abdominal examination is carried out from 24 weeks' gestation to establish and affirm that fetal growth is consistent with gestational age during the pregnancy. The specific aims are to:

- Observe the signs of pregnancy
- Assess fetal size and growth
- Auscultate the fetal heart when indicated
- Locate fetal parts
- Detect any deviation from normal.

Preparation

The woman should be asked to empty her bladder before making herself comfortable on the couch. A full bladder will make the examination uncomfortable; this can also make the measurement of fundal height less accurate. The midwife

washes her hands and exposes only that area of the abdomen she needs to palpate, and covers the remainder of the woman to promote privacy and protect her dignity. The woman should be lying comfortably with her arms by her sides to relax the abdominal muscles. The midwife should discuss her findings throughout the abdominal examination with the woman.

a. Inspection

The uterus is first assessed by observation. A full bladder, distended colon or obesity may give a false impression of fetal size. The shape of the uterus is longer than it is broad when the lie of the fetus is longitudinal, as occurs in the majority of cases. If the lie of the fetus is transverse, the uterus is low and broad.

The multiparous uterus may lack the snug ovoid shape of the primigravid uterus. Often it is possible to see the shape of the fetal back or limbs. If the fetus is in an occipitoposterior position a saucer-like depression may be seen at or below the umbilicus. The midwife may observe fetal movements, or the mother may feel them; this can help the midwife determine the position of the fetus. The woman's umbilicus becomes less dimpled as pregnancy advances and may protrude slightly in later weeks.

Lax abdominal muscles in the parous woman may cause the uterus to sag forwards; this is known as pendulous abdomen or anterior obliquity of the uterus. In the primigravida it is a significant sign as it may be due to pelvic contraction.

Skin changes

Stretch marks from previous pregnancies appear silvery and recent ones appear pink. A linea nigra may be seen; this is a normal dark line of pigmentation running longitudinally in the centre of the abdomen below and sometimes above the umbilicus. Scars may indicate previous obstetric or abdominal surgery or self-harm.

b. Measuring fundal height

In order to determine the height of the fundus the midwife places her hand just at the upper border of the symphysis pubis. Pressing gently, she moves her hand to the abdomen up to the level below the sternum where she feels the fundus. Clinically assessing the uterine size to compare it with gestation does not always produce an accurate result, although there are landmarks that can be used as an approximate guide. From 25 weeks of pregnancy, the midwife should commence serial symphysis fundal height (SFH) measurements. She uses a tape measure (with the centimetres facing the mother's abdomen) held at the symphysis pubis and extended up to the fundus, to take a single measurement. This should be recorded in the pregnancy record and plotted on a customized chart rather than a population-based chart.



Figure 2. 3 Measuring fundal height

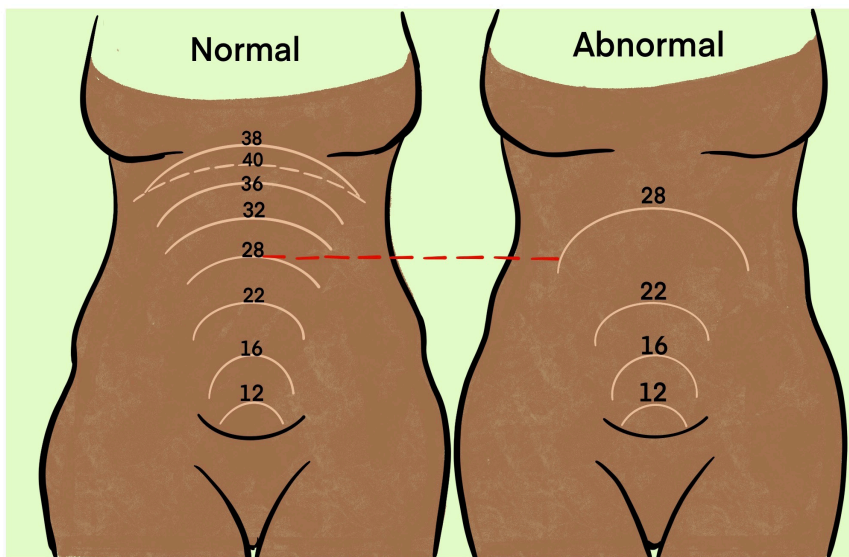


Figure 2. 4 Growth of the uterus, showing the fundal heights at various weeks of pregnancy

2. Leopold's manoeuvres:

a. Fundal palpation

This determines the presence of the breech or the head in the fundus. This information will help to diagnose the lie and presentation of the fetus. Talking through the palpation with the woman, making eye contact with her during the procedure, the midwife lays both hands on the sides of the fundus, fingers held close together

and curving round the upper border of the uterus. Gentle yet deliberate pressure is applied using the palmar surfaces of the fingers to determine the soft consistency and indefinite outline that denotes the breech. Palms of hands on either side of the fundus, fingers held close together palpate the upper pole of the uterus.

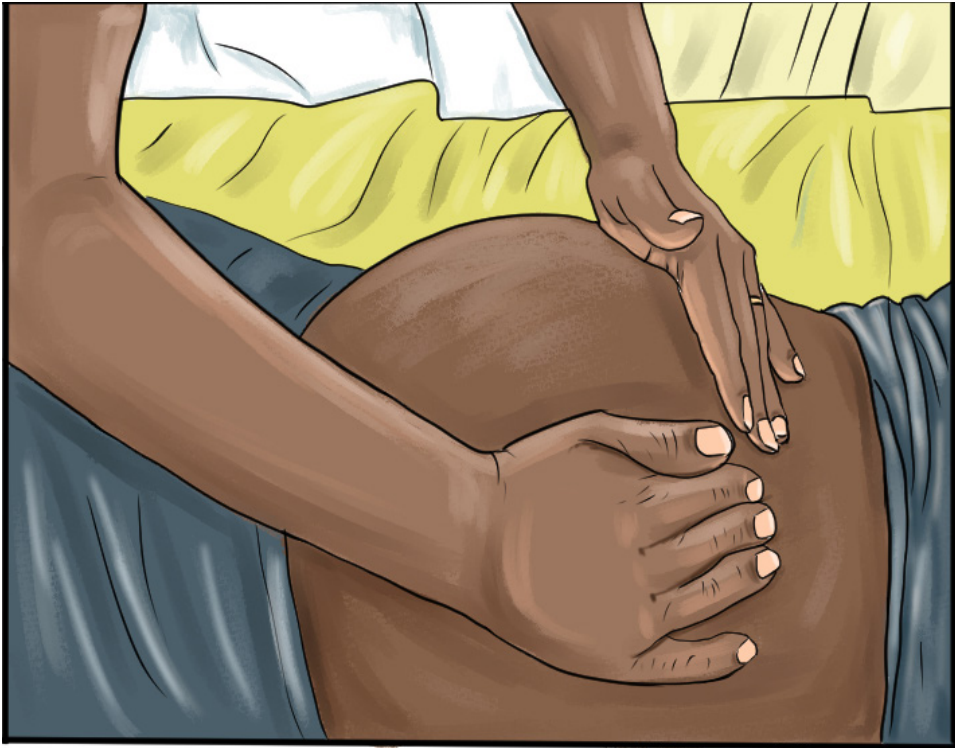


Figure 2. 5 Fundal palpation

b. Lateral palpation

This is used to locate the fetal back in order to determine position. The hands are placed on either side of the uterus at the level of the umbilicus. Gentle pressure is applied with alternate hands in order to detect which side of the uterus offers the greater resistance. More detailed information is obtained by feeling along the length of each side with the fingers. This can be done by sliding the hands down the abdomen while feeling the sides of the uterus alternately. Some midwives prefer to steady the uterus with one hand, and using a rotary movement of the opposite hand, to map out the back as a continuous smooth resistant mass from the breech down to the neck; on the other side the same movement reveals the limbs as small parts that slip about under the examining fingers.

‘Walking’ the fingertips of both hands over the abdomen from one side to the other is another method of locating the fetal back. Hands placed at umbilical level on either side of the uterus. Pressure is applied alternately with each hand.

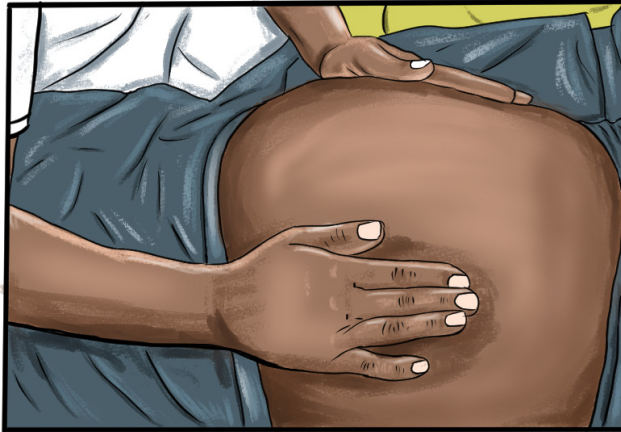


Figure 2. 6 Lateral palpation



Figure 2. 7 'Walking' the fingertips across the abdomen to locate the position of the fetal back

c. Pelvic palpation

Pelvic palpation will identify the pole of the fetus in the pelvis; it should not cause discomfort to the woman. This is done only from 36 weeks onwards.

The midwife should ask the woman to bend her knees slightly in order to relax the abdominal muscles and also suggest that she breathe steadily; relaxation may be helped if she sighs out slowly. The sides of the uterus just below umbilical level are grasped snugly between the palms of the hands with the fingers held close together, and pointing downwards and inwards.

If the head is presenting (towards the lower part of the uterus), a hard mass with a distinctive round smooth surface will be felt. The midwife should also estimate how much of the fetal head is palpable above the pelvic brim to determine engagement. This two-handed technique appears to be the most comfortable for the woman and gives the most information.

Pawlik's manoeuvre, where the practitioner grasps the lower pole of the uterus between her fingers and thumb, which should be spread wide enough apart to accommodate the fetal head, is sometimes used to judge the size, flexion and mobility of the head, but undue pressure must not be applied. It should be used only if absolutely necessary as it can be very uncomfortable for the woman: There is no research evidence to support one method over the other.

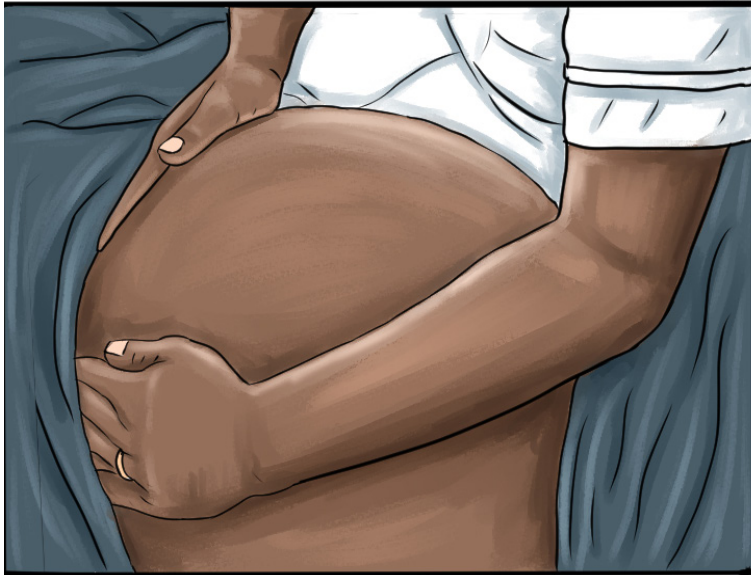


Figure 2. 8 Pelvic palpation

On the figure above, the fingers are directed inwards and downwards.

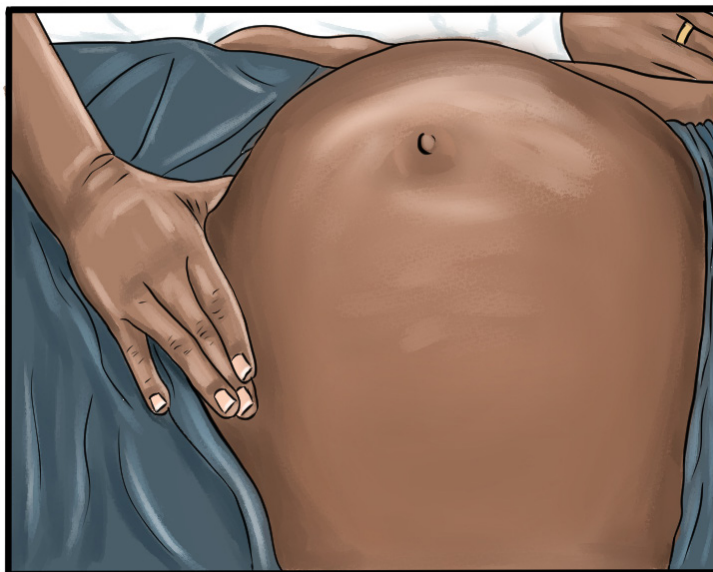


Figure 2. 9 Pawlik's manoeuvre

On the figure above, the lower pole of the uterus is grasped with the right hand, the midwife facing the woman's head.

d. Engagement

Engagement is said to have occurred when the widest presenting transverse diameter of the fetal head has passed through the brim of the pelvis. In cephalic presentations this is the biparietal diameter and in breech presentations the bitrochanteric diameter. In a primigravid woman, the head normally engages at any time from about 36 weeks of pregnancy, but in a multipara this may not occur until after the onset of labour. Engagement of the fetal head is usually measured in fifths palpable above the pelvic brim.

When the vertex presents and the head is engaged the following will be evident on clinical examination:

- Only two- to three-fifths of the fetal head is palpable above the pelvic brim
- The head will not be mobile.

On rare occasions, the head is not palpable abdominally because it has descended deeply into the pelvis. If the head is not engaged, the findings are as follows:

- More than half of the head is palpable above the brim
- The head may be high and freely movable (ballotable) or partly settled in the pelvic brim and consequently immobile.

In a primigravid woman, it is usual for the head to engage by 37 weeks' gestation; however, this is not always the case. When labour starts, the force of labour contractions encourages flexion and moulding of the fetal head and the relaxed ligaments of the pelvis allow the joints to give. This is usually sufficient to allow engagement and descent. Other causes of a non-engaged head at term include:

- Occipitoposterior position
- Full bladder
- Wrongly calculated gestational age
- Polyhydramnios
- Placenta praevia or other space-occupying lesion
- Multiple pregnancy
- Pelvic abnormalities
- Fetal abnormality

Checklist to be used when performing Leopold maneuver

a) Equipment

- Tray
- Vital signs materials
- Weighing and height scale
- Table of examination
- Pinard fetoscope
- Pregnancy wheel
- Preventive medication
- IEC materials
- ANC and Client records
- Screening materials for HIV, Syphilis, Albuminuria, Urinalysis, Full Blood Counts (FBC)
- Gloves (examination gloves and sterile gloves)
- Trash can
- Dust bin

b) Implementation

- Wash and dry hands
- Put on examination gloves.
- Systematic assessment from head to toe for pregnant woman (inspection, palpation, auscultation and percussion)
- Explain to the woman/client/ couple/ family each step of procedure and provide feedback
- Ask the woman to lie on her back, feet posed on the bed and knees bending (LEOPOLD MANEUVER)
- Assess fundal /uterine height: Use two hands to palpate the top of the uterus, and then the measurement is taken from the upper border of the symphysis pubis to the highest point of the fundus of the uterus by using a tape measure.
- First Maneuver: Feel the consistency and the mobility of the fetal part lying in the fundus of the uterus. The fetal head is firm, hard and round, it moves independently from the fetal body. The breech/buttock is softer and moves at the same time as the whole fetal body. If fundus is empty suspect transverse lie (presentation transverse)

- **Second Maneuver:** Determine the lie (presentation): the position of the fetal back and other small parts of the fetal body). By moving the hands to half way down the uterus, palpate the abdomen, apply gentle pressure. One hand palpates, the other hand supports the abdomen. The fetal back, which is on the side of the abdomen, is a continuous smooth resistant mass during palpation. The other side of the abdomen, where limbs are felt as small parts, is embossed or irregular.
- **Third Maneuver:** Place one hand just above the symphysis. Determine which part of the fetus occupies the lower uterine pole: if the palpated part is the head or the buttock of the fetus or other, and check/verify if the presentation is engaged
- Change position by turning your back towards the client.
- **Fourth Maneuver:** Two hands are placed to the lower uterine pole and slide them on the sides of the uterus towards the pubis. Identify a cephalic, a breech or another presentation. Determine the degree of the engagement of the presentation
- Auscultation of the FHR (see checklist FHR)
- This is a separate procedure but it should be done after this procedure

c) Completion

- Thank the client for her collaboration and request the client if she has any concern
- Assist the client to maintain a comfortable position.
- Clean and dispose used materials and clean the work area.
- Wash hand
- Provide preventive medications if indicated
- Document the results of the examination and give appointment.

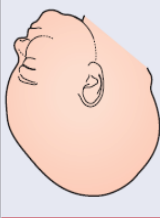


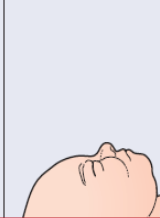
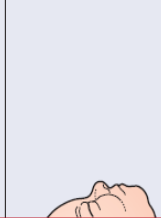
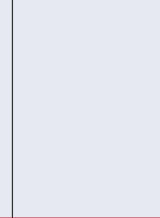
$\frac{5}{5}$	$\frac{4}{5}$	$\frac{3}{5}$	$\frac{2}{5}$	$\frac{1}{5}$	$\frac{0}{5}$
Sinciput and Occiput above the brim	Sinciput prominent Occiput descending	Sinciput rising Occiput can be tipped	Sinciput not so prominent	Sinciput and Occiput not felt	Head on pelvic floor
					
Brim					

Figure 2. 10 Descent of the fetal head estimated in fifths palpable above the pelvic brim

3. Presentation

Presentation refers to the part of the fetus that lies at the pelvic brim or in the lower pole of the uterus. Presentations can be vertex, breech, shoulder, face or brow. Vertex, face and brow are all head or cephalic presentations. When the head is flexed the vertex presents; when it is fully extended the face presents; and when it is partially extended the brow presents.

4. Auscultation

A Pinard's fetoscope will enable the midwife to hear the fetal heart directly and determine that it is fetal and not maternal. The fetoscope is placed on the mother's abdomen, at right-angles to it over the fetal back. The ear must be in close, firm contact with the fetoscope but the hand should not touch it while listening because then extraneous sounds are produced. The fetoscope should be moved about until the point of maximum intensity is located where the fetal heart is heard most clearly. The midwife should count the beats per minute, which should be in the range of 110–160. The midwife should take the woman's pulse at the same time as listening to the fetal heart to enable her to distinguish between the two.



Figure 2. 11 Auscultation of the fetal heart. Vertex right occipitoanterior

Lie

The lie of the fetus is the relationship between the long axis of the fetus and the long axis of the uterus. In the majority of cases the lie is longitudinal due to the ovoid shape of the uterus; the remainder are oblique or transverse.

Attitude

Attitude is the relationship of the fetal head and limbs to its trunk. The attitude should be one of flexion. The fetus is curled up with chin on chest, arms and legs flexed, forming a snug, compact mass, which utilizes the space in the uterine cavity most effectively. If the fetal head is flexed the smallest diameters will present and, with efficient uterine action, labour will be most effective.

Denominator

'Denominate' means 'to give a name to'; the denominator is the name of the part of the presentation, which is used when referring to fetal position. Each presentation has a different denominator and these are as follows:

- In the vertex presentation it is the occiput
- In the breech presentation it is the sacrum
- In the face presentation it is the mentum.

Position

The position is the relationship between the denominator of the presentation and six points on the pelvic brim.

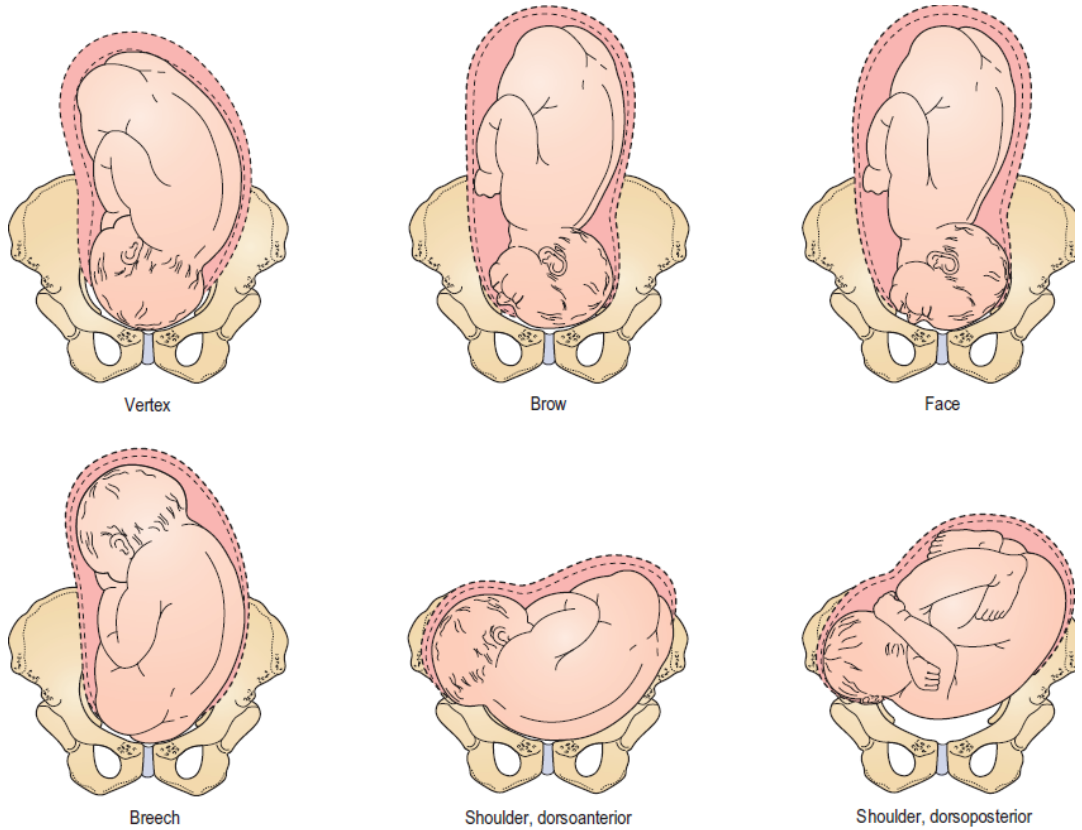


Figure 2.12 The five presentations

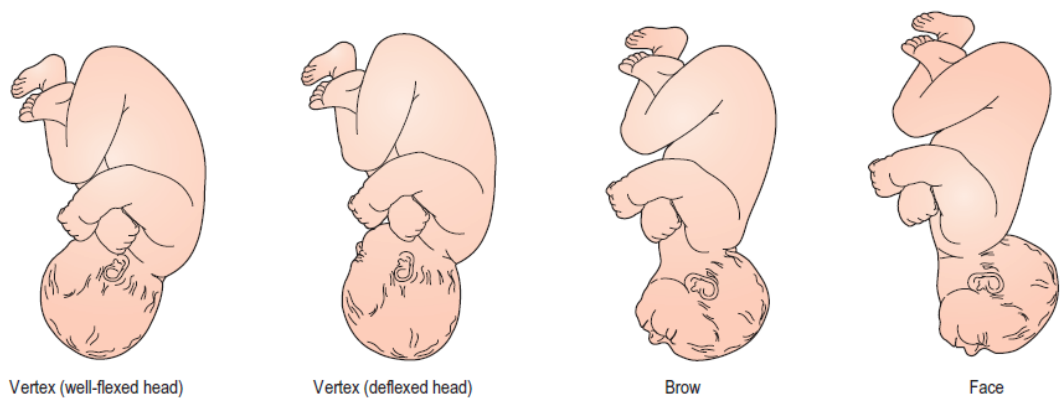


Figure 2.13 Varieties of cephalic or head presentation

Indicators of maternal wellbeing

The woman's general health and wellbeing is observed throughout and the midwife must remain vigilant for signs of domestic abuse, emotional fragility and social instability. Endeavouring to maintain continuity of carer will be a key process for identifying impending problems and for encouraging free exchange of information between the woman and her midwife.

Indicators of fetal wellbeing

These include:

- Increasing uterine size compatible with the gestational age of the fetus;
- Fetal movements that follow a regular pattern from the time when they are first felt;
- Fetal heart rate that is regular and variable with a rate between 110 and 160 beats/minute.

Self-assessment 2.6

1. Using checklist in the simulation lab, perform Leopold's manoeuvres on mannequin
2. Practice in simulation lab, on listening to the fetal heart beat using the pinard's stethoscope

2.7 Calculation of gestational age based on the last menstruation period and pregnancy wheel

Learning Activity 2.7

Madam X, aged 28 years, attend the health center for her ANC first contact; she wanted to know how her baby is and when she will deliver.

How will you determine the time the woman will deliver her baby?

An accurate menstrual history helps determine the expected date of birth (EDB), enables the nurse to predict a birth date and subsequently calculate the gestational age at any point in the pregnancy. This is particularly important for the timing of fetal anomaly screening and measuring fetal growth. The EDB is calculated by adding 9 calendar months and seven days to the date of the first day of the woman's last menstrual period (known as Naegele's Rule). This method assumes that:

- a. The woman takes regular notes of regularity and length of times between periods
- b. Conception occurred 14 days after the first day of the last period, this is true only if the woman has 28-day cycle

- c. The last period of bleeding was true menstruation; implantation of the ovum may cause slight bleeding
- d. Breakthrough bleeding and anovulation can be affected by the contraceptive pill thus impacting on the accuracy of a Last Menstrual Period (LMP)

The duration of pregnancy based on Naegele's Rule is 280 days. However, if the woman has 35-day cycle, then, 7 days should be added; if her cycle is less than 28 days, then the appropriate number of days is subtracted. A definitive EDB will be given when the woman attends for her dating ultrasound scan at around 12 weeks of pregnancy.

The EDD is calculated by **adding 9 calendar months** if the last month of menstruation is \leq to 3 or $- 3$ if month \geq to 4 and adding **7 days** to the date of the 1st day of the woman's last menstrual period (LMP) this method assumes that:

- The woman takes regular note of regularity and length of time between periods
- Conception occurred 14 days after the 1st day of the last period; this is true only if the woman has a regular 28 days cycle.
- The last period of bleeding was true menstruation but implantation of the ovum may cause slight bleeding.

Example on calculation of EDD

Calculating from "sure" dates by Naegele's Rule

Cycle of 28 days = LMP: 9 June 2014

EDD = 9 + 7 days / 6 - 3 / EDD: 16 March 2015

A pregnancy wheel is used to determine the due date of delivery. Also known as a gestation calculator, it uses the first day of your last menstrual period to establish your due date

It combines three things needed to derive all the dates necessary in pregnancy care, and no other app has this combination. It contains a calendar calculator to determine EDD (EDC) from LMP or from a sonogram report.

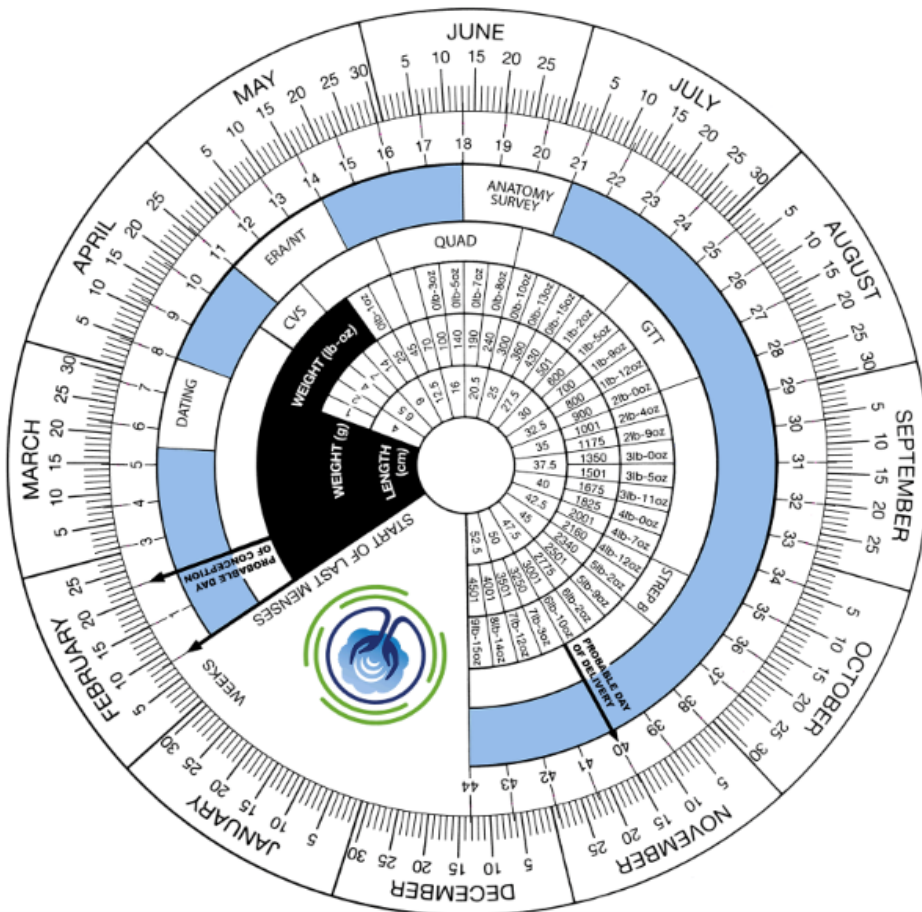


Figure 2. 14 Gravidometer/Gestational Wheel

Self-assessment 2.7

Calculate the EDD of a pregnant woman whose last menstrual period (LMP) was on 14th December 2020.

2.8 Physiological changes during pregnancy: Changes in the female reproductive system during pregnancy

Learning Activity 2.8

What happens with menstruation to a pregnant woman?

Changes in the body during pregnancy are most obvious in the organs of the reproductive system.

a. Uterus

When a woman becomes pregnant, the part of her body affected first and the part that undergoes the most significant changes is the uterus. It increases to 20 times its original weight, and 1,000 times its initial capacity. The amount of its muscle, connective and elastic tissue, blood vessels, and nerves increases.

b. The cervix and vagina

Other parts of the reproductive system change along with the uterus. The cervix and vagina have an increased blood supply, which causes a darkening in color apparent by the sixth week.

c. Ovaries

The ovaries cease to ovulate. The follicle-stimulating hormone (FSH) ceases its activity due to the increased levels of estrogen and progesterone secreted by the ovaries and corpus luteum. The FSH prevents ovulation and menstruation.

d. Breasts

Breasts must undergo many changes during pregnancy to produce milk. In the first two months of pregnancy, breasts may feel sore or full. They enlarge, and veins may become visible. The nipples also increase in size and usually darken. By mid-pregnancy, colostrum (a thick, yellowish fluid) can be expressed, but milk is not produced until after delivery.

Self-assessment 2.8

What are the physiological changes on the breast during pregnancy?

2.9 Physiological changes in pregnancy on endocrine system

Learning Activity 2.9

Describe 3 hormones involved in reproductive system based on your knowledge from S3 biology?

The female endocrine system consists of the pituitary, the thyroid, the adrenal and the thymus glands, along with the pancreas and the ovaries. All of them undergo changes during pregnancy in order to prepare the mother's body to effectively meet the challenges associated with pregnancy, childbirth and breastfeeding. Some of the most significant changes occur in the pituitary and thyroid glands to meet the nutritional needs of the baby in the uterus, restricting reproductive organs and passing on genetic information.

Main female reproductive hormones and their functions in preparing the uterus for pregnancy.

Estrogens and progesterone are the chief hormones throughout pregnancy.

a. Oestrogens

A woman will produce more estrogens during one pregnancy than throughout her entire life when not pregnant. During pregnancy, estrogen promotes maternal blood flow within the uterus and the placenta.

b. Progesterone

A pregnant woman's progesterone levels are also very high. Among other effects, high levels of progesterone cause some internal structures to increase in size, including the uterus, enabling it to accommodate a full-term baby. Levels of progesterone and estrogens rise continually throughout pregnancy, suppressing the hypothalamic axis and subsequently the menstrual cycle. Estrogen is mainly produced by the placenta and is associated with fetal well-being.

c. HCG

Women also experience increased human chorionic gonadotropin (β -hCG); which is produced by the placenta. This maintains progesterone production by the corpus luteum. The increased progesterone production, first by corpus luteum and later by the placenta, mainly functions to relax smooth muscle.

d. Prolactin

Prolactin levels increase due to maternal pituitary gland enlargement by 50%. This mediates a change in the structure of the mammary gland from ductal to lobular-alveolar.

e. Parathyroid hormone

Parathyroid hormone is increased which leads to increases of calcium uptake in the gut and re-absorption by the kidney. Adrenal hormones such as cortisol and aldosterone also increase.

f. HPL

Human placental lactogen (HPL) is produced by the placenta and stimulates lipolysis and fatty acid metabolism by the woman, conserving blood glucose for use by the fetus. It can also decrease maternal tissue sensitivity to insulin, resulting in gestational diabetes. There are some experiences in life of a woman that cause similar conditions like those in pregnancy, therefore correct diagnosis is very important.

Self-assessment 2.9

Describe two hormones that help to maintain pregnancy.

2.10 Changes in the cardiovascular and respiratory systems

Learning Activity 2.10

What is the role the heart in human being?

a. Changes in the cardiovascular system

During pregnancy profound but predominantly reversible changes occur in maternal haemodynamics and cardiac function. These complex adaptations are necessary to:

- Meet evolving maternal changes in physiological function
- Promote the growth and development of the uteroplacental–fetal unit
- Compensate for blood loss at the end of labour.

Table 2. 4 A summary of the key components of the cardiovascular system and adaptations in pregnancy

Component	Key change in pregnancy
The heart	<ul style="list-style-type: none">• Increases in size• Shifted upwards and to left
Arteries	Dramatic systemic and pulmonary vasodilatation to increase blood flow
Capillaries	Increased permeability
Veins	Vasodilatation and impeded venous return in lower extremities

Blood	Haemodilution Increased capacity for clot formation
-------	--

b. Changes in the respiratory system

To accommodate increased oxygen requirements and the physical impact of the enlarging uterus intricate changes occur in respiratory physiology.

Breathlessness

The respiratory changes can be extremely uncomfortable and may lead to dyspnoea, dizziness and altered exercise tolerance. Up to 75% of pregnant women with no underlying pre-existing respiratory disease experience some dyspnoea, possibly due to an increased awareness of the physiological hyperventilation.

Self-assessment 2.10

How does pregnancy affect the heart?

2.11 Changes in the urinary and Gastro-intestinal system

Learning Activity 2.11

A pregnant woman of 32 weeks visited your antenatal care facility complaining of not sleeping at night and urinate all the time. She is worried and want you to help her with this problem.

1. What advice can you give to her?
2. Describe the reason why you think she is having this problem.

a. urinary system

The striking anatomical and physiological changes occurring in the urinary system are critical for an optimal pregnancy outcome. Systemic vasodilatation in the first trimester and an increase in blood volume and cardiac output results in a massive vasodilatation of the renal circulation that increases the renal plasma flow.

b. Gastrointestinal system changes

Anatomical and physiological changes take place in each organ of the gastrointestinal system, influenced by oestrogen and progesterone.

- **Ptyalism**

Ptyalism is the excessive production of saliva throughout pregnancy. Ptyalism causes a bad taste in the mouth and women complain that swallowing the excessive or thickened saliva perpetuates a sense of nausea and that they need to spit it out.

- **Nausea and vomiting**

Nausea and vomiting (morning sickness) has varying levels of severity and has far-reaching effects for some women in terms of ability to carry out day-to-day tasks, care for children and take part in full-time employment.

Symptoms usually begin in the 4th week of pregnancy with a marked increase between 5 and 10 weeks when hCG levels are at their highest, followed by a steady decline until 20 weeks.

- **Pica**

Pica is the persistent craving and compulsive consumption of substances such as ice, clay, soap, coal or starch.

- **Heartburn**

Troublesome symptoms of retrosternal and epigastric pain, regurgitation and acid taste in the mouth can all affect the woman's quality of life. Increasing gestational age, heartburn before pregnancy and multiparity may also predispose women to gastrooesophageal reflux in pregnancy which usually resolves after the birth of the baby.

Management

- Skip foods and drinks that can make it worse, such as citrus; spicy, fatty (especially fried or greasy) foods; caffeine; and carbonated drinks.
- Eat several small meals throughout the day.
- Take your time when eating.
- Drink liquids between — not during — meals.
- Abdominal distension

Abdominal distension and a bloated feeling occur when nutrients and fluids remain in the intestinal tract for longer, particularly in the third trimester due to the prolonged transit time

- **Constipation and hemorrhoids**

Hemorrhoids are varicosities of the anal and perianal venous plexus. They are caused by the rise in intra-abdominal pressure and restriction of venous return in the lower extremities and pelvis.

- **Maternal weight**

A variety of components contribute to weight gain during pregnancy.

These includes:

Fetus 27%, the placenta, amniotic fluid and uterus 20%, Breasts 3%, blood volume and extravascular fluid 23%, and maternal fat stores 27%. Most weight is gained in the second and third trimesters at rates of 0.45 kg and 0.40 kg per week respectively.

Table 2. 5 Distribution of average increase in weight

	Weight gain (kg)	Percentage of total weight
Maternal		
Uterus	0.9	} 64
Breasts	0.4	
Fat	4.0	
Blood	1.2	
Extracellular fluid	1.2	
Total	7.7	
Fetal		
Fetus	3.3	25
Placenta	0.7	} 11
Amniotic fluid	0.8	
Total	4.8	
Grand total	12.5	

Self-assessment 2.11

1. What contributes to weight gain during pregnancy?
2. Discuss Heart burns and how it can be managed.

2.12 The basic laboratory investigations during antenatal care

Learning Activity 2.12

Which test can you request to a couple who visited the hospital and complained that the wife has not seen her monthly period?

The basic laboratory tests to rule out pregnancy include pregnancy test through urine or blood to determine β HCG and progesterone dosage where necessary.

Self-assessment activity 2.12

Explain the most accurate test done to confirm pregnancy

2.13 Common laboratory investigations to rule out medical conditions during antenatal care.

Learning Activity 2.13

Why is it important to rule out sexual transmitted diseases in pregnant women?

Routine antenatal care screening tests include: Complete blood count (CBC), Blood Group and antibody screening (BG&Rh) Syphilis, HIV, Rubella antibody status, Hepatitis B&C, Urinalysis, Glucosuria, Proteinuria and Blood glucose). These tests are required during all antenatal visits. However, other test may be requested during subsequent visits for different reasons. These test include: Group B streptococcus, Malaria and TB, Vitamin D deficiency and Pregnancy test.

a. Complete blood count

Anemia is one of the commonest complications of pregnancy. The most common reason for iron deficiency anemia in pregnancy is the increased demands of the fetus for iron. Anemia in pregnancy is defined as Hb < 11 g/dL (severe anemia as Hb < 7 g/dL) at any gestational age.

Anemia is generally defined as hemoglobin level less than 11g/dl or specifically:

- HB <11g/dL in 1st trimester
- HB <10.5g/dL in 2nd trimester
- HB <11g/dL in 3rd trimester

b. Blood group and antibody screen

Identifying ABO blood group, rhesus D status and red cell antibodies in pregnant women is important to prevent “haemolytic disease of the new-born” in subsequent pregnancies. If the foetus is rhesus D-positive (and the mother is negative), the mother may form anti-D antibodies, which may affect a subsequent rhesus D-positive foetus. Haemolytic disease of the new-born in subsequent pregnancies.

c. Rubella antibody status

All pregnant women should be screened for rubella antibodies. Congenital Rubella Syndrome occurs when the rubella virus infects the developing foetus, especially during the first trimester when up to 90% of affected infants will be born with a birth defect, e.g. deafness, eye defects, heart defects, mental retardation.

d. Syphilis serology

All pregnant women should be screened for syphilis, mothers infected with syphilis can experience long-term morbidity and the complications for pregnancy are significant. Treponema Elisa Screen assay is used to screen for syphilis as this can detect primary or secondary infection.

e. Hepatitis B serology

Transmission of the hepatitis B virus from mother to infant can be prevented by administration of the hepatitis B vaccine and immunoglobulin to the infant at birth, therefore screening is important.

f. HIV screening

All pregnant women should be screened for HIV. Women who are HIV positive can be given treatment to reduce the risk of HIV being transmitted to their infant (risk reduced from 32% to less than 1%).

g. Screening for gestational diabetes

Gestational diabetes affects 5–8% of pregnant, it is recommended that testing for gestational diabetes occurs for all women between 26 and 28 weeks of gestation.

h. Screening for Group B streptococcus

Group B streptococcal (GBS) infection is a significant cause of serious neonatal infection. Women may have a vaginorectal culture collected at 35 to 37 weeks' gestation to prevent this infection.

i. Malaria

All women with malaria symptoms will receive early detection and management of malaria. During antenatal care, the health facility staff must do the following to the pregnant woman:

- Give her a long-lasting insecticide treated mosquito net;
- Rapid Diagnostic Tests (RDT) in case of signs and symptoms.

j. Additional testing in pregnancy

Testing for chlamydia and gonorrhoea should be considered for those who may be at increased risk based on age (e.g. less than 25 years) and sexual history.

- Vitamin D

It is required for normal bone growth development in the fetus. Mothers with known vitamin D deficiency or at risk for deficiency (e.g. dark-skinned women, women who wear a veil) should receive vitamin D supplementation.

Self-assessment 2.13

Discuss some laboratory investigations you know that can be done in pregnancy based on your knowledge and understanding from biology in S3

2.14 Danger signs of pregnancy

Learning Activity 2.14

In a community work “umuganda”, they were discussing about maternal health, and chief of village identifies you as a scientist and asked to explain to those pregnant women the bad signs that may show on pregnancy.

Every woman needs to be aware of the danger signs that occur during pregnancy, as complications can be unpredictable. These danger signs usually indicate the presence of an obstetric complication that may arise during pregnancy, delivery or post-delivery. Knowledge of these danger signs will help women and the nurse to make the right decisions and take appropriate healthcare seeking actions

These danger signs include:

- Vaginal bleeding
- Sudden gush of fluid or leaking of fluid from vagina
- Severe headache not relieved by simple analgesics (e.g. paracetamol)
- Dizziness and blurring of vision
- Sustained vomiting
- Swelling (hands, face, etc.)
- Decrease or Loss of fetal movements
- Convulsions

- Premature onset of contractions (before 37 weeks)
- Severe or unusual abdominal pain,
- Chills or fever

If a patient develops any of the above signs during pregnancy the nurse must quickly refer the patient for further management.

Self-assessment 2.14

What will the knowledge of the danger signs of pregnancy help the nurse to achieve in the care pathway for the woman?

2.15 Management of minor pregnancy complications

Learning Activity 2.15

Based on what you have learnt; what problems do you think a pregnant woman can have?

a. Early morning sickness

Around half to two-thirds of all pregnant women will experience morning sickness. Possible causes include high levels of hormones, blood pressure fluctuations and changes in carbohydrate metabolism. Severe morning sickness, called hyperemesis gravidarum, may require hospitalisation. Symptoms of morning sickness may be relieved by eating a few dry crackers before you get up in the morning, avoiding foods and smells that make you nauseous, drinking plenty of fluids and choosing high-carbohydrate and high-protein foods.

Pregnant women should be informed that symptoms of nausea and vomiting usually resolve in the second half of pregnancy. Ginger, chamomile, and vitamin B6 are recommended for the relief of nausea in early pregnancy, based on woman's preferences and available options.

Pregnant women with persistent vomiting or with severe symptoms and signs of dehydration, reduced urine output, and dark-colored urine should be referred to hospital level.

b. Heart burn

Lifestyle advice to prevent and relieve symptoms of heartburn includes avoidance of large, fatty meals and alcohol, cessation of smoking, and raising the head of the bed to sleep. Antacids, such as magnesium carbonate and aluminum hydroxide preparations can also be prescribed if symptoms are not relieved with lifestyle modification.

c. Constipation

Dietary modifications should include increasing intake of fruits, vegetables, high fiber foods and water; if these fails, fiber supplements can be used to relieve constipation in pregnancy based on a woman's preferences and available options.

d. Leg cramps

Non-pharmacological treatment options like muscle stretching, dorsiflexion, relaxation, heat therapy, massage can be used for the relief of leg cramps in pregnancy, based on a woman's preferences and available options.

In addition to multivitamin, Magnesium and calcium supplementation can also be prescribed according to the woman preferences and options.

e. Low back and pelvic pain

Regular exercise throughout pregnancy is recommended to prevent low back and pelvic pain. There are a several number of different treatment options, such as physiotherapy and support belts based on a woman's preferences and availability. Refer to hospital level if exercise does not improve symptoms.

f. Varicose veins and edema

Non-pharmacological options, such as compression stockings and leg elevation can be used for the management of varicose veins and edema in pregnancy, based on a woman's preferences and available options. Refer to hospital level if symptoms are severe.

Self-assessment 2.15

A 22 years old pregnant woman at 34 weeks of pregnancy tells you that she craves to eat clay soil. She also tells you that she has developed darker brown patches on her face, and that her feet and ankles swell up during the day.

1. Identify the minor disorders of pregnancy this woman is displaying, using their medical names.
2. What advices should you give her to manage her symptoms?

2.16. Preventive measures during pregnancy

Learning Activity 2.16

Based on your knowledge and understanding of ANC, what preventive activities should be incorporated in subsequent ANC visits?

Health care providers must ensure that all pregnant women get all recommended preventive measures in line with the 8-contact schedule including treatment of asymptomatic bacteria, prevention of Tetanus, Nutritional anaemia, HIV, Intestinal worms and malaria in pregnancy.

Tetanus Vaccination

Tetanus is an acute disease caused by an exotoxin produced by *Clostridium tetani*.

Preventing tetanus during pregnancy primarily involves ensuring that the mother is properly immunized.

In Rwanda, 34% of women who had a live birth received two or more doses of anti-tetanus vaccine during their most recent pregnancy. This figure has not changed since 2010. Considering mothers who had previous protection against tetanus, the proportion protected against tetanus rises to 82 percent, an increase from 79 percent in 2010. This means that 18 percent of pregnant women were not protected against tetanus. Because tetanus spores are ubiquitous in the environment, eradication is not biologically feasible and high immunization coverage remains essential.

Table 2. 6 Schedule for Tetanus Toxoid administration

Dose	Time for administration	Duration of protection
TT1	At first contact	No protection
TT2	4 weeks after TT1	Three years
TT3	At least 6 months after TT2	Five years
TT4	At least one-year TT3	Ten years
TT5	At least one year after TT4	For thirty years

Self-assessment 2.16

1. Why is it important to vaccinate pregnant women against Tetanus?
2. Identify different preventive measures during ANC?

2.17. Anemia in pregnancy

Learning Activity 2.17

Mrs. A. aged 23 is a married pregnant female student who lives in the campus as she is studying at the University.

She is not able to eat the food from the university restaurant and she is having a lot of nausea and sometimes vomiting. Her gestational age is 28 weeks. Today she comes for consultation and complaining of dizziness, tiredness and not able to stand for long time.

What problem do you think she maybe having?

Anemia results from a lack of red blood cells or dysfunctional red blood cells in the body. This leads to reduced oxygen flow to the body's organs.

A serum ferritin concentration $<30 \mu\text{g/L}$ together with an Hb concentration $<11 \text{ g/dL}$ during the 1st trimester, $<10.5 \text{ g/dL}$ during the 2nd trimester, and $<11 \text{ g/dL}$ during the 3rd trimester are diagnostic for anemia during pregnancy.

How does iron deficiency anemia during pregnancy affect the baby? Severe anemia during pregnancy increases your risk of premature birth, having a low birth weight baby and postpartum depression. Some studies also show an increased risk of infant death immediately before or after birth.

If Hb $< 7 \text{ g/dL}$, especially if symptomatic, then blood transfusion. Transfuse rapidly in anaemia due to acute blood loss.

Transfuse slowly if chronic anaemia (Consider use of diuretics like Lasix 20-40mg stat as necessary to reduce risk of congestive cardiac failure due to sudden circulatory overload).

- If Hb is <7 and asymptomatic manage according to clinician judgement treat the cause + Fe supplement
- If Hb $< 8 \text{ g/dL}$, treat as per FBC results
- If MCV < 80 , then send blood for iron studies (ferritin, TIBC and % saturation (% sat) if available.
- If MCV 80-93, then send blood for peripheral smear and consult hematologist
- If MCV ≥ 94 , then treat for folate or vitamin B12 deficiency
- If Hb $> 8 \text{ g/dL}$, then treat with folate and FeSO_4 325 mg PO BD and recheck Hb in 2-4 weeks
- Treat with Albendazole
- Treat for malaria or schistosomiasis if indicated
- Mixed anemia may occur and complicate laboratory findings
- If iron deficiency, then treat with elemental iron 200 mg PO OD. Titrate up to reduce side effects and encourage compliance. Take iron on empty stomach with vitamin C and without antacids.
- If folate deficiency, then treat with folate 1 mg PO OD.
- If vitamin B12 deficiency, then treat with vitamin B12 1000 mg IM monthly.
- If hemolytic anemia, then send blood for direct and indirect Coombs tests.
- Treat with corticosteroids. Of note, drug-induced (i.e. methyldopa, penicillin, cephalosporin) hemolytic anemia is typically milder and is treated by stopping the offending medication.

Types of Anemia during Pregnancy

Iron-deficiency anemia. This type of anemia occurs when the body doesn't have enough iron to produce adequate amounts of hemoglobin. That's a protein in red blood cells. It carries oxygen from the lungs to the rest of the body.

Types of anemia during pregnancy:

In iron-deficiency anemia, the blood cannot carry enough oxygen to tissues throughout the body.

- Iron deficiency is the most common cause of anemia in pregnancy.
- Folate-deficiency anemia. Folate deficiency can directly contribute to certain types of birth defects, such as neural tube abnormalities (spina bifida) and low birth weight.
- Vitamin B12 deficiency. The body needs vitamin B12 to form healthy red blood cells.
- Blood loss during and after delivery can also cause anemia.

RISK FACTORS

- Are pregnant with multiples (more than one child)
- Have had two pregnancies close together
- Vomit a lot because of morning sickness
- Are a pregnant teenager
- Don't eat enough foods that are rich in iron
- Had anemia before you became pregnant

Symptoms of Anemia during Pregnancy

- Pale skin, lips, and nails
- Feeling tired or weak
- Dizziness
- Shortness of breath
- Rapid heartbeat
- Trouble concentrating

Preventing Anemia

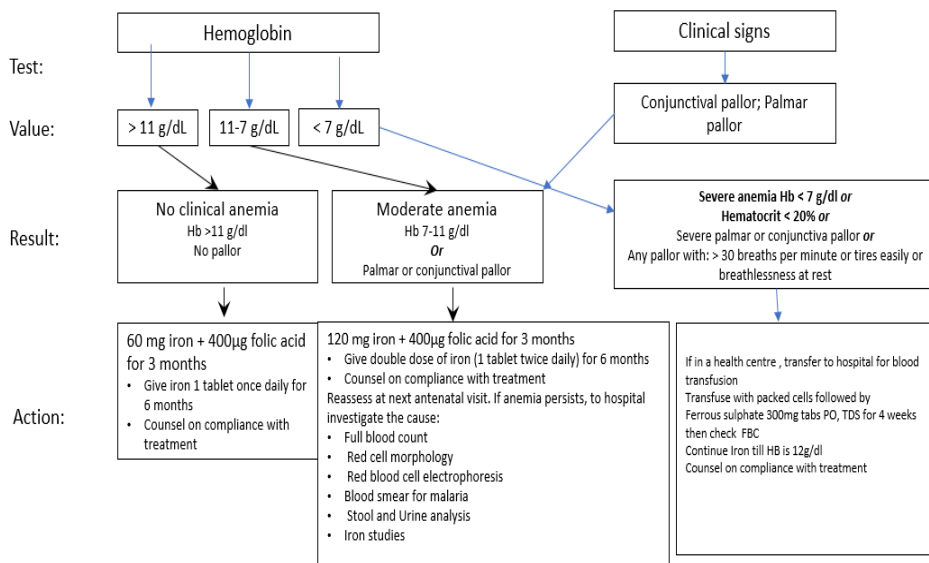
To prevent anemia in pregnancy, encourage pregnant women to consume food like:

- lean red meat, poultry, and fish
- leafy, dark green vegetables (such as spinach, broccoli, and kale)
- iron-enriched cereals and grains
- beans, lentils, and tofu
- nuts and seeds
- eggs

Foods that are high in vitamin C and iron. These include:

- citrus fruits and juices
- strawberries
- kiwis
- tomatoes
- bell peppers
- leafy green vegetables
- citrus fruits and juices
- dried beans
- breads and cereals fortified with folic acid

Check for Anemia: All the antenatal care visits **M**



Check Hemoglobin at every ANC visit and follow decision flow-chart as above.

Figure 2. 15 Checking anemia at all antenatal care visits

Self-assessment 2.17

How does iron deficiency anemia affect the fetus during pregnancy?

2.18 Nutrition during pregnancy

Learning Activity 2.18

In village, pregnant women and other families with under five years' children were being taught the importance of kitchen garden (“akarima k’igikoni”), and you were asked to talk about what the pregnant need to eat to be healthy.

Describe a balanced diet and its benefits to human body.

To maintain a healthy pregnancy, approximately 300 extra calories are needed each day. These calories should come from a balanced diet of protein, fruits, vegetables and whole grains. Sweets and fats should be kept to a minimum. A healthy, well-balanced diet can also help to reduce some pregnancy symptoms, such as nausea and constipation.

Key messages on nutrition for a positive pregnancy:

- All pregnant women should be counseled on healthy eating for a positive pregnancy at each ANC visit. These messages should be reinforced by the CHWs during home visits;
- Pregnant women should receive 3 meals and at least one additional snack using diverse food types to improve the quality and micronutrient intake;
- Pregnant women should avoid coffee, energy drinks, Coca-Cola, alcohol, fatty foods, raw or undercooked meats in pregnancy;
- Pregnant women who are obviously malnourished need special attention, counselling and advice from a trained nutritionist or a trained health care provider;
- Adolescent girls who are pregnant have their own need for growth and additional needs for fetus growth. Adolescent girls who become pregnant needs very special care with at least 3 meals and 2 snacks daily, using a variety of foods including animal source foods in every meal.

Education for appropriate infant feeding:

Health providers should discuss the importance and management of breastfeeding with all pregnant women and their families. All pregnant women must have basic information about breastfeeding, in order to make informed decisions.

Where facilities provide antenatal care, pregnant women and their families should be counselled about the benefits and management of breastfeeding.

The health facility could organize classes with practical sessions on breastfeeding and how to overcome breastfeeding difficulties.

The message given during antenatal discussion, group's education and communication materials should include at a minimum:

- Importance of breastfeeding;
- Exclusive breastfeeding for the first 6 months, the risks of giving formula or other breast-milk
- Substitutes, and the fact that breastfeeding continues to be important after 6 months;
- Importance of immediate and sustained skin to-skin contact;
- Importance of early initiation of breastfeeding within one hour after birth;
- Importance of rooming-in;
- Basics of good positioning and attachment;
- Recognition of feeding cues;
- Importance of starting to give other foods at 6 months of age;
- Importance of gradually introducing a variety of foods from 6 months to one year;
- Importance of continuing to breastfeed the child up to 24 months;

If the mother's HIV test is positive, she should receive ARTs and be counselled and supported for infant feeding; the mother can breastfeed like for other infants, except that breastfeeding should gradually be interrupted at 18 months.

Micronutrient supplementation during pregnancy:

During pregnancy, women have additional needs in all nutrients and micronutrients. For some micronutrients such as iron, folic acid and calcium, the needs are difficult to be covered by food intake alone and micronutrients supplements are needed.

a. Iron and folic acid supplementation:

Pregnant women should be prescribed a daily dose of oral iron (60mg) and folic acid supplementation (400µg =0.4 mg) during the whole course of pregnancy to prevent maternal anemia, puerperal sepsis, low birth weight, and preterm birth.

b. Calcium supplementation:

Given the insufficient intake of calcium in women in Rwanda, pregnant women should receive a daily calcium supplementation (1.5–2.0 g oral elemental calcium) to reduce the risk of pre-eclampsia.

Dividing the dose of calcium may improve acceptability. The suggested scheme for calcium supplementation is 1.5–2 g daily, with the total dose divided into three doses, preferably taken at mealtimes.

Calcium supplementation is recommended to woman with high risks to develop pre-eclampsia during pregnancy:

- Primigravidae, teenagers and elderly primigravidae.
- Women of age 35 years and above.
- Previous pregnancy complicated by pre-eclampsia.
- Previous abruptio placentae or intra-uterine death.
- Multiple pregnancies.
- Medical complications such as chronic hypertension, renal disorders, diabetes, connective tissue disorders or antiphospholipid syndrome

Self-assessment 2.18

Differentiate micro nutrients from macro nutrients

End unit assessment 2

1. What is focused FANC?
2. Differentiate the terms: Health promotion and health education
3. Describe the components of focused ANC
4. Using a table, show the new model of eight contacts in FANC
5. List the issue that may confuse the diagnosis of an early pregnancy

Key Unit competence: Provide adequate support to a women in labour

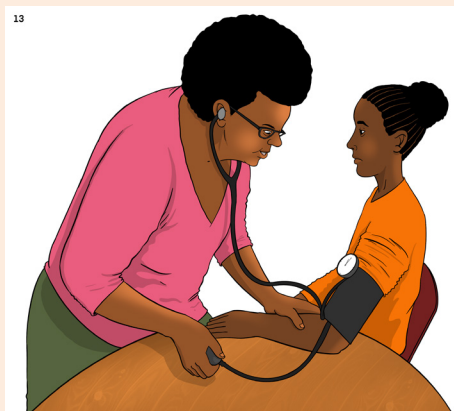
Introductory activity 3

By looking at the following picture A and B, respond to the questions below:

A



B



Describe the situation on the above pictures.

1. What are the signs that characterize the mother's situation on both pictures A and B.
2. What should be the elements to assess on a pregnant woman?
3. According to the picture above explain how patient's rights are respected.

3.1. Concepts of normal labour

Learning Activity 3.1

Using different source of information (internet, libraries) search for the meaning of the following terms and be prepared for class presentation

- a. Labour
- b. Uterine contractions
- c. Cervical effacement
- d. Cervical dilatation
- e. engagement
- f. Descent
- g. Stations

During the last weeks of pregnancy, a woman and her fetus prepares for the labour process. This process is considered as normal at 40 weeks (- or + 2 weeks). The pregnant woman undergoes the various physiological changes and adaptations during pregnancy that prepares her for childbirth and later along motherhood. The term labor refers to the process of moving the fetus, placenta, and membranes out of the uterus and through the birth canal. The labour process occurs with the presence of uterine contractions which are forceful and very painful motion of the uterus resulting in tightening and shortening of the uterine muscles.

The presence of uterine contractions also facilitates the cervical effacement which refers to the softening, thinning and shortening of the cervical canal. In primigravida, the cervical effacement occurs before the cervical dilatation referring to the increase in diameter of the cervical opening. Contrary to prim gravida, these two processes occur simultaneously among multigravida women

Cervical Effacement

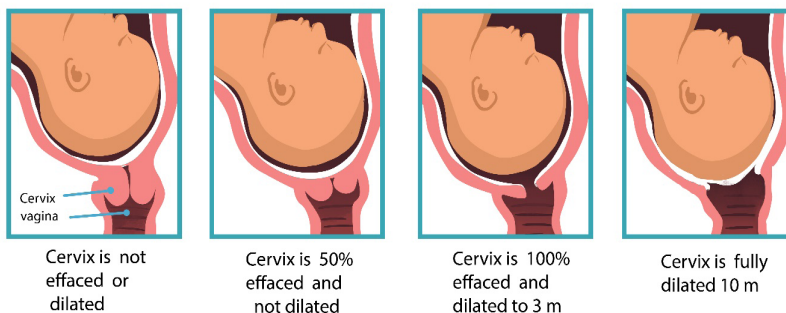
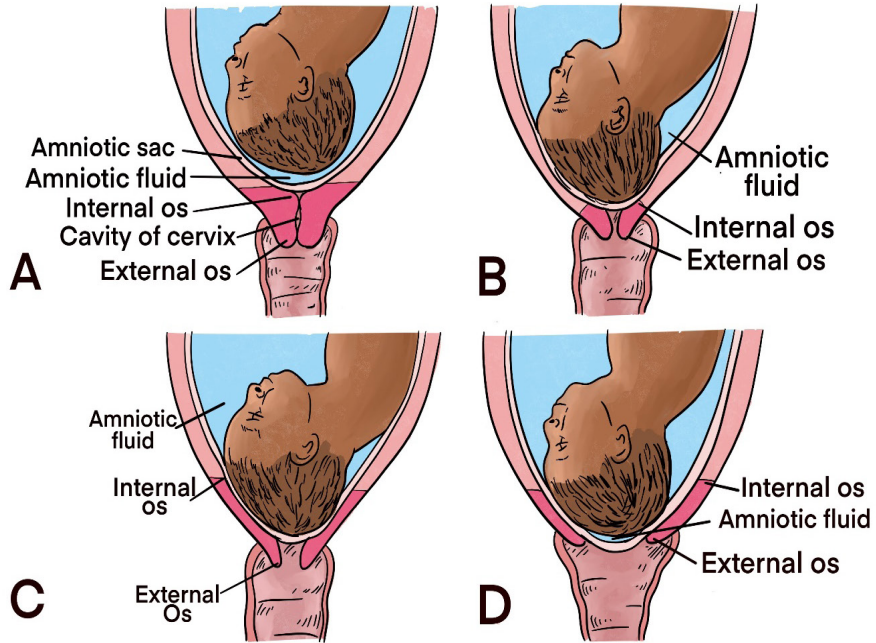


Figure 3.1 Cervical effacement

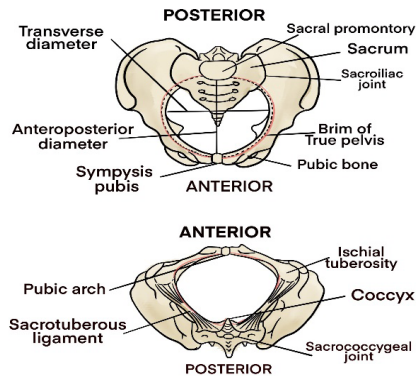
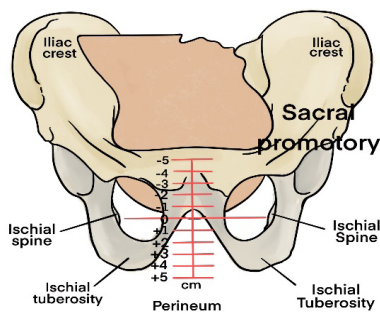
The fetus begins to enter the maternal pelvis and when the largest transverse diameter of the presenting part (usually biparietal diameter in case of Cephalic presentation or bitrochanteric diameter in breech presentation) has passed through the maternal pelvic brim or inlet into the true pelvis this process is named engagement. When the fetus is engaged, the presenting part continues to progress through the pelvis (**Descent**). The descent of the fetus and its relationship to the level of ischial spines is evaluated and reported as **stations**.



A. non dilated non effaced cervix
C. dilated cervix

B: Cervix starting effacement
D: dilated and effaced cervix

Figure 3.2 Cervical effacement and dilatation.



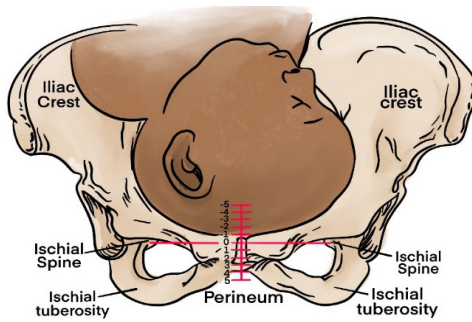


Figure 3.3 Stations

Self-assessment 3.1

1. Define labour and uterine contractions.
2. Differentiate cervical dilatation from cervical effacement.

3.2. Signs preceding labor, types and onset of labour

Learning Activity 3.2

Use books or other sources of information to answer the following questions.

1. What are the common signs that may indicate that a woman will be soon in labour?
2. What are the types of labour for a pregnant woman?
3. Describe the onset of labour for a pregnant woman.

3.2.1. Signs preceding labour

Before the onset of labor, a number of physiological changes occur that signal the readiness for labor and birth. These changes are usually noted by the primigravid woman at about 38 weeks of gestation. In multigravidas, they may not take place until labor begins.

Labor itself can be discussed in terms of the mechanisms involved in the process and the stages through which the woman moves.

3.2.2 Types of labour

False labour

Braxton-Hicks contractions As the pregnancy approaches term, most women become more aware of irregular contractions called Braxton-Hicks contractions. As the contractions increase in frequency (they may occur as often as every 10 to 20 minutes), they may be associated with increased discomfort.

Braxton-Hicks contractions are usually felt in the abdomen or groin region and patients may mistake them for true labor. It is believed that these contractions contribute to the preparation of the cervix and uterus for the advent of true labor. Braxton-Hicks contractions do not lead to dilation or effacement of the cervix, and thus are often termed “false labor.”

True labour

As time passes, the woman’s uterine **contractions** increase the intensity, regularity and pain. A woman starting labour experiences **cervical changes** in preparation for passage of the fetus. The cervix soften (cervical ripening), stretches, and thin, and eventually is taken up into the lower segment of the uterus. This softening and thinning is called **cervical effacement**. As the effacement progresses, there may be rupture of the small cervical capillaries. The added pressure created by engagement of the presenting part may lead to the expulsion of a brownish or blood-tinged cervical mucus plug, called bloody **show**. This mucus acts as a protective barrier for the uterus and its contents throughout the pregnancy. The cervix becomes soft (ripens) and partially effaced and may begin to dilate.

Rupture of membranes

A few numbers of pregnant women experience spontaneous rupture of the amniotic sac (**“rupture of membranes” or “rupture of the bag of water”**) prior to onset of labour. the rupture of membrane may be spontaneous or artificial. The rupture of membrane is a critical event in pregnancy.

Table no 3.1 Differences between False and True labor

Distinguishing True from False Labor	
True Labor	False Labor
Contractions are at regular intervals	Contractions are irregular
Contractions increase in frequency, duration, and intensity.	Usually there is no increase in frequency, duration, or intensity of contractions.
Pain usually begins in lower back, radiating to the abdomen.	Pains usually occur in the abdominal region

Dilation and effacement of the cervix are progressive	There is no change in cervix
Activity such as walking usually increases labor pains	Walking may lessen the pain

3.2.3. Onset of labor

At the onset of labor, the position of the fetus with respect to the birth canal is critical to the route of delivery. The onset of labour is determined by a complex interaction of maternal and fetal hormones and it is not yet well understood. **Childbirth** is the period from the onset of regular uterine contractions until expulsion of the placenta.

Self-assessment 3.2

1. List four signs that may signify impending of labour?
2. Distinguish the two types of labour for a pregnant woman
3. What determines the onset of labour of a pregnant woman?
4. Describe when a woman experiencing contractions at term should be instructed to go to the hospital.

3.3. Factors affecting labour and Mechanism of labour

Learning Activity 3.3

When a pregnant woman is on labour there are factors that are affecting labour process. Use books or other sources of information to answer the followings questions:

1. List 2 factors affecting the labour process?
2. What are the 7 elements of the mechanism of labour?

The mechanisms of labor, also known as the cardinal movements, involve changes in the position of the fetus's head during its passage in labor. These are described in relation to a vertex presentation.

The labour and birth process are affected by at least five factors. These factors are known as:

A. Factors affecting labour

Five P's : **Passageway**(Birth canal) , **Passenger** (fetus and placenta) ,**Power** (Uterine contractions) , **Position** of the mother , and **psychologic** response of

the mother. Based on the maternal needs and her childbearing rights, a sixth P is added which is **Partner**. This partner may be her husband /life partner or a person of her choice.

The first four factors are presented here as the basic for understanding the physiologic process of labour. The fifth and six Ps are the factors that may affect labour indirectly but with positive impact.

- **Passageway**

The passageway, or birth canal, is composed of the mother's rigid bony pelvis and the soft tissues of the cervix, the pelvic floor, the vagina, and the introitus (the external opening to the vagina). Even though the soft tissues, particularly the muscular layers of the pelvic floor, contribute to vaginal birth of the fetus, the maternal pelvis plays a far greater role in the labor process because the fetus must successfully accommodate itself to this relatively rigid passageway.

- **Passenger**

During labour and birth process the fetus moves through the birth canal. These fetal movements are affected by the following factors: The fetal presentation, lie, attitude, position and size.

- **Position of a labouring woman:**

Position of the labouring woman affects the woman's anatomic and physiologic adaptations to labour. Frequent changes in position relieve fatigue, increase comfort, and improve circulation. Therefore, a laboring woman should be encouraged to find positions that are most comfortable to her. Positioning for labor may be determined by the woman's preference, but choices are limited by her condition or that of the fetus, the environment, and the health care provider's confidence in assisting in a specific position.

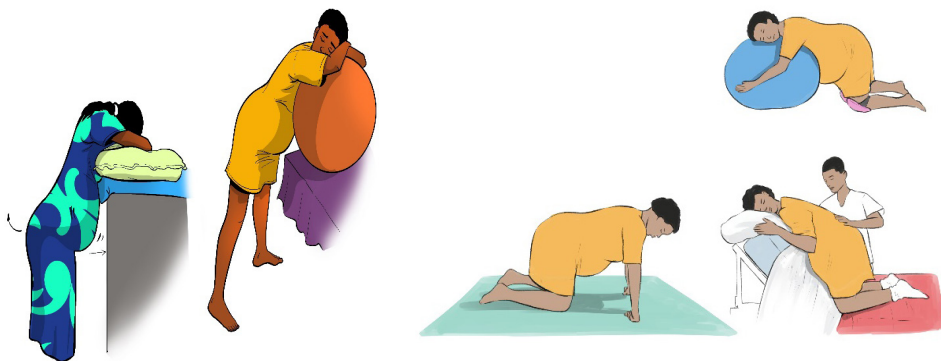


Figure 3.4 Positions of labouring woman

Points to remember: signs preceding labour

- Lightening
- Return of urinary frequency
- Backache
- Stronger Braxton Hicks contractions
- Surge of energy

B. Mechanism of Labour

The most common fetal presentation is Occiput Anterior Presentation (**Vertex presentation**). During labour process, the fetus adopts positional changes in the presenting part required to navigate the pelvic canal. These positional changes constitute the **mechanism of labour**

The cardinal movements of labour are engagement, descent, flexion, Internal rotation, extension, external rotation, and expulsion

A. Engagement

The term engagement designates the mechanism by which the biparietal diameter “the greatest transverse diameter in an occiput presentation” passes through the pelvic inlet is designated engagement

B. Descent

Descent refers to the progress of the presenting part through the pelvis. Descent depends on at least four forces: (1) pressure exerted by the amniotic fluid, (2) direct pressure exerted by the contracting fundus on the fetus, (3) force of the contraction of the maternal diaphragm and abdominal muscles in the second stage of labor, and (4) extension and straightening of the fetal body. The effects of these forces are modified by the size and shape of the maternal pelvic planes and the size of the fetal head and its capacity to mold.

C. Flexion

As soon as the descending head meets resistance from the cervix, pelvic wall, or pelvic floor, it normally flexes so that the chin is brought into closer contact with the fetal chest (see Fig. 16-12, B). Flexion permits the smaller suboccipito-bregmatic diameter (9.5 cm) rather than the larger diameters to present to the outlet.

D. Internal rotation

The maternal pelvic inlet is widest in the transverse diameter; therefore, the fetal head passes the inlet into the true pelvis in the occipito-transverse position. The outlet is widest in the anteroposterior diameter; for the fetus to exit, the head must rotate. Internal rotation begins at the level of the ischial spines but is not completed until the presenting part reaches the lower pelvis. As the occiput rotates anteriorly, the face rotates posteriorly. With each contraction the fetal head is guided by the bony pelvis and the muscles of the pelvic floor.

E. Extension

After internal rotation, the sharply flexed head reaches the vulva and undergoes extension. When the fetal head reaches the perineum for birth, it is deflected anteriorly by the perineum. The occiput passes under the lower border of the symphysis pubis first, and then the head emerges by extension

When the head presses upon the pelvic floor, however, two forces come into play. The first force, exerted by the uterus, acts more posteriorly, and the second, supplied by the resistant pelvic floor and the symphysis, acts more anteriorly. The resultant vector is in the direction of the vulvar opening, thereby causing head extension. This brings the base, first the occiput into direct contact with the inferior margin of the symphysis pubis, then the face, and finally the chin.

P. External rotation

After the head is born it rotates briefly to the position it occupied when it was engaged in the inlet. This movement is referred to as restitution. The 45-degree turn realigns the infant's head with the back and shoulders. Restitution of the head to the oblique position is followed by completion of external rotation to the transverse position. This movement corresponds to rotation of the fetal body and serves to bring its bi-acromial diameter into relation with the anteroposterior diameter of the pelvic outlet. Thus, one shoulder is anterior behind the symphysis and the other is posterior.

This external rotation occurs as the shoulders engage and descend in maneuvers similar to those of the head. As noted, the anterior shoulder descends first. When it reaches the outlet, it rotates to the midline and is delivered from under the pubic arch. The posterior shoulder is guided over the perineum until it is free of the vaginal introitus.

G. Expulsion

After birth of the shoulders, the head and shoulders are lifted up toward the mother's pubic bone and the trunk of the baby is born by flexing it laterally in the direction of the symphysis pubis. After delivery of the shoulders, the rest of the body quickly passes. When the baby has completely emerged, birth is complete, and the second stage of labor ends.

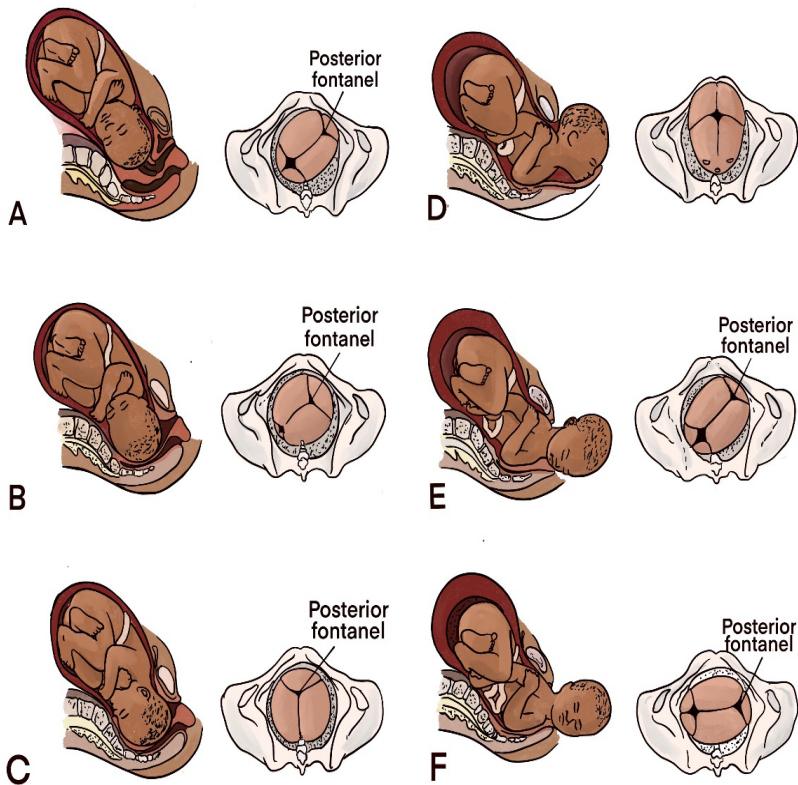


Figure 3.5 Mechanism of labor

Self-assessment 3.3

1. Define the fetal presentation?
2. Define the 5 Ps affecting labour?
3. Differentiate the first powers and secondary powers.
4. Explain the mechanism of labour

3.4. Assessment of a woman in labour: General history taking, vital signs and physical examination

Learning Activity 3.4

Using textbooks and other resources identify different general pregnant woman's histories taken during history taking.

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

Before starting the assessment remember to ask the woman if she has had any danger signs (vaginal bleeding, gush of fluid or any problems such as fever, difficulty breathing, cough, leg pain, etc.) or has any concern.

- The vital signs (temperature, blood pressure, heart rate and respiratory rate) and parameters (Height, weight, BMI). Respond immediately to any abnormalities in vital signs or other problems identified during the rapid initial assessment.
- General Medical History: Ask about any serious medical diseases likely to affect pregnancy and labour such as heart diseases, diabetes mellitus, renal diseases, tuberculosis and sickle cell disease. Note any allergies to drugs, Syphilis testing, VCT, HIV diagnosis or currently on any medication taken regularly.
- Surgical history: Any previous hospitalizations for injuries to the pelvis and spine, major or minor surgeries on the abdomen and blood transfusion.
- Physical assessment includes the examination from head to toe.

Self-assessment 3.4

1. What are the vital signs and parameters taken during the pregnant woman's assessment?
2. What are the components of the general history taking?

3.5. Assessment of a woman in labour: Obstetrical history taking

Learning Activity 3.5

Using text books and other sources of information, identify the components of obstetrical and gynecological history of a woman on labour.

- **History of the present pregnancy:** It includes the date of the first day of the last normal menstrual period (LMP), the Parity and Gravidity. From this, calculate and record the expected date of delivery (EDD). Ask the woman about the history of this labour: approximate time contractions began and membranes ruptured (**when, what color and odor?**).
- **Past obstetric history:** You should ask the mother about the outcomes or complications of each of the previous pregnancies. Inquire whether she delivered at home or at a hospital. Ask for the birth weights of the children, whether they were breastfed and whether they are alive or not.

- **Gynecological history:** This will include the menstrual history, any past operations for gynecological complaints and sexually transmitted infections (STI).

Self-assessment 3.5

A pregnant woman attends the health post complaining of labour pains and she explained that she has attended antenatal care 4 times and this is her 3rd pregnancy and her last menstruation date is 12th/January /2021

1. Calculate her expected date of delivery (EDD)
2. What are the questions that you would ask to know the history of the present pregnancy.
2. What are the obstetrical history would you ask her?
3. What are the questions will you ask her to know her gynecological history?

3.6 Assessment of a woman in labour: Obstetrical examination

Learning Activity 3.6

Using text books and other sources, identify the steps of obstetrical examination for a woman on labour.

Abdominal palpation: Check the woman's abdomen for caesarean scar; a horizontal ridge across lower abdomen (if present, ask the woman to empty her bladder and observe her again). This examination includes **Leopold maneuvers** (palpation to determine position, lie, engagement and descent of the presenting part); uterine **contraction palpation** (palpate uterine contraction at the fundus, record duration in seconds, **frequency** which is the number of uterine contractions in 10 minutes, and the intensity of contractions). It also includes **listening to fetal heart rate for one whole minute** (20-30 minutes baseline, External fetal monitoring is required) and

Digital vaginal examination (DVE): To determine the cervical position, length, thickness, dilation and effacement. Assessment of the state of membranes (intact, ruptured, color and consistency, amount and note the time of rupture); we also assess the pelvic floor; the diagnosis of the position and evaluation of the descent of the fetal presenting part. Assess the descent in terms of fifths of fetal head palpable above the symphysis pubis. A head that is entirely above the symphysis pubis is five fifths (5/5) palpable; a head that is entirely below the symphysis pubis is zero fifths (0/5) palpable. The vaginal examination equipment and steps to follow are described below:

► **Equipment:** sterile examination gloves (clean gloves may be used if the membranes are intact); sterile lubricant; antiseptic solution and light source (if required); disposable wipes.

► **Steps:**

- a. Wash and dry your hands. Explain the procedure and purpose of the examination to the patient. **RATIONALE:** Hand washing helps to prevent the spread of microorganisms. Explanations help to decrease anxiety and promote patient understanding and cooperation.
- b. Assess for latex allergies. **RATIONALE:** To prevent injury from latex exposure; if patient has a latex allergy, use non latex gloves.
- c. Ensure privacy. **RATIONALE:** Privacy promotes comfort and self-esteem.
- d. Assemble necessary equipment including clean gloves (if the membranes are intact) or sterile examination gloves (if the membranes are ruptured), sterile lubricant, and antiseptic solution (if required).
- e. Position the patient in a supine position with a small pillow or towel under her hip to prevent supine hypotension. Instruct the patient to relax and position herself with her thighs flexed and abducted. **RATIONALE:** Relaxation decreases muscle tension and enhances patient comfort. Proper positioning facilitates the examination by providing access to the perineum.
- f. Don sterile gloves (clean gloves may be used if the membranes are intact).
- g. Inspect the perineum for any redness, irritation, or vesicles.
- h. Using the nondominant hand, spread the labia majora and continue assessment of the genitalia. Note the presence of any discharge including blood or amniotic fluid. **RATIONALE:** Positioning the hand in this manner facilitates good visualization of the perineum. The presence of lesions may be indicative of an infection and possibly preclude a vaginal birth. The presence of amniotic fluid implies that the membranes have ruptured.
- i. Gently insert the lubricated gloved index and third fingers into the vagina in the direction of the posterior wall until they touch the cervix. The uterus may be stabilized by placing the nondominant hand on the woman's abdomen.
- j. Assess the cervix for effacement and the amount of dilation.
- k. Assess for intact membranes; if fluid is expressed, test for amniotic fluid.
- l. Palpate the presenting part. **RATIONALE:** It is necessary to determine the presenting part in order to assess fetal position and evaluate fetal descent.
- m. Assess fetal descent and station by identifying the position of the posterior fontanel.
- n. Withdraw the fingers. Assist the patient in wiping her perineum from front to back to remove lubricant or secretions. Help her to resume a comfortable position. **RATIONALE:** Wiping from front to back prevents the transfer of rectal contamination toward the vagina.

- o. Inform the patient of the findings from the examination.
- p. Wash hands. Document the procedure on the patient's chart and on the fetal monitor strip (if a fetal monitor is being used). Include the assessment findings and the patient's tolerance of the procedure. **RATIONALE:** Documentation provides a record for communication and evaluation of patient care.

Points to remember

- Physical assessment can be completed at the same time as the labor assessment and the history should include any findings of concern that are not on your checklist.
- Be mindful of her privacy and special needs.

Laboratory investigations

Laboratory testing is a routine component of the admission process. Tests for blood type and Rh factor, complete blood count (CBC), hemoglobin (Hb) and hematocrit (HCT), and blood glucose/Glycemia are basically obtained. Blood tests for syphilis, hepatitis B, and HIV are also collected. The urine specimen is tested for the presence of protein, glucose, blood, pus, bacteria and ketones.

Self-assessment 3.6

A pregnant woman attends health post complaining of lombo pelvic pains on a term pregnancy. When asked she told you that she started laboring for the past two hours.

1. Explain the steps of obstetrical examination?
2. What are the required laboratory tests for her before transfer?

3.6.1 Use of partograph

Learning Activity 3.6.1

Observe the picture bellow and answer the following questions:

1. What is the name of this tool?
2. What is this tool used for?
3. What are the elements that are on the tool below:

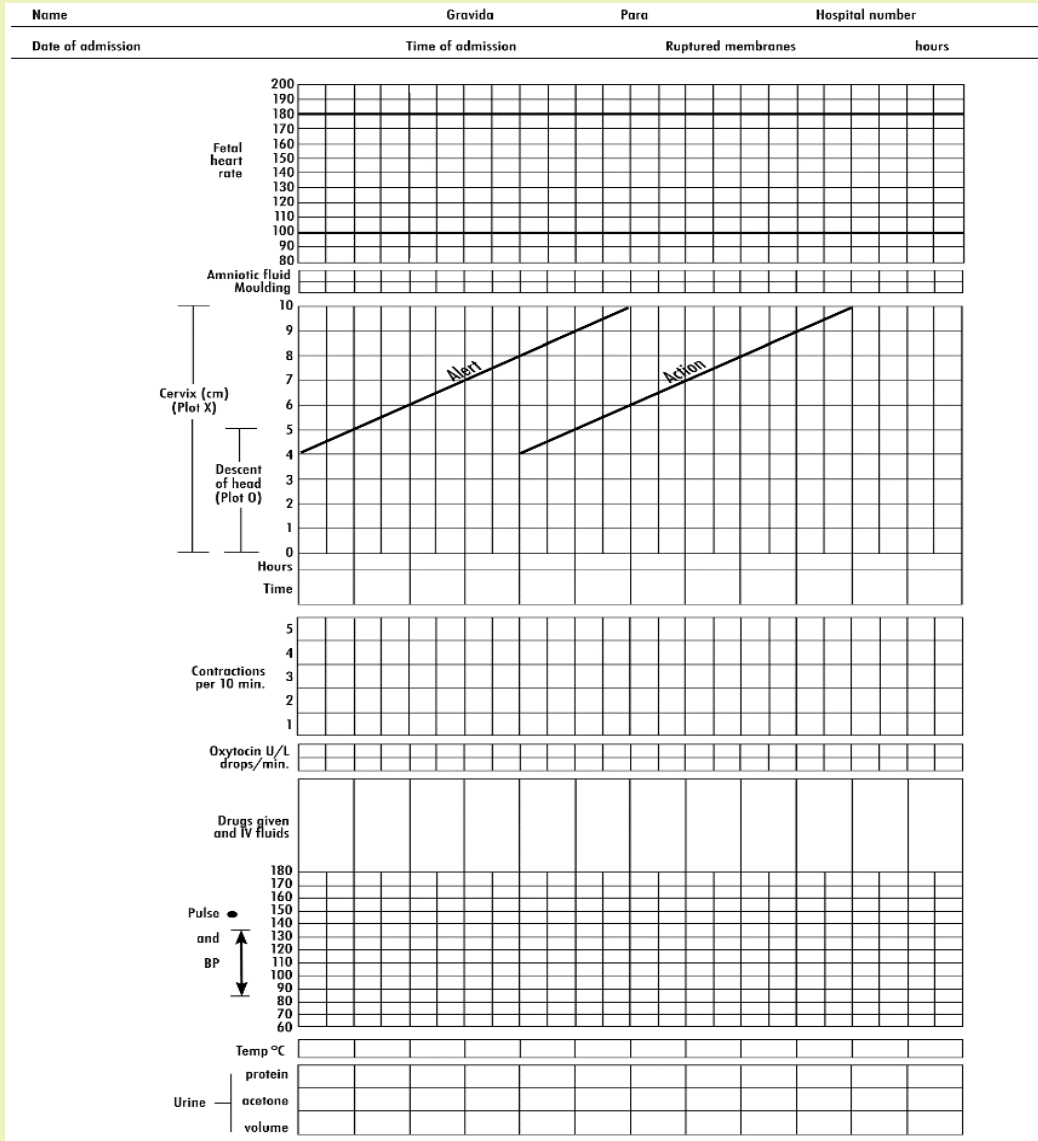


Figure 3.6 Partograph

The partograph was developed and extensively tested by the world health organization WHO for guiding birth attendant to have a good overview of labor progression and therefore decide appropriate action. The partograph is accessible in paper and electronic versions for most health care workers in maternity as the tool of labor monitoring.

The use of partograph helps in health facilities for early detection of abnormal progress of a labor; prevention of prolonged labor; recognition cephalopelvic disproportion; early decision on transfer, augmentation, or termination of labor; increased quality and regularity of all observations of mother and fetus; early recognition of maternal or fetal problems; reduction of complications from prolonged labor for the mother and for the newborn.

All observations and examinations like cervical dilatation; effacement; descent of presenting part; strengths and duration of uterine contractions; maternal and fetal wellbeing and any drug treatment are documented on partograph.

Parts of the partograph

Plotting on the partograph begins in the active phase when the cervix is 4 cm dilated. The partograph should be enlarged to full size before use.

The following are element to be recorded on the partograph:

1. Maternal information and conditions:

Woman's name; gravida; para, hospital number; date and time of admission; time of ruptured membranes; Pulse recorded every 30 min and mark with a dot (•); Blood pressure every 4 hours; Temperature every 2 hours; Urine output, Protein and Glucose when urine is passed.

2. Fetal conditions:

Fetal heart rate every half hour; Colour of the amniotic fluid and the status of membranes at every vaginal examination as I: membranes intact, R: membranes ruptured, C: membranes ruptured, clear fluid, M: meconium-stained fluid, B: blood-stained fluid; Moulding as 1: sutures apposed 2: sutures overlapped but reducible sutures overlapped and not reducible.

3. Progress of labor:

Cervical dilatation at every vaginal examination and mark a cross (X) and start to plot it at 4 cm. There are two lines **Alert line** which starts at 4 cm of cervical dilatation to the point of expected full dilatation at the rate of 1 cm per hour and **Action line** which is parallel and four hours to the right of the alert line; **Descent** as a circle (O) at every abdominal examination. **At 5/5**, the **sinciput** is completely above the symphysis pubis; **at 4/5**, the **sinciput** is high and occiput easily felt;

at 3/5 the sinciput is easily felt; **at 2/5**, the sinciput is felt and occiput just felt; **at 1/5**, the sinciput is felt and occiput is not felt; **at 0/5**, none of the head is palpable. Assess **contractions** every half hour and count the number of contractions in a 10-minute time period and their duration in seconds and intensity. The contractions are recorded as follows: less than 20 seconds: ▤; between 20 and 40 seconds: ▨; more than 40 seconds: ■

4. **Drugs: Oxytocin** when used, record the amount per volume of IV fluids in drops per minute every 30 minutes; any **additional drugs** given are also recorded.

Self-assessment 3.6.1

Alexa is 38 years of age G4P3, was admitted at 10:00 am on 11 October 2021 with complaints of labour pains since 7:00 am. This is her first pregnancy. Plot the following findings on the partograph:

At 10:00am:

- The cervix is dilated 4 cm.
- The fetal head is at 0 station, no moulding.
- The membranes are intact.
- She had 2 contractions in 10 minutes, each lasting less than 20 seconds.
- The FHR is 140 per minute.
- Her BP is 100/70 mmHg.
- Pulse: 82b/1minute.
- Her temperature is 37°C.
- Her pulse is 80 per minute
- no oxytocin added

End unit assessment 3

Mutesi is a 25-year-old G 1 P 0 at 39 weeks of gestation. She presents herself to the health center at maternity ward and announces, "I'm here to have my baby. I think I'm in labor." Mutesi reports that she saw a thick bloody vaginal discharge several hours ago when wiping after peeing earlier today. She states that she has lower abdominal cramping ("It feels like the cramps I have with my periods") but denies leakage of vaginal fluid. Mutesi also reports active fetal movements. In answering to your question, she replies that her current pain level is mild, while alternating between texting on her phone and chatting with her mother, who accompanied her to the hospital. Few hours later you observe change in her pain. She expressed that her pain is increasing and she feels like pushing.

After assessment you realize her cervix is dilated at 6cm; effaced at 100%; the baby's head is at 0 station with vertex presentation; water bag is intact; the Fetal heart rate are 140beats/min and regular; she has 3 contractions in 10 min lasting between 20 and 40 seconds. The nurse at health post indicates that the woman's hemoglobin is 12g/dl; glycosuria is negative; temperature of 37.3°C; Blood pressure is 100/80mmHg; Pulse of 86 beats/min and respiration of 20 mvts/min.

Plot all above information on partograph.

1. Define the following terminologies:
 - a. Labour
 - b. Uterine contractions
 - c. Stations
2. Describe the digital Vaginal examination that you would do to Mutesi?
3. What are the essential elements to focus on in your assessment?
4. Using the information you have above Plot the partograph for this woman.

Key Unit competence: Assist in management of woman in the first stage of labor

Introductory activity 4



- Referring to figure A and B above identify what it indicates in terms of Maternal and fetal monitoring during labour.
- What do you think would be done to support a woman on labour?

4.1. Stages of labor

Learning Activity 4.1

Madam Kawera came in labour suite, complaining of labour pain that started 2 hours ago. She reports that a nurse earlier told her that she has a cervical dilatation of 6 cm and the fetal descent was at 0 station, FHR was 140b/minute. Uterine contractions were 3 in 10 minutes lasting 40 seconds. Her membranes were intact and no any other complain.

Answer the following questions based on information given to you by madam Kawera, previous lessons in unit 1,2 and 3 and books:

- In which phase of labour is Madam Kawera?
- In which stage of labour is Madam Kawera?

The labor and childbirth processes are natural phenomena during which most women benefit from a philosophy of minimal intervention.

The first stage of labor starts from the commencement of contractions and lasts until full dilatation of the cervix. It is a progressive process, and is divided in 3 phases: the **latent phase** begins with the establishment of regular contractions (labor pains). Labor pains are often initially felt as sensations similar to painful menstrual cramping and are usually accompanied by low back pain. Contractions during this phase are typically about 5 minutes apart, last 30 to 45 seconds, and are considered to be mild. The latent phase of labor can last as long as 10 to 14 hours as the contractions are mild and cervical changes occur slowly (0 to 3 cm of dilation).

The **active phase** of labor is characterized by more contractions, they become more frequent (every 3 to 5 minutes), last longer, and are of a moderate to strong intensity. During the active phase, the cervical dilation advances more quickly (4 to 7 cm) as the contractions are often more efficient. While the length of the active phase is variable, nulliparous women generally progress at an average speed of 1 cm of dilation per hour and multiparas at 1.5 cm of cervical dilation per hour.

The transition phase is the most intense phase of labor (8 to 10 cm of dilation). Transition phase is characterized by frequent, strong contractions that occur every 2 to 3 minutes. Fortunately, this phase often does not take long because dilation usually progresses at a pace equal to or faster than active labor (1 cm/hr for a nullipara and 1.5 cm/hr for a multipara). During the transition phase, the laboring woman may feel that she can no longer continue; rectal pressure, an increased urge to bear down, an increase in bloody show, and spontaneous rupture of the membranes (if they have not already ruptured).

The **second stage of labor** is traditionally defined as the stage from full cervical dilation until the baby is born. Usually, the actual time of onset is uncertain because the complete cervical dilatation does not always go with the descent and station of the presenting part. The woman may experience vomiting, often with contractions; show or bright red vaginal loss; spontaneous rupture of the membranes can occur any time but often at full dilatation; urge to push; powerful, expulsive contractions every 2–3 minutes, often lasting ≥ 60 seconds.

The third stage of labor refers to the period following the completed delivery of the newborn until the completed delivery of the placenta. The length of the third stage and its complications are affected by the uterine contractility and the duration of placental separation.

This stage usually lasts 5 to 10 minutes, and may last up to 30 minutes. Once the baby is born, the uterine cavity immediately becomes smaller.

Table 4.1: Classification of stage and phase of labour based on cervical dilatation

Signs and symptoms	stage	phase
Cervix not dilated	False labour	
Cervix dilated less than 4 cm	First	Latent
Cervix dilated 4 cm up to 10 cm; rate of dilatation typically 1 cm per hour or more; fetal descent begins	First	Active
Cervix fully dilated (10 cm); fetal descent continues; no urge to push	Second	Early (nonexpulsive)
Cervix fully dilated (10 cm); presenting part of fetus reaches pelvic floor; woman has the urge to push	Second	Late (expulsive)

The appropriate time taken for each stage of labour depends on gravidity. In **primigravidae** the first stage lasts between 12 to 14 hours and 6 to 10 hours in **multigravidae**; the second stage lasts 60 minutes for **primigravidae** and up to 30 minutes for **multigravidae**; the third stage lasts 20 to 30 minutes or 5 to 15 minutes for **primigravidae** and **multigravidae** in active management.

Self-assessment 4.1

1. Define the characteristics of the first and second stages of labor including contractions and dilation.
2. Describe the three phases of the first stage of labor and the changes that occur during each phase?

4.2. Care during the first stage of labour

Learning Activity 4.2

Using different source of information (internet, library) discuss in group, the care provided to a pregnant woman during the first stage of labour.

During labour a pregnant woman receives the care that is centered to her.

The following table is showing the care provided during management of the first stage of labour.

Table 4.2 Care during the first stage of labour

Assessments of the first stage of labour		
Admit a woman:		
History taking		
Physical examination		
Obstetrical examination		
Assessment to be performed on a woman on labor		
Labour phase	Time frame	Specific assessment
Latent	Every 30-60 minutes	Maternal blood pressure, pulse, and respirations Fetal heart rate (FHR) and pattern Uterine activity Presence of vaginal show
Active and transitional phase	Every 30 minutes	Changes in maternal appearance
	Every 4 hours	Blood pressure Temperature (every 4 hours until membranes rupture, then every 2 hours)
	As indicated	vaginal examination to identify progress in labor
	Every 30 minutes	Maternal pulse, and respirations
	Every 15 - 30 minutes	FHR and pattern Uterine contractions Presence of bloody show

Vaginal Examination of the Laboring Woman

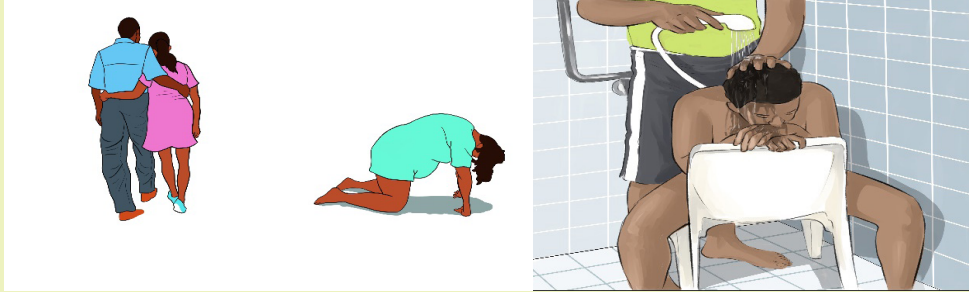
- Use a sterile glove and antiseptic solution or soluble gel for lubrication.
- Ensure the woman has empty bladder
- Position the woman to prevent supine hypotension. Drape to ensure privacy.
- After obtaining the woman's permission to touch her
- Cleanse the perineum and vulva, if needed.
- Gently insert the index and middle fingers into the woman's vagina.
- Determine:
 - Cervical dilation, effacement, and position (e.g., posterior, mid, anterior)
 - Presenting part, position, and station; molding of the head with development of caput succedaneum (may affect accuracy of determination of station)
 - Status of membranes (intact, bulging, or ruptured) • Characteristics of amniotic fluid (e.g., color, clarity, and odor), if membranes are ruptured.
 - Explain the findings of the examination to the woman.
 - Document your findings and report them to the nurse/midwife or physician.

Self-assessment 4.2

1. If a pregnant woman's cervix is 2 cm dilated, when should you perform the next vaginal examination?
 - a. After 2 hours of admission.
 - b. After 8 hours of physical exercises.
 - c. When the woman wants to bear down.
 - d. When there are signs that the woman is in established labour with more regular and painful uterine contractions.
2. In general, what must be monitored during the first stage of labor?

4.3 Labor Support

Learning Activity 4.3



A

B

Observe the pictures A and B describe the care provided to the pregnant woman during labour.

Whenever possible, continuous labor support should be given to women in labor and providing this level of care has been associated with positive outcomes for mothers and infants. Continuous labor support can be provided by health professional or by lay people and include **presence, promotion of comfort, anticipatory guidance, caring of birth partner, and ensuring culture centered care.**

- Presence: Offering one's presence in labor can be defined simply as "physically being with the woman." Women find that having a skilled birth attendant present can be reassuring because they recognize that assistance is available when needed. Women want a healthcare professional or a person of choice to be available, to be emotionally involved, to help create a special moment, to hear and respond to their concerns, to share the responsibilities for keeping them safe, and to act as a go-between for their family and the medical institution.



Figure 4.1 Labor support

- Promotion of comfort: Women comfort is always needed and include different measures which are positions changes and personal comfort measures.

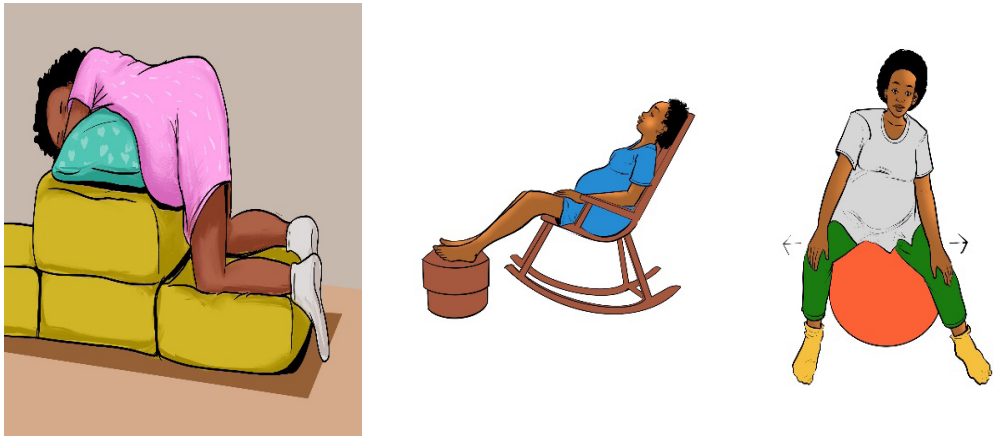


Figure 4.2 Different positions a woman can take during labor

- **Position Changes:** In labor, frequent position changes are beneficial in helping to promote the descent of the fetus. The woman's person of choice may assist the laboring woman to various positions and activities such as walking, standing, sitting, squatting, leaning over a piece of furniture, or assuming a hands and knees position.



Figure 4.3 Different labour positions

- Maternal preferences can guide the healthcare professional or her person of choice in assessing which positions or activities the woman finds most comfortable. Changes in the woman's status may necessitate a need of bed rest and the nurse should encourage the laboring woman to rest on her left side to facilitate optimal uteroplacental blood flow.

In addition, position changes should be encouraged even if the woman must remain in bed. It is important to avoid the supine position since the pressure of the uterus on the maternal spine can cause compression of the inferior vena cava and lead to decreased blood pressure and diminished uteroplacental blood flow.

- Personal comfort measures: Based on laboring woman's preferences and needs, the nurse can provide personal comfort measures (**good environment, personal hygiene, elimination, and supportive relaxation techniques**) and encourage family members and support persons to help woman to meet them.



Figure 4.4 Offering fluid intake during labour

- Environment: The healthcare provider will need to assess the woman's environmental preferences such as sun streaming, lights dimmed, intolerance to hot and remember to turn off the fan or assess the room temperature during childbirth to ensure that the infant does not get unnecessarily chilled.
- Personal hygiene: The nurse can help promote the patient's sense of cleanliness and well-being by changing pads, linens, or gown especially if the woman is leaking amniotic fluid or bloody show. Many women who remain ambulatory are able to perform their own personal care. However, if the laboring woman is confined to bed or exhausted from the exertion of labor, full assistance should be provided. Frequent mouth care should be encouraged since dry mouth is common during labor. Providing drinks, ice chips, popsicles, or hard candy may help to alleviate the symptoms.
- Elimination: A full bladder can inhibit the descent of the fetus and contribute to increased pain with contractions. Encouraging and assisting the woman to the toilet (or bedpan) to void at least every 2 hours is recommended. If the woman is unable to void and has a distended bladder a urinary catheter may be required.
- Supportive relaxation techniques: During labor, the healthcare providers may encourage, assist, or teach the woman about different interventions to help decrease pain and relieve anxiety. Relaxation techniques may include visualization, focal points, imagery, hydrotherapy, and breathing techniques. In addition, patients may bring items from home to enhance relaxation such as music, a picture, or a stuffed animal.



Figure 4.5 Labour support

- Anticipatory guidance: Regardless of whether or not they have attended prenatal classes, most women and their families have many questions. Women and families usually want to know what to expect. While the nurse/midwife cannot predict exactly what will happen, helpful information can be provided in general terms.

For example, a woman in early active labor may comment: “These contractions are getting stronger, how strong will they get?” The nurse can empower the woman by identifying the progress she has made to that point. Explaining how the contractions have gradually become stronger and emphasizing how successful the patient has been in adjusting to the changes provides factual feedback and positive reinforcement of the progress made.

- Keeping the woman and her family informed about the process of labor and birth is a constant and ever-changing task. For example, during the transition phase the nurse may be teaching the woman breathing techniques to avoid pushing with a partially dilated cervix and then with full cervical dilation, the nurse teaches her how to push and may need to assist the woman into an effective pushing position.
- Caring for the birth partner: Most of the nurse’s attention focuses on the woman in labor. Efforts also should be made to help the support person feel welcome and included whenever possible according to the woman’s wishes. Orientation to the birth unit is helpful in identifying where to locate items such as towels and washcloths, kitchen supplies and the restroom. Assessment of the degree of involvement the support person would like to assume is also important.
- Ensuring culture-centered care: It is important for nurses to remain open minded and aware that there are a myriad of values, attitudes, beliefs, and practices regarding childbearing that vary among cultures just as there may be wide variations within cultures.

Body language and communication approaches provide examples of how differences in cultural practices can be applied when caring for a woman and her family during the childbirth experience.

Self-assessment 4.3

Max and Kate are a couple that attends the clinic and they ask a midwife on duty to explain to them about labour support so that Kate can get a smooth and enjoyable labour process.

Explain the components of the continuous labour support to Kate and Max.

4.4 Obstetric danger signs

Learning Activity 4.4

Using books and internet resources search for what can indicate a sign of danger of a pregnant woman in the first stage of labour.

Knowledge of obstetric danger signs during labour is an important first step for appropriate management and timely referral. Increasing knowledge of obstetric danger signs for pregnant women would reduce delay in seeking care and improve early detection of obstetric complications. The following are the key danger signs that a laboring woman may present during the first stage of labour.



Figure 4.6 Vaginal bleeding

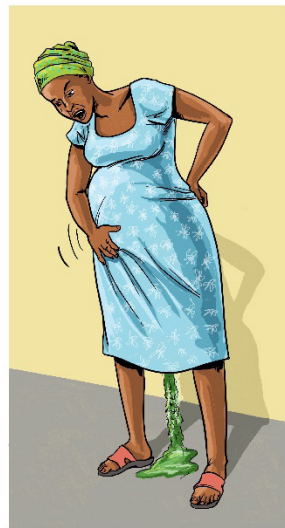


Figure 4.7 Green amniotic fluid

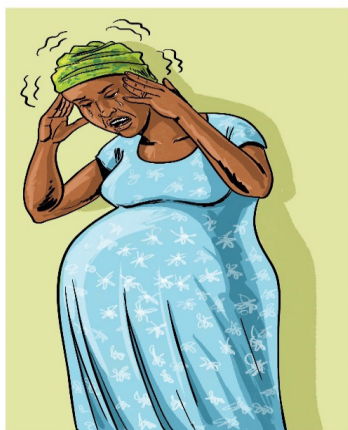


Figure 4.8 Headache

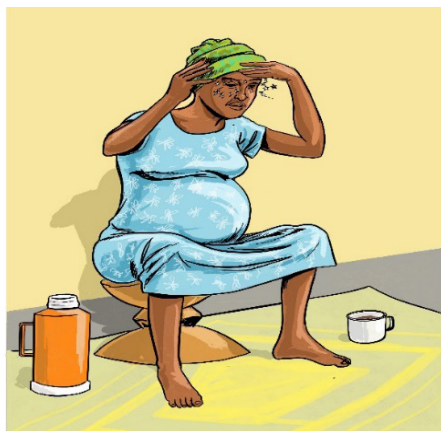


Figure 4.9 Blurred vision



Figure 4.10 Convulsion

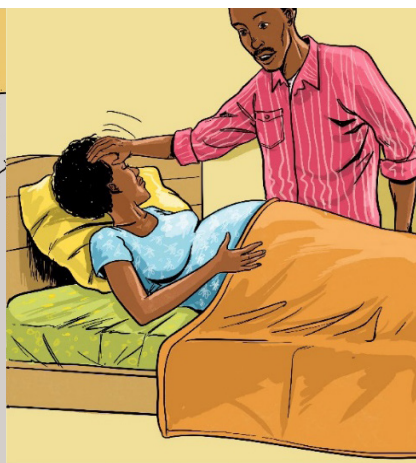


Figure 4.11 High fever

They key danger signs during labour includes **severe vaginal bleeding** (Figure 4.6) before the baby is born. Vaginal bleeding is very dangerous especially when the bleeding is bright red because it could mean that the placenta is separating from the uterine wall. Lack of fetal heart rate or fetal movement during labour, brown or **green amniotic fluid** (figure 4.7)

Headache (Figure 4.8), **blurred vision** (Figure 4.9) and **convulsion** (Figure 4.10) may be the results of a woman having a high blood pressure. A woman on labour may experience also **high fever** (Figure 4.11), this high fever is usually a sign of infection. **Labour lasting for more than 24hours** (first stage of labour) may be due to cephalo-pelvic disproportion, malposition or malpresentation of the fetus or due to maternal causes: insufficient contractions or inadequate pelvis.

Indicates that the baby is in danger.

A woman experiencing all the above cited signs of danger is needs more attention from healthcare and she must be transported to the nearest hospital for more advanced obstetrical care.

Self-assessment 4.4

Zubeda is a 29 years old mother of 2 who comes in health post she stated that she is about to give birth as her pregnancy is at term but she needs to know the danger signs that can make her consult immediately.

Tell her the danger signs of the fetus and those that are maternal related during labour.

End unit assessment 4

During labour monitoring, Olga a 23 years old prim gravida took tightly my hand and asks me a soft drink and some snacks. Few minutes later she requested me to rub her back because she was feeling backaches with slight lower abdominal pain and confirm that 2 days ago a bloody show was expelled out from the vagina. She was bed ridden for the past three days without taking anything. “These mothers that are suffering are scaring me, it seems so hard and painful”: She said!

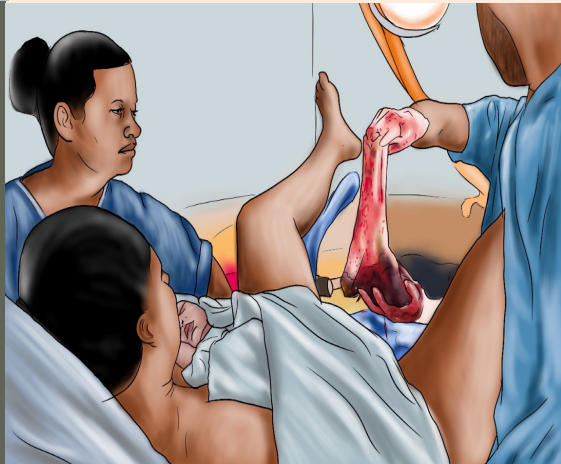
“Can you please help me to get up? Now I feel better with you! At least I can cope with my pain. Let’s turn around before the midwife come to assess me again”. She added. As long as she continues ambulating, contractions increased, the associate nurse continues rubbing her back, wiping her face with a cold tower and offering drinks frequently. Suddenly Olga feels a strong contraction, and a gush of reddish bloody amniotic fluid spreads on the flow. The associate nurse shout out for help and the cervix was 6cm dilated and FHB were 101beats/min and the patient was referred at the nearest district hospital for further management.

- a. Throughout the scenario above remind clinical signs that characterize the first stage of labor.
- b. Compare the elements that differentiate the first and second phase of the first stage
- c. Using the text words indicate the elements that express the labor support and monitoring
- d. Identify the danger signs occurred during Olga’s labor

Key Unit competence: Assist in management of women in the second and third stages of labor

Introductory activity 5

Carefully observe the pictures below and answer the questions below:



1. Based on the above pictures, how many stages of labour does a woman go through?
2. According to what you know, what happens in each stage of labour?
3. Mention some medications that can be administered to the woman during labour and circumstances in which these medications are indicated.
4. Which complications may likely occur during labour?
5. What can a nurse do to support a woman having labour related complications?

5.1. Management of the second stage of labour

5.1.1 Introduction to the second stage of labour

Learning Activity 5.1.1

Watch the video titled '**Managing Second Stage and Active Management of Third Stage of Labour Perfect**' found on this link: <https://www.youtube.com/watch?v=Yq8RJKLP0mc> and answer the following questions:

1. What do you understand by the term 'second stage of labour'?
2. Briefly describe the physiological changes occurring during the second stage of labour?

Second stage of labor, referred to as the pushing stage, starts when the expectant woman's cervix is fully dilated and ends with the birth of the baby. The woman is actively involved in giving birth with the support of skilled birth attendants.

Effective descent of the foetus through the birth canal involves not only position and presentation but also a number of different positional alternatives termed as 'cardinal movements'. These changes enable the smallest diameter of the foetal head to pass through the vagina based on the diameter of the mother's pelvis. For this to happen, during the second stage of labour, a number of physiological changes occur to facilitate the birth of the baby. The contractile power of the uterus is intensified because the foetus is closely applied to the uterus, as some of the amniotic fluid has leaked. The upper uterine segment becomes short and thick because of the retraction of uterine muscle fibres. During each contraction, its force is transmitted through the long axis of the foetus, directing it through the birth canal and this is termed as foetal axis pressure.

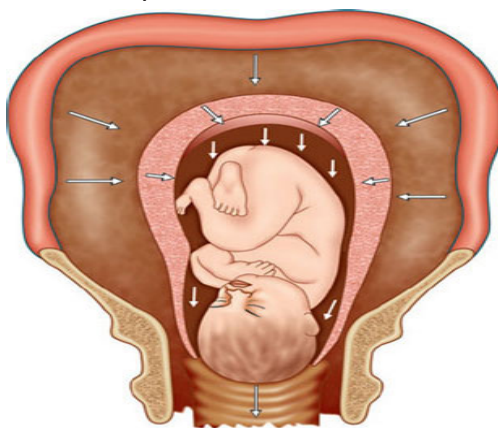


Fig. 5.1: Foetal axis pressure

The foetal axis pressure leads to expulsive action of the abdominal muscles and diaphragm. The abdominal muscles and diaphragm contracts, known as 'bearing down' or 'pushing'. Initially it is reflex, but can be aided by voluntary effort. With the distension of the pelvic floor by the presenting part, the expulsive action becomes involuntary.

Another physiological change that occur during the second stage of labour is the displacement of the pelvic floor. The bladder is drawn up into the abdomen, the vagina is dilated by the advancing head, the posterior segment of the pelvic floor is pushed downwards in front of the presenting part and the reaction is compressed by the advancing head. Further changes that takes place is pouting and gaping of the anus, thinning out of the perineum and lengthening of the posterior wall of the birth canal.

During the normal spontaneous vaginal birth, the next physiological change that occurs is the expulsion of the foetus. As the woman collects her efforts to birth, the baby's head becomes visible at the opening of her birth canal and this biological movement is called crowning (see picture below).



Fig. 5.2: Crowning

The head is born by extension, after which the shoulders and body are born, with the remaining amniotic fluid.

Self-assessment activity 5.1.1

1. Define the following terms:
 - crowning
 - Bearing down
 - Fetal axis pressure
2. Describe the physiological stages involved in the birth of the baby during the second stage of labour.

5.1.2 Mechanism of labour during the second stage

Learning Activity 5.1.2

Watch the video titled 'Mechanism of Normal Labor' found at: <https://www.youtube.com/watch?v=AKFS8I-uwHA> and answer the following questions.

1. Based on the video you have watched, outline the movements that happen before the baby is born.

The second stage of labour involves a number of cardinal movements leading to the birth of the baby. These cardinal movements involve positional changes that are effected by the foetus during the birth process. They encompass engagement, descent, flexion, internal rotation, extension, external rotation, and expulsion as shown in the picture below.

Cardinal Movements of Labor

- **Descent**
- **Flexion**
- **Internal rotation**
- **Extension**
- **External rotation**
- **Expulsion**

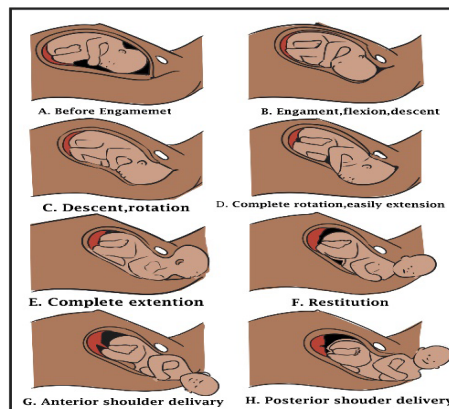


Fig. 5.3: Cardinal movements of labour

a. Engagement

Engagement occurs when the largest transverse diameter of the head of the foetus had passed through the pelvic inlet. When the foetal head is engaged, a small part of the head is palpable above the pelvic brim. The healthcare provider assesses the engagement of the presenting part during abdominal examination. When engagement has started, the skilled birth attendant should take care of the following:

- Assess the woman after one hour if there are no signs of foetal distress and the maternal observations are normal.
- If the head has not engaged after 1 hour, the skilled birth attendants must carefully examine the patient for cephalopelvic disproportion which may be present as a result of a big foetus or an abnormal presentation of the foetal head. In this case, the skilled birth attendant refer the mother to advanced care.

b. Descent

Descent is the downward movement of the biparietal diameter of the foetal head within the pelvic inlet. Full descent occurs when the foetal head protrudes beyond the dilated cervix and touches the posterior vaginal floor. Descent occurs because of pressure on the foetus by the uterine fundus. As the pressure of the foetal head presses on the sacral nerves at the pelvic floor, the labouring woman will experience the typical “pushing sensation,” which occurs with labour. As a woman contracts her abdominal muscles with pushing, this aids descent.

c. Flexion

As descent is completed and the foetal head touches the pelvic floor, the head bends forward onto the chest, causing the smallest anteroposterior diameter (the suboccipitobregmatic diameter) to present to the birth canal. Flexion is also aided by abdominal muscle contraction during pushing.

d. Internal Rotation

During descent, the biparietal diameter of the fetal skull was aligned to fit through the anteroposterior diameter of the mother’s pelvis. The head flexes at the end of descent, the occiput rotates thus the head is brought into the best relationship to the outlet of the pelvis, or the anteroposterior diameter is now in the anteroposterior plane of the pelvis. This movement brings the shoulders, coming next, into the optimal position to enter the inlet, or puts the widest diameter of the shoulders (a transverse one) in line with the wide transverse diameter of the inlet.

e. Extension

When the occiput of the fetal head is born, the back of the neck stops beneath the pubic arch and acts as a pivot for the rest of the head. The head extends and the foremost parts of the head, the face and chin is born.

f. External Rotation

In external rotation, almost immediately after the head of the foetus is born, the head rotates a final time (from the anteroposterior position it is assumed to enter the outlet) back to the diagonal or transverse position of the early part of labor. This brings the after coming shoulders into an anteroposterior position, which is best for entering the outlet. The anterior shoulder is born first, assisted perhaps by downward flexion of the foetal head.

g. Expulsion

Once the shoulders are born, the rest of the baby is born easily and smoothly because of its smaller size. This movement, called expulsion, is the end of the pelvic division of labor.

Self-assessment 5.1.2

1. Define the following terms:
 - a. Engagement
 - b. External rotation
 - c. Descent
2. As a nurse, what can you do when you notice that engagement has started?

Homework 5.1

Read Chapter about the management of the second stage of labour in book titled 'The Continuous Textbook of Women's Medicine Series – Obstetrics Module'. Focus on pages 3, 4, and 5 of the chapter.

5.1.3. Factors affecting the second stage of labour

Learning Activity 5.1.3

Based on what you have read from the book titled 'The Continuous Textbook of Women's Medicine Series – Obstetrics Module', what are the biological factors that may influence the second stage of labour?

A successful second stage of labour depends on four integrated factors; namely the passage, passenger, power, and position.

A. The passage (a woman's pelvis)

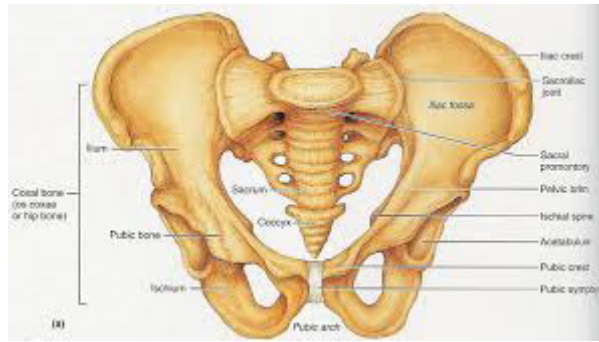


Fig. 5.4: A woman's pelvis

The passageway refers to the route a foetus must travel through from the uterus to the cervix, vagina, and to the external perineum. The bony pelvis through which the foetus must pass is divided into three sections: the inlet, mid-pelvis (pelvic cavity), and outlet. Each of these pelvic components has a unique shape and dimension through which the foetus must manoeuvre to be born vaginally. Because the cervix and vagina are contained inside the bony pelvis, the foetus must also pass through the bony pelvic ring. The two pelvic measurements that are important to determine the adequacy of the pelvis are the diagonal conjugate (the anteroposterior diameter of the inlet) and the transverse diameter of the outlet.

B. The passenger

The passenger can be defined as the foetus and the foetal membranes. The body part of the foetus that has the widest diameter is the head, so this is the part least likely to be able to pass through the pelvic ring in normal vaginal births. For birth to occur normally, the passenger should be of appropriate size (not big for the woman's pelvis) and in an advantageous position and presentation. Whether a foetal skull can pass through the woman's pelvis depends on both its structure (bones, fontanelles, and suture lines) and its alignment with the pelvis.

C. The powers of labour:

The powers of labour refer to the quality of contractions including frequency, strength, and duration.

D. Position

Foetal position refers to the relationship of an arbitrarily chosen portion of the foetal presenting part (Occiput, sacrum, mentum /chin or sinciput) to the right or left side of the mother's birth canal. The foetal presenting part may be in either the left or right position to the four quadrants of the maternal pelvis, the foetal positions may be left occipital (LO) and right occipital (RO), left mental (LM) and right mental (LM), and left sacral (LS) and right sacral presentations.

Self-assessment 5.1.3

With examples, explain how these factors can influence the second stage of labour:

1. Passage
2. Passenger
3. The powers of labour.

Homework 5.2

Go to the internet and watch the video titled 'Management of Second Stage of Labour | Normal Labour | Nursing Lecture' using this link: <https://www.youtube.com/watch?v=hHHA4vfWMcA>

5.1.4. Nursing Management of the woman during the second stage of labour

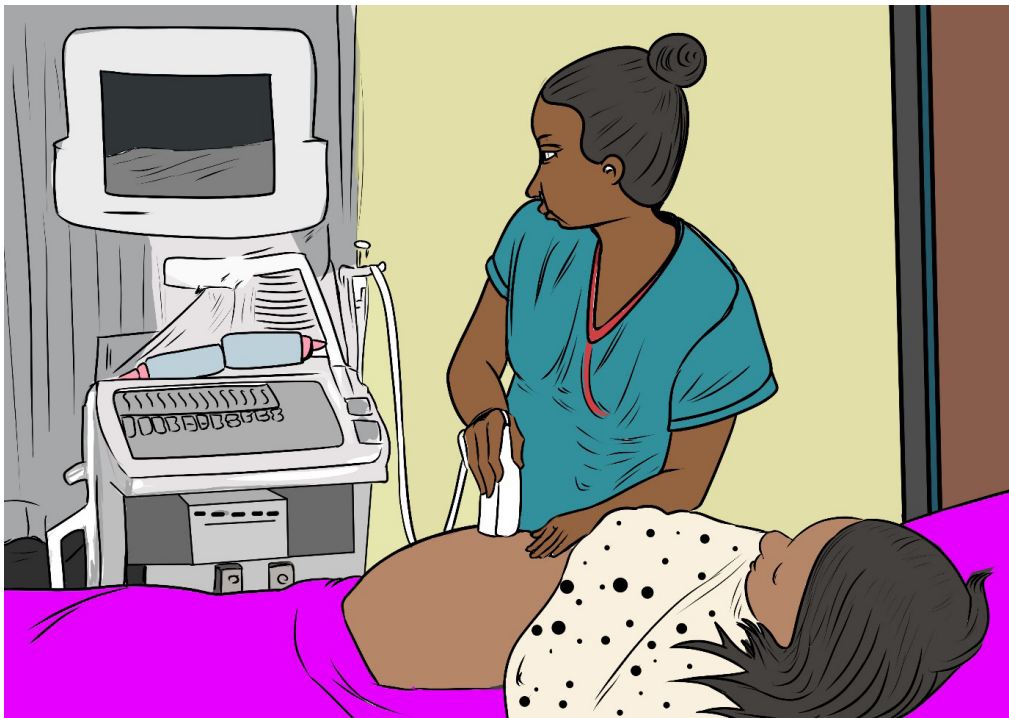


Fig. 5.5: A nurse monitoring the woman's labour progress during the second stage of labour

Learning Activity 5.1.4

Based on the video you have watched in homework, answer the following questions.

1. Why is it very important for a skilled birth attendant to manage the second stage of labour adequately?
2. What assessments and observation should a skilled birth attendant perform during the second stage of labour?

Promoting the health of women in labour is one of the measures to reduce maternal morbidity, mortality and ensuring universal access to reproductive health services. During the second stage of labour, a labouring woman needs optimum care in order to prevent any complications that may affect her and that of the baby. The nurse at this stage must coach quality pushing and support delivery.

It is very important for the skilled birth attendant to recognise the commencement of the second stage. There are many probable signs that indicate the transition from first to second stage as outlined below.

Table 5.1 Probable signs of the second stage of labour

- Expulsive uterine contractions: The woman has a strong inclination to bear down.
- Trickling of blood: It is due to mild laceration of the cervix that takes place when it is stretched and laceration of the vaginal mucous when the head descends down.
- Rupture of the membranes may take place.
- Pouting and gaping of the anus: This occurs when the head has reached the pelvic floor. When the anus gapes and faeces are expelled, the cervix is usually dilated.
- Tenseness between anus and coccyx: This can be assessed by applying pressure with the middle finger between the anus and the coccyx.
- Congestion and gaping of the vulva.
- A caput may appear.

During the second stage of labour, the skilled birth attendant has to observe maternal and foetal condition in order to ensure the safety of the second stage of labour. Factors to observe include uterine conditions, the descent, foetal condition, and maternal condition.

Regarding the uterine condition, the skilled birth attendant has to assess the strength, length and frequency of contractions should be assessed continuously. In comparison to the first stage, contractions are stronger and their duration is longer (1 minute), with a longer resting phase.

As for the descent, the progress is observed by noting the descent of the foetus. It accelerates during the active phase. If there is delay, a vaginal examination should be performed to note whether internal rotation of the head has taken place to note the station of the presenting part and for presence of caput succedaneum.

The skilled birth attendant also has to assess any presence of the colour of liquor amnii (for meconium staining) and changes in foetal heart pattern. The skilled birth attendant has to perform intermittent auscultation of the foetal heart rate immediately after a contraction for at least 1 minute, at least every 5 minutes. The caring team has to palpate the woman's pulse every 15 minutes to differentiate between the two heartbeats. Ongoing consideration should be given to the woman's position, hydration, coping strategies and pain relief throughout the second stage.

Women in the second stage of labour will feel exhausted, and may not have the ability to care for themselves. As a skilled birth attendant, you will have to give best possible care to the woman and help her to cope with this stage of labour. The care to offer encompass the following:

- Maternal comfort and hygiene
- Sponge the face and neck of the mother with a wet towel.
- Provide ice-chips or sips of water
- Apply moisturizing cream to lips to prevent dryness and cracking.
- Encourage to pass urine at the beginning of the second stage if she hasn't done it during the late first stage.
- Apply measures like massaging, encourage deep breathing, distraction, etc., to relieve pain.
- Reassure the woman. Encourage her to bear down only when instructed to.

As the woman prepares to give birth, the skilled birth attendant will have to give the woman an appropriate position, to enable the birth process to be completed smoothly. There are several factors that will affect the decision for adopting a specific position, i.e., the maternal and foetal condition, the need for frequent monitoring, the woman's personal choice, the environment's safety, privacy in the room, and the birth attendant's confidence to assist in the birthing process.

Some of the positions that can be adopted include semi-recumbent or supported sitting position, squatting, kneeling or standing positions, and left lateral position as shown in the images below.

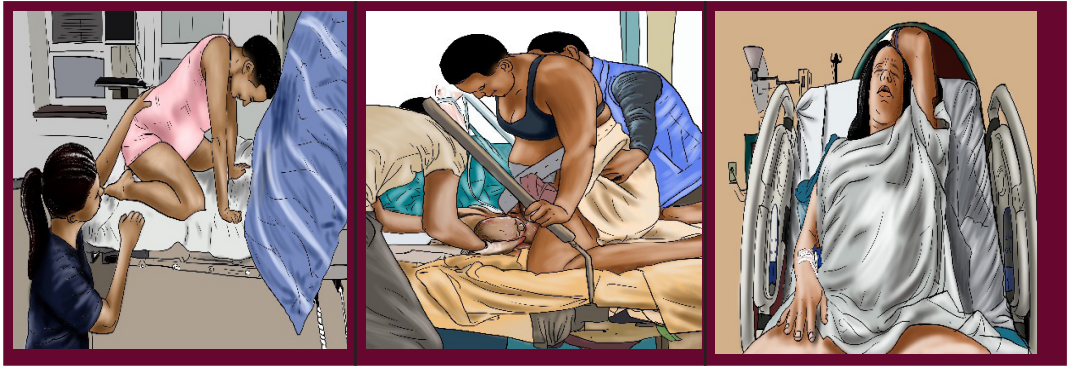


Fig. 5.6: Different birthing positions

As for the supported sitting position, it increases the efficiency of the uterine contractions and prevents hypotension and reduced placental perfusion. The squatting position increases the transverse diameter by 1 cm and the anteroposterior diameter by 2 cm, thereby resulting in easy delivery. The kneeling and standing position also contribute to easy delivery. The left lateral position enables the skilled birth attendant to view the perineum clearly. This position is useful for women who cannot abduct their hips.

The woman should be helped to avoid 'active pushing' before the vertex is visible at the vulva. This will allow the mother to conserve her effort and will permit the vaginal tissues to stretch passively. Once the head becomes visible, the mother should be encouraged to follow her own inclinations in relation to expulsive efforts.

The next step will involve the skilled birth attendant to facilitate the birth of the baby. In this book, the entire process of conducting births is discussed in the skills lab and practical checklist. To avoid complications in the mother as well as the newborn, one must conduct the delivery very skillfully in a vertex presentation.



Fig. 5.7: Delivering a baby in the vertex presentation

The two phases of delivery of the foetus in a vertex presentation are:

- i. Delivery of the head, and
- ii. Delivery of the shoulders and body.

The principles to be kept in mind while conducting the delivery is to minimise maternal and foetal trauma and ensure a safe delivery for the baby. Principle of asepsis must be maintained. The perineum is swabbed and the woman is draped with sterile towels. A pad is used to cover the anus. With each contraction the head descends and the superficial muscles of the pelvic floor especially the transverse perineal muscles are visible. During the resting phase, the head recedes, thereby the muscle thins gradually. The skilled birth attendant places her fingers on the advancing head to monitor descent and prevent expulsive crowning.

During the birth, the skilled birth attendant must help the mother to prevent the tears in the vaginal opening. Some health care providers do not touch the vagina or baby at all during the birth. This is a good practice because interference can lead to infection, injury, or bleeding. But the healthcare providers may be able to prevent tears by supporting perineum during the birth.

Self-assessment 5.1.4

1. What precautions should a skilled birth attendant take while delivering the baby?
2. What can you base on to determine if the second stage of labour has started?

5.1.5. Assessing foetal wellbeing during the second stage of labour



Fig. 5.8: Cardiotocograph machine used to assess the foetal heart beat and labour contractions

Learning Activity 5.1.5

1. What is the role of the machine pictured above?
2. Why is it important to assess the foetal wellbeing during the second stage of labour?

A foetus is at a high risk of being exposed to maximum hypoxic stress during second stage of labour, due to a combination of maternal expulsive efforts and their impact on the uteroplacental circulation, as well as repetitive and sustained compression of the umbilical cord and the foetal head. Since this can lead to physiologic stress for the foetus and hypoxic ischemic encephalopathy and foetal death, frequent monitoring of foetal status is performed to detect early the onset of foetal hypoxic stress. It is recommended to monitor foetal heart rate in low risk women for every 15 minutes in the active phase of the first stage of labour and every 5 minutes in the second stage of labour and it is easiest to hear, by auscultating immediately after a contraction. The care provider should have the skills to interpret the foetal heart rate and take appropriate action when needed. Foetal heart rate can range between 120 and 160 times a minute during labour.

At times, the heart may be as fast as 180 beats per minute (Tachycardia) or as slow as 100 beats per minute (Bradycardia). Once these abnormal heart beat trends are detected, the skilled attendant has to intervene in order to normalise these irregularities in the foetal heart beating by for instance assisting the mother to lie in comfortable position.

Table 5.2: Causes of bradycardia

Bradycardia

Baby's heartbeat is slower than 100 beats a minute or slower than 120 beats a minute for several minutes.

The following are the causes of fetal heart beat to dropdown:

- Cord is very short or is being pinched;
- The baby is not healthy.
- There is not enough amniotic fluid.
- Placenta does not work well, usually because the mother has high blood pressure or the pregnancy is post due.
- Placenta is separating from the womb (placenta abruptio)
- Contractions are too strong (Hyperkynesia).
- Other causes of bradycardia include viral infections (e.g., cytomegalovirus), maternal hypoglycemia, and maternal hypothermia.

When the baby's heartbeat is slow after a contraction is over but then goes back to normal, the baby may be having trouble. The skilled attendant has to listen to several contractions in a row. If the heartbeat is normal after most other contractions have ended, there is a possibility that the baby's heart is beating normally. However, the skilled birth attendants should ask the mother to change position to take pressure off the cord. They also have to listen again after she moves to see if this helps, and keep checking the baby's heartbeat often during the rest of labour to see if it slows down again.

Table 5.3: causes of tachycardia

Tachycardia

FHR greater than 160 beats/minute for 10 minutes or longer or faster than 180 beats a minute. It can be considered an early sign of fetal hypoxemia

The following are the causes of fetal heart beat speed up:

- The mother is dehydrated
- The mother or baby has an infection
- The mother is bleeding
- The mother has been in labor for long (prolonged labour)
- The mother's womb is tearing (Ruptured uterus)

If the baby's heartbeat stays fast for 20 minutes (or 5 contractions), get medical help.

Self-assessment 5.1.5

1. What is the normal foetal heart beat?
2. Mention some of the conditions that cause foetal bradycardia.
3. What is the range of a slowing foetal heart rate?

5.1.6. Recognising foetal compromise during second stage of labour

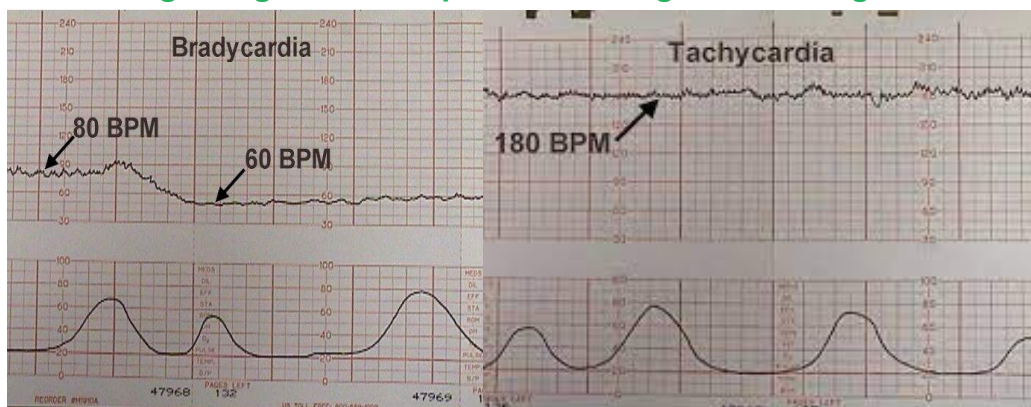


Fig. 5.9: Cardiotocograph paper results presenting cases of foetal distress

Learning Activity 5.1.6

Referring to the two CTG paper results shown on the above images, answer the following questions:

1. What is the difference between the two results of the foetal heart displayed?
2. Which of the above results may require medical attention and why?

Foetal compromise or foetal distress is when the baby is not well due to inadequate oxygen during labour. Foetal compromise is caused by a number of factors including placental insufficiency, uterine hyperstimulation, maternal hypotension, cord compression, placental abruption, uterine rupture, and foetal sepsis. It can also be caused by problems with the umbilical cord namely cord compression. Foetal distress can also occur in case the mother has a health condition such as diabetes, kidney disease or cholestasis. At some point, foetal distress can happen as a result of contractions that are too strong or too close together.

Foetal distress is diagnosed by reading the baby's heart rate. Another sign is to check if there is meconium in the amniotic fluid.

If the amniotic fluid is green or brown, this signals the presence of meconium. A slow heart rate, or unusual patterns in the heart rate, may signal foetal distress. Continuous cardiotocograph (CTG) monitoring is recommended when either risk factors for foetal compromise have been detected antenatally, at the onset of labour or develop during labour. A CTG associated with a low probability of foetal compromise and is characterised by the features presented in following tables

Table 5.4: CTG Characteristics

- Baseline rate 110-160 bpm
- Baseline variability 6-25 bpm
- Accelerations of greater than or equal to 15 bpm above baseline and lasting greater than or equal to 15 seconds at the baseline
- No decelerations

The following features are unlikely associated with foetal compromise when occurring in isolation:

- Baseline rate 100-109 bpm
- Reduced or reducing baseline variability (3-5 bpm)
- Absence of accelerations
- Early decelerations
- Variable decelerations without complicating features.
- The following features may be associated with significant fetal compromise and require further action:
 - Baseline fetal tachycardia >160 bpm
 - Rising baseline fetal heart rate (FHR), including where the fetal heart rate remains within normal range
 - Complicated variable decelerations
 - Late decelerations
 - Prolonged decelerations (a fall in baseline FHR for >90 seconds and up to 5 minutes).

The first step to manage foetal compromise is to give the mother oxygen and oral and intra venous fluids. In addition to this, the mother can be assisted to move position, such as turning onto one side, can reduce the baby's distress. If the woman had been given drugs to speed up labour, these may be stopped if there are signs of foetal distress. If it is a natural labour, the woman can be given medication to slow down the contractions. A baby in foetal distress needs to be born quickly.

Self-assessment 5.1.6

1. What are the maternal related possible causes of foetal compromise during the second stage of labour?
2. When the foetal heart rate is recognised as abnormal?
3. What major interventions are performed if foetal distress is diagnosed?

5.1.7. Duration of the second stage of labour

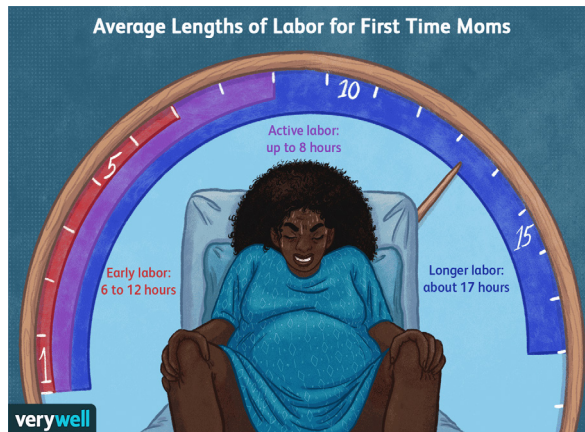


Fig. 5.10: A woman enduring labour

Learning Activity 5.1.7

Using your prior knowledge, answer the following questions:

1. What is the estimated duration of second stage of labour?
2. What are the maternal and foetal factors influence the second stage of labour?

The second stage of labour commences with full dilation of the cervix and ends with the birth of the baby. The median duration of second stage of labour is 50 to 60 minutes in nulliparous women and 20 to 30 minutes in multiparous women. The upper limits for the duration of normal second-stage labour are 2 hours for nulliparous women and 1 hour for multiparous women. The duration of the second stage is variable and the length of this stage may be influenced by several factors such as parity, maternal size and foetal weight; position, and descent; the type and amount of pain relief administered, the frequency, intensity, and duration of contractions, maternal efforts in pushing, and the support the woman receives during labour.

The second stage of labour is subdivided into two phases: the latent or labouring down phase (period of rest and relative calm) and the active pushing or descent phase (woman has strong urges to bear down). Maternal verbal and nonverbal behaviours, uterine activity, the urge to bear down, and foetal descent characterize these two phases. Table 5.5 presents the expected maternal progress for each phase and the average duration it may take.

Table 5.5. Expected Maternal Progress in the Second Stage of Labour

Criteria	Latent (“laboring down”) phase (average duration, 10-30 minutes)	Active pushing (descent) phase (average duration varies)
Contractions 1. Intensity 2. Frequency 3. Duration	Period of physiologic calm for all criteria; period of peace and rest	Significant increase becoming overwhelmingly strong and expulsive Every 2 to 2.5 minutes progressing to every 1 to 2 minutes 90 seconds
Descent, station	0 to +2	+2 to +4; rate of descent increases and Ferguson reflex is activated; fetal head becomes visible at introitus, and birth occurs
Show: color and amount		Significant increase in dark red bloody show; bloody show accompanies emergence of head
Spontaneous bearing-down efforts	Slight to absent, except at peak of strongest contractions	Increased urge to bear down; becomes stronger as fetus descends to vaginal introitus and reaches perineum
Vocalization	Quiet; concern over progress	Grunting sounds or expiratory vocalizations; announces contractions; may scream or swear

<p>Maternal behavior</p>	<ul style="list-style-type: none"> • Experiences sense of relief that transition to second stage is finished • Feels fatigued and sleepy • Feels a sense of accomplishment and optimism because the worst is over • Feels in control 	<ul style="list-style-type: none"> • Senses increased urge to push and describes increasing pain; describes ring of fire (burning sensation of acute pain as vagina stretches and fetal head crowns) • Expresses feeling of powerlessness Shows decreased ability to listen to or concentrate on anything but giving birth • Alters respiratory pattern: has short 4- to 5-second breath holds with regular breaths in between, 5 to 7 times per contraction • Frequent repositioning • Often shows excitement immediately after birth of head
--------------------------	--	---

Self-assessment 5.1.7

1. Using concrete examples, discuss how long is the second stage of labour expected to last?
2. What are the phases of the second stage of labour?
3. Outline the criteria used to characterise the phases of the second stage of labour.
4. How bearing down effort is differs from each other in those phases?
5. What are the factors influencing the length of the second stage of labour?

5.1.8. Reducing risks during second stage of labour

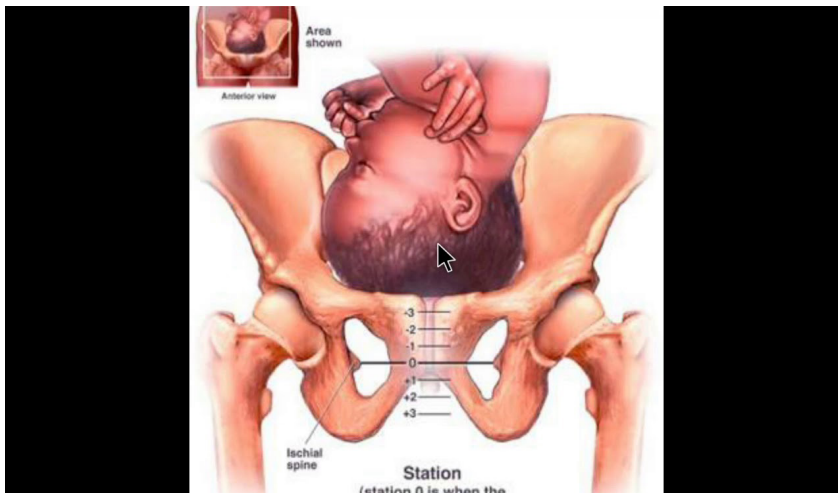


Fig. 5.11: When the foetal head is big, it may lead to prolonged second stage of labour as it may not pass through the cervix easily

Learning Activity 5.1.8

Using your prior knowledge, books, and the picture above, answer the following questions

1. What risks may likely occur during the second stage of labour?
2. What is the main cause of risk during the second stage of labour?

The second stage of labour is very demanding for both the woman and the foetus. When the second stage of labour is not optimally managed, the woman's and foetus' life may be at risk. Complications that may occur during the second stage of labour include but are not limited to abnormal foetal heart rate patterns, infection particularly following membrane rupture, stillbirth, neonatal asphyxia, meconium aspiration syndrome, fatigue, and neonatal birth injury example branchial plexus paralysis. For the woman, some of the common risks that may occur during the second stage of labour include chorioamionitis (membrane infection), tears (cervical or perineal), urinary retention, increased rate of caesarean birth, and future urinary incontinence.

Most of the risks that affect the woman and her baby result from prolonged labour. For this reason, close monitoring and skills and capacity to offer timely intervention are required for all births to prevent adverse maternal and neonatal outcomes such as stillbirth and newborn complications arising from undetected hypoxia, as well as maternal mortality and morbidity from complications such as vesicovaginal fistula, genital tract lacerations, infection, haemorrhage, and worsening of hypertensive disorders. In order to prevent complications associated with the delayed second stage of labour, skilled birth attendants must not leave the labouring woman alone

after the late first stage has commenced.

Because of the increase in foetal lactate levels after the onset of active maternal pushing, continued active maternal pushing for more than 60 minutes should be avoided, unless a spontaneous vaginal birth is imminent and the foetal heart rate monitoring does not show any evidence of ongoing foetal compromise. The skilled birth attendants have to encourage active pushing once the woman's urge to bear down is present. They should assist the woman to adopt any position of their preference for pushing, except lying supine which risks aortocaval compression and reduced uteroplacental perfusion. The skilled birth attendants should listen to the foetal heart rate frequently (at least 1 minute every 5 minutes) in between contractions to detect bradycardia. The caring team also has to check the maternal pulse and blood pressure, especially where there is a pre-existing problem of hypertension, severe anaemia, intrapartum haemorrhage or cardiac disease. To minimise prolonged second stage of labour, the frequency, strength and duration of uterine contractions are observed, as well as the relaxation of the uterus between contractions. The amniotic fluid is observed for meconium staining. The birth attendant must not allow the mother's bladder to become distended. The woman's bladder must always be assessed for fullness and she should be encouraged to void if fullness of bladder is found.

Self-assessment 5.1.8

What precautions can be undertaken to prevent the risks occurring in the second stage of labour?

5.2 Management of third stage of labour

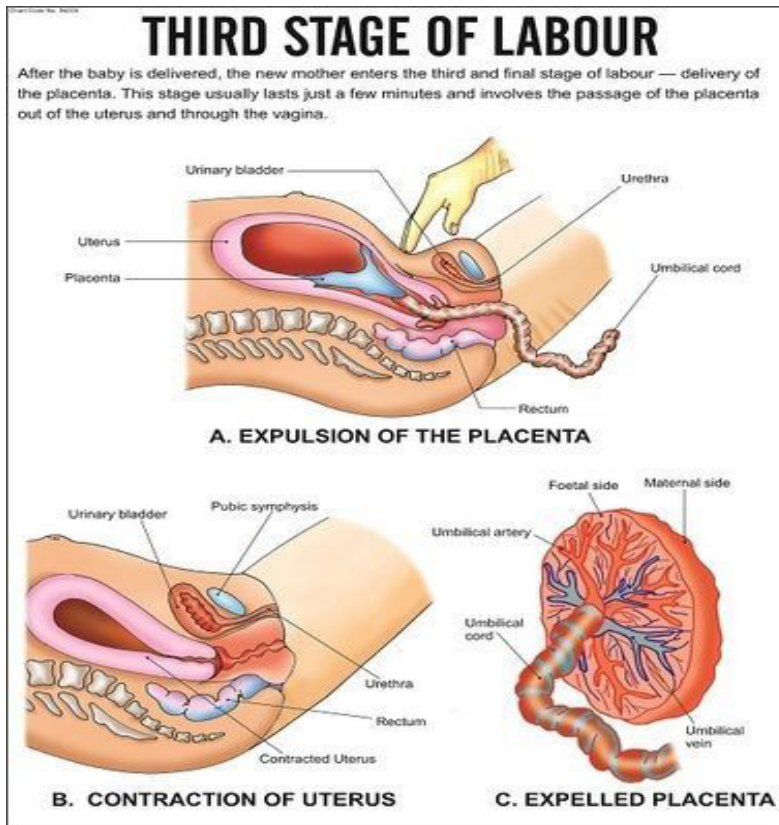


Fig. 5.12: Description of the third stage of labour

5.2.1 Introduction to the third stage of labour

Learning Activity 5.2.1

Watch the video titled 'Managing the Third Stage of Labour - Childbirth Series' found on this link: https://www.youtube.com/watch?v=frQTx7G_DMk and answer the following questions:

1. What do you understand by the third stage of labour?
2. What happens during the third stage of labour?

The third stage of labour is the period extending from the second stage of labour (The completed birth of the new-born) until the completed delivery of the placenta. Once a baby is born, the womb (uterus) continues to contract, causing the placenta to separate from the wall of the uterus and then delivered .

When the woman gives birth normally, the third stage is when natural physiological processes spontaneously deliver the placenta and fetal membranes.

For this to happen without problem, the cervix must remain open and there needs to be good uterine contractions. In the majority of cases, the processes occur in the following order:

- 1. Separation of the placenta:** The placenta separates from the wall of uterus. As it detaches, blood from the tiny vessels in the placental bed begins to clot between the placenta and the muscular wall of the uterus.
- 2. Descent of the placenta:** After separation, the placenta moves down the birth canal and through the dilated cervix.
- 3. Expulsion of the placenta:** The placenta is completely expelled from the birth canal.

This expulsion marks the end of the third stage of labour. Thereafter, the muscles of the uterus continue to contract powerfully and thus compress the torn blood vessels.

Thus the management of the third stage of labour entails the period after the birth of the baby to help the uterus contract or return to normal, clamping the cord, and controlled cord traction to deliver the placenta.

- a. Why third stage of labour important in the care of the expectant woman

Most of the conditions that lead to maternal morbidity and even deaths occur during the third stage of labour if the woman does not receive optimal care. Some of the major contributors of maternal deaths, postpartum haemorrhage and sepsis can be associated with limited proper management of the third stage of labour. When the placenta remains inside the uterus for longer than 30 minutes after the birth of the baby due to inadequate uterine contractions, and the rapid retraction of the cervix which traps the placenta into the uterus, and full bladder obstructing placental delivery can all contribute to excessive bleeding after birth.

- b. How is the third stage of labour managed?

There are two options applied to manage the third stage of labour: active management and physiological management. The physiological management is general practised in midwife-led units and in home births. This management approach of the third stage of labour allows the placenta to be delivered only by pushing, gravity, contractions and sometimes by nipple stimulation. This management technique does not rely on the use of oxytocin injections. The umbilical cord is clamped and cut once it has stopped pulsing or when the placenta comes out. Normally the physiologic management of the third stage of labour takes up to one hour. This requires that the health care team helps the mother to initiate skin-to-skin contact with the baby while breastfeeding him/her in order to stimulate more natural oxytocin production. The physiological management of the third stage of labour is only advised if there is no risk for the woman to bleed heavily after the birth of the baby.

The second approach and which is mostly used especially in most developing countries is the active management of the third stage of labour. This approach is recommended by the World Health Organisation because of it is effective in reducing the risks of the complications of the poor management of the third stage of labour. When applying the active management of third stage of labour, the caring team does not wait for the spontaneous placental delivery. Instead, the interventions are prompt and follows the following sequential order:

- Just after the baby is born, the midwife/or nurse puts the baby on the mother's abdomen in **skin to skin** contact with her;
- Check the uterus to find out if there is any second baby;
- In less than one minute, administer a uterotonic drug to make the uterus contract more powerfully;
- The midwife or nurse clamps the baby's umbilical cord at two sites and cuts it in between;
- Apply controlled cord traction;
- After delivering the placenta, immediately start massaging the uterus;
- Examine the placenta to make sure it is complete and there are no retained parts of the placenta in the uterus;
- Examine the woman's vagina, perineum and external genitalia for any lacerations and active bleeding.

Self-assessment 5.2.1

1. Explain in orderly sequence the three processes characterising the third stage of labour.
2. Why is it important for health professionals to take much care when managing the third stage of labour?
3. Mention at least three things that can happen if the third stage of labour is not appropriately managed.

Homework 5.3

Go to the internet, read an extract about uterotonic drugs from the book titled 'Uterotonic drugs to prevent postpartum haemorrhage: a network meta-analysis' found on this link: <https://www.ncbi.nlm.nih.gov/books/NBK537857/>

5.2.2. Administration of uterotonic drugs



Fig. 5.13: Oxytocin, one of the uterotonics used to manage the third stage of labour

Learning Activity 5.2.2

Based on the information you read in the book 'Uterotonic drugs to prevent postpartum haemorrhage: a network meta-analysis', what do you understand by the term 'uterotonic drugs'?

1. Why is it important to administer uterotonic drugs during the third stage of labour
2. Mention some of the examples of uterotonic drugs you have read?

Introduction to uterotonic drugs

Uterotonic drugs are medications given to the woman in order to stimulate the uterus to contract or to increase the frequency and intensity of the uterine contractions. When administered, these drugs stimulate the placenta to separate from the uterine wall to be delivered. Uterotonic drugs, when given to the woman during the third stage of labour act as one of the interventions package to prevent postpartum haemorrhage. Uterotonic drugs include oxytocin, ergometrine, misoprostol, carbetocin, prostaglandins, and ergot alkaloids, but the three frequently used uterotonic drugs are oxytocin, prostaglandins, and ergot alkaloids.

Uterotonic drugs have a number of advantages as shown in figure below:

Table 5.6: Advantages of uterotonic drugs

- Uterotonic drugs increase the uterine tonicity and contractions
- They lessen blood loss during third stage of labour
- They are used in prevention and treatment of postpartum hemorrhage

How to give uterotonic drugs

The uterotonic drugs can be used in all stages of childbirth when needed. In the case of the third stage of labour, the uterotonic drugs are indicated as one of the vital interventions of the active management of third stage of labour. When providing uterotonic drugs, the nurse has to consider the following:

1. Administer uterotonic drugs immediately after the birth of the baby before performing cord clamping and cutting the cord.
2. Before giving uterotonic drug to the woman, the nurse has to perform abdominal palpation to find out if there is no any other baby. This is because, if for instance oxytocin is administered when there is a second baby, there is a risk that the second baby could be trapped in the uterus.
3. Administration of uterotonic drug of the choice is given after confirmation that no any other baby inside the uterus and is given with 1 minute after childbirth. The uterotonic of choice is oxytocin 10IU IM. The dose given to the woman is usually IM: 10 units if a woman has an IV when she gives birth. The nurse can either give 10 IU IM or 5 IU by slow IV injection.
4. Controlled cord traction is applied with counter-pressure on the uterus to deliver the placenta.

Any health worker administering or dispensing the uterotonic drug should be authorized to do so and be trained in the proper use of the drug and management of side and adverse effects. Clear documentation of administration of any uterotonic drugs should be part of the woman's medical record. Documentation includes the time, route, and dosage of any medications given, as well as a record of any side effects.

Contraindication of uterotonic drugs

Most of the uterotonic drugs have no known contraindications when administered in the third stage of labour.

Self-assessment 5.2.2

1. Which uterotonic of choice is used in active management of third stage of labour?
2. What are the advantages of using uterotonic in third stage of labour?

5.2.3. Cord clamping and cutting



Fig. 5.14: A skilled birth attendant performing cord clamping

Learning Activity 5.2.3

Watch the video found on this link: <https://www.youtube.com/watch?v=5xUY7SIGxfM> and answer the following questions.

1. Why do you think it important to clamp the cord after the birth of baby?
2. Based on what you have seen in the video, describe the steps involved in cord clamping.

Introduction

The umbilical cord, is typically made up of two arteries and one vein and covered in a thick gelatinous substance known as Wharton's Jelly. The main function of the umbilical cord is to pass oxygen and nutrients from the mom to the baby and to transport waste away from the baby to the mother via the placenta. Most of the time, there is no need to cut the cord right away. Leaving the cord attached will help the baby to have enough iron in his blood. It will also keep the baby on his mother's belly where the baby belongs. When the baby is just born, the cord is fat and blue. If you put your finger on it, you will feel it pulsating. This means the baby is still getting oxygen from his mother.

When the placenta separates from the wall of the womb, the cord will get thin and white and stop pulsating and at this time it will not be facilitating blood circulation to the baby from the mother. As a result the cord can be clamped, usually after about 3 minutes in order to separate the baby from the placenta. When this is done, it facilitates the baby's organs to start adapting to the new environment other than its mother's womb.

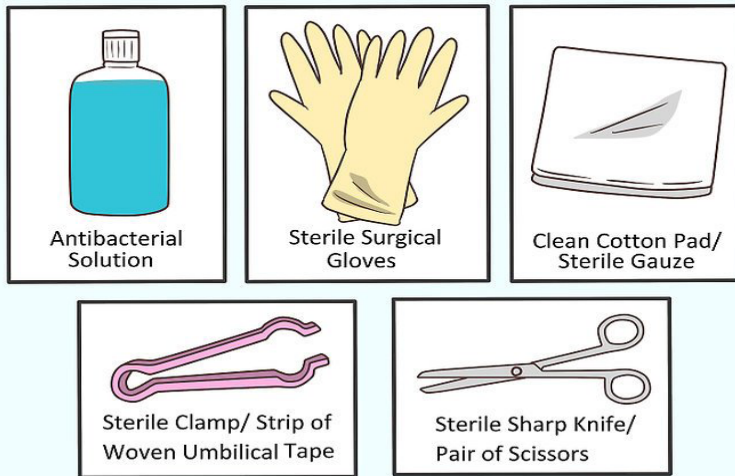
There are two approaches of clamping the cord; i) early clamping which is usually carried out in the first 60 seconds and ii) late cord clamping carried out more than one minute after the birth of the baby or when the cord pulsation has stopped. The latter approach, often called delayed umbilical cord clamping, according to the World Health Organisation facilitates placental-to-new-born transfusion and results in an increased neonatal blood volume at birth. In addition, delayed umbilical cord clamping may be particularly relevant for infants living in low-resource settings with less access to iron-rich foods and thus greater risk of anaemia.

Benefits of delayed cord clamping

The evidence further shows that delayed cord clamping can have immediate and long term benefits for babies. In preterm infants, delayed umbilical cord clamping is associated with significant neonatal benefits, including improved transitional circulation, better establishment of red blood cell volume, decreased need for blood transfusion, and lower incidence of necrotizing enterocolitis and intraventricular haemorrhage. Furthermore, delayed cord clamping further promotes cerebral oxygenation. For term infants, delayed cord clamping can provide adequate blood volume and birth iron stores to the baby. It further increases haemoglobin amounts in the term infants. For the mothers, delayed clamping can decrease the incidence of retained placenta.

Procedure for cord clamping and cutting

Before starting the procedure of cord clamping and cutting, the health provider has to make sure that he/she has access to the following medical supplies:



wikiHow to Cut the Umbilical Cord of a Baby

Fig. 5.15: Tools needed to perform cord clamping

- An antibacterial solution.
- Sterile surgical gloves
- A clean cotton pad or (preferably) sterile gauze
- A sterile clamp or strip of woven umbilical tape
- A sterile sharp knife or pair of scissors

Once you have collected all the medical supplies together, the health provider has to check if the cord is wrapped around the newborn's neck.

If so, slide your finger under the cord and gently pull it over the newborn head. Next, use sterile plastic clamps or sterile woven umbilical tape to tie off the cord (see the image below).



Fig. 5.16: Process of tying the cord before clamping it

Put the first tie of the clamps about 3 cm from the baby. The second tie should be placed further away from the baby, about 5 centimetres from the first tie. Keep in mind that although a pulse in the umbilical cord may stop shortly after delivery, significant bleeding may still occur if the cord is not clamped or tied. Prepare the umbilical cord by swabbing between the clamps or ties with antibacterial solution. You can use betadine or chlorhexidine. This step should be done especially if delivery occurs in a public or unhygienic setting. Use a sterile, sharp blade such as a scalpel or a strong pair of scissors.

The umbilical cord is much tougher than it looks, and will feel like rubber or gristle.

Grasp the cord with a piece of gauze. The cord may be slippery so this will ensure you have a firm grip on the cord.

Cut cleanly between the ties or clamps. Make sure you hold the cord firmly to ensure the cut is clean.

Self-assessment 5.2.3

1. Define the term delayed cord clamping and explain why it is important to delay cord clamping.
2. What should a nurse do before clamping the cord?

5.2.4 Controlled cord traction

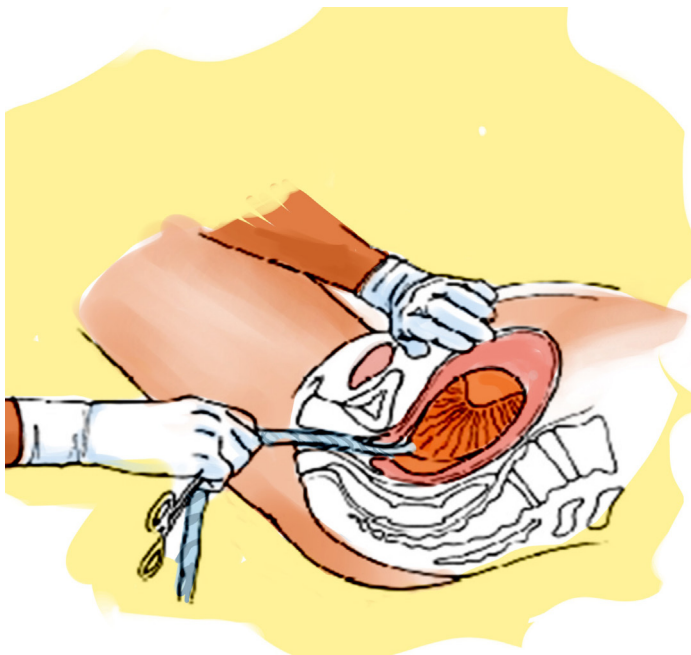


Fig. 5.17: A skilled birth attendant performing controlled cord traction

Learning Activity 5.2.4

Watch the video titled 'Placental delivery by controlled cord traction' found on this link: <https://www.youtube.com/watch?v=rd4PmlS5W5A> and answer the following questions.

1. What do you understand by controlled cord traction?
2. Why is important to perform controlled cord traction?
3. Describe each step involved in controlled cord traction.

Controlled cord traction (CCT) can be defined as traction applied to the umbilical cord once the woman's uterus has contracted after the birth of her baby, and her placenta is felt to have separated from the uterine wall. Counter-pressure is at the same time applied to her uterus beneath her pubic bone until her placenta delivers. Controlled cord traction is used to stabilise and deliver the placenta.

This method involves a number of steps in order the technique to be effectively done.

Controlled cord traction involves the following steps:

- Clamp the cord close to the perineum and hold in with one hand.
- Place the other above the woman's pubic bone and stabilise the uterus by applying counter-pressure during controlled cord-traction
- Keep slight tension on the cord and wait for the strong uterine contraction (2-3 minutes) encourage the mother to push and very gently pull down the cord to deliver the placenta and continue with counter-pressure to the uterus.
- If the placenta does not descend during 30-40 second of controlled cord traction do not continue to pull on the cord.
- Gently hold the cord and wait until the uterus is well contracted again; with the next contraction, repeat controlled cord traction with counter-pressure
- Never apply cord traction (pull) without applying counter traction (push) above the pubic bone on a well-contracted uterus.
- As the placenta delivers, hold the placenta in two hands and gently turn it until the membranes are twisted.
- Slowly pull to the placenta delivery
- If the membranes tear, gently examine the internal and external genitalia wearing the sterile gloves and use sponge holding forceps to remove fragments of membranes that are present.
- Examine carefully the placenta to rule out any missing portion of it, if you suspect retained portions on maternal surface or tone membranes take appropriate action.

Contraindication of controlled cord traction

The nurse should at all costs avoid controlled cord traction if there are no uterotonic drugs available. Controlled cord traction is also contraindicated prior to signs of separation of the placenta as this can cause partial placental separation, a ruptured cord, excessive bleeding, and/or uterine inversion.

Self-assessment 5.2.4

1. What should one avoid while doing controlled cord-traction?
2. What important technique one should do after delivering the placenta during controlled –cord traction?
3. In what situations controlled cord traction is contraindicated?

Homework 5.4

Go to the library and read the book titled 'A Book for Midwives: Care for pregnancy, birth, and women's health' chapter 12, from page 226 to 230.

5.2.5 Delivery of the placenta

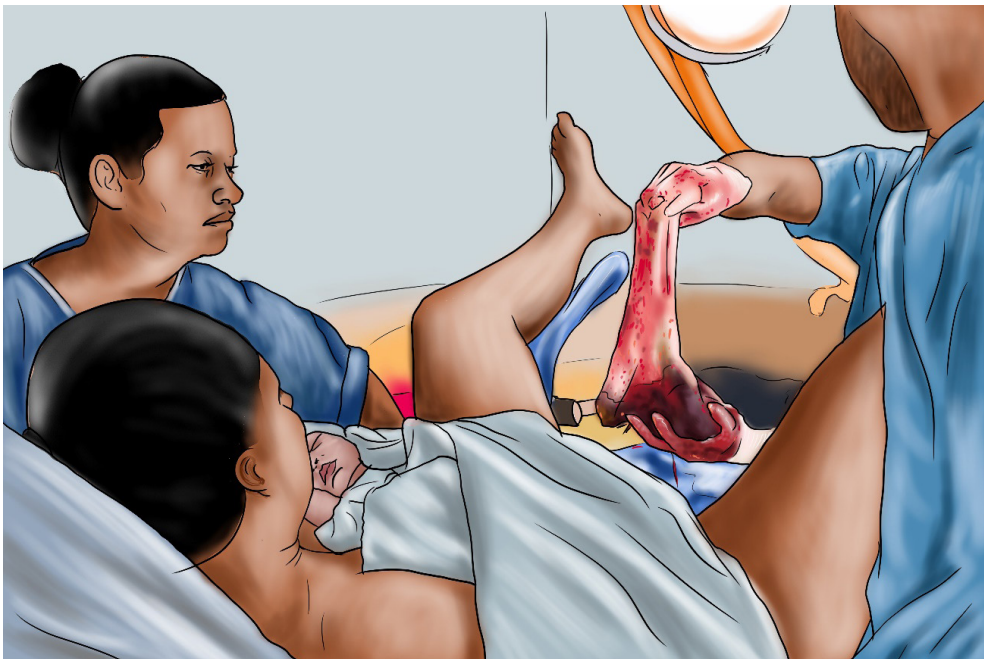


Fig. 5.18: A skilled birth attendant examining the placenta after delivering it

Learning Activity 5.2.5

1. What should the nurse do before starting the delivery of the placenta?
2. What signs should the nurse check to make sure if the placenta has separated from the uterine wall?

Before going into the details of placenta delivery, it is essential to understand the biological events that lead to the delivery of the placenta. The placenta normally separates with the third or fourth strong uterine contraction after the birth of the baby. After the birth, the nurse must watch the mother for any signs of infection, pre-eclampsia, and heavy bleeding. The nurse has to also check the mother's blood pressure and pulse within the 30 minutes after birth.

In spontaneous vaginal birth, the placenta usually separates from the womb in the first few minutes after birth. However, in some cases it may take some time to come out. In order to ascertain that the placenta has separated from the uterus, the care provider has to check the following signs:

- A small gush of blood comes from the vagina. A gush is a handful of blood that comes out all at one time.
- The cord looks longer because when the placenta comes off the wall of the uterus, it drops down closer to the vaginal opening which makes the cord seem a little longer because more of it appears outside the woman's body.
- Check if the uterus has risen. This should be checked because when the placenta separates from the uterine wall, the top of the uterus moves a little below the mother's navel.

If 30 minutes have elapsed since the birth of baby and there are no signs that the placenta has separated from the uterus, the care provider should check if the baby has started breastfeeding. Breastfeeding causes contractions and will help the uterus push the placenta out. If the placenta does not deliver after breastfeeding, request the mother to urinate because a full bladder can slow the birth of the placenta.

If the placenta does not deliver by itself or if the mother is bleeding heavily, the care provider has to deliver it. The care provider helps the mother sit up or squat over a bowl. He/she asks her to push when she feels a contraction and the woman can also try to push between contractions and the placenta will slip out easily. The membranes (or bag) that holds the waters and the baby should come out with the placenta.

Steps in delivering the placenta

Attempt delivery of the placenta only when it is fully separated from the uterus to avoid uterine inversion or pulling off a section of placenta from the wall of the uterus leaving the remainder attached, thus creating an open bleeding area in the uterine wall.

The nurse has to check for separation of the placenta from the uterine wall by doing the following:

- Placing the hand over the uterus through the abdominal wall (inside a folded sterile towel) to note when the uterus contracts into a hard globular ball which rises slightly under your hand.
- Requesting the mother to tell you, after the delivery of the baby, when she next has contractions.
- Noting whether there is a small gush of blood and/or lengthening of the cord.
- Noting the time of the birth of the baby so you know how long you have waited for separation of the placenta.
- If you are uncertain whether the placenta has actually separated, you may also follow the cord with your hand in the vagina, up to the cervix, to determine if the placenta is trapped in the cervical os, or whether the cord disappears into the uterus.

Some precautions to take when delivering the placenta

- When the woman is bleeding a lot and cannot push the placenta out herself, gently guide the placenta out by the cord.
- But, if the woman is not bleeding and there is no any danger for both the woman and the baby, do not pull on the cord. Since the placenta is still attached to the uterus, the cord may break or you may pull the woman's uterus out which may result in death. Only guide the placenta out by the cord if you are sure that the placenta has separated.
- If any part of the placenta is missing, immediately report this finding to the attending physician for intervention. Retained placental fragments can contribute to postpartum haemorrhage or sepsis.

Self-assessment 5.2.5

1. Explain the steps involved in the delivery of the placenta by a nurse/or any care provider.
2. What precautions should a nurse take when delivering the placenta?

5.2.6 Uterine massage

Learning Activity 5.2.6

Using different sources of information, answer the following questions:

1. What do you understand by the term uterine massage?
2. When do we need to apply uterine massage?

Introduction to uterine massage

Uterine massage is one of the interventions to manage the third stage of labour especially after the placenta had been delivered. Light massage of the abdomen is performed in order to stimulate the uterus contract in order for it to return to its normal size. The uterine massage is advantageous because it helps in preventing massive blood loss after childbirth which can lead to both maternal morbidity and mortality rate.

How the uterine massage should be done

Uterine massage should be done immediately after third stage of labour in spontaneous vaginal delivery only when the uterus is soft.

Techniques of offering uterine massage

- Before performing uterine massage, advise the woman to empty her bladder. A full bladder may push the uterus off to the side, which makes the massage process both uncomfortable and ineffective.
- Ask the woman to relax her body as much as possible. The skilled birth attendant guides the woman to practice deep breathing and muscle relaxation immediately prior and during the massage. The woman relaxes her muscle and take slow, calm breaths to help with the potential discomfort.
- The nurse places a hand on the woman's lower abdomen and stimulates the uterus by massaging.
- Ask the woman to lie down flat.

Once, she is lying flat on her back, place your flat palms on her abdomen at about where her belly button is located. If her uterus is hard, you should not need to massage the area. If the area is soft and you feel little resistance, a massage may be recommended.

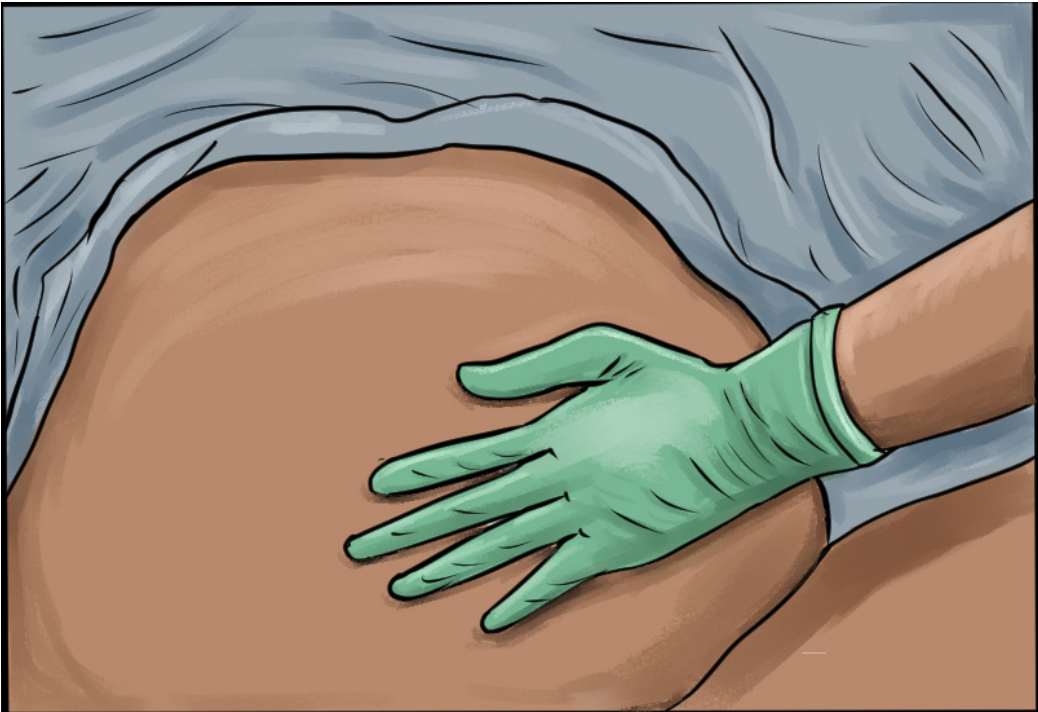


Fig. 5.19: A skilled birth attendant performing uterine massage

Take one hand and cup it slightly. Slowly move it in a circular motion over the woman's lower abdomen. Keep doing these movements until you feel her uterus contract.

Self-assessment 5.2.6

1. When should we do uterine massage and for how long.
2. What are the advantages of uterine massage?
3. Briefly describe the steps involved in offering uterine massage.
4. What precautions does a nurse should take prior and during uterine massage?

End unit assessment 5

1. When is the second stage of labour starts and ends?
2. What are the signs indicating that the second stage of labour has begun?
3. What elements of monitoring during the second stage of labour?
4. Explain the following terms:
 - a. Engagement
 - b. Descent

- c. Flexion
 - d. Internal rotation
 - e. Extension
 - f. External rotation
 - g. Expulsion.
5. Explain in orderly sequence the three processes characterising the third stage of labour?
 6. Why the active management of the third stage of labour is more effective than the physiological management of the third stage of labour?
 7. Which uterotonic drug of choice is used in active management of third stage of labour?
 8. What are the advantages of using uterotonic in third stage of labour?
 9. Mention all uterotonic you know that can be used in third stage of labour.
 10. What is the importance of delayed cord clamping in third stage of labour?
 11. Describe each step involved in cord clamping.
 12. What should one avoid while doing controlled cord-traction?
 13. What important technique one should do after delivering the placenta during controlled –cord traction?
 14. In what situations controlled cord traction is contraindicated?
 15. What should the nurse do before starting the delivery of the placenta?
 16. What are the signs of placenta separation during third stage of labour?
 17. Describe the steps involved in the delivery of the placenta?
 18. What precautions should a nurse take when delivering the placenta?
 19. When should we do uterine massage and for how long.
 20. What are the advantages of uterine massage?
 21. What precautions does a nurse take prior and during uterine massage?

Multiple choice questions

1. What is the drug of choice in active management of third stage management?
 - a) Intravenous Ergometrine
 - b) Intramuscular ergometrine
 - c) Intramuscular oxytocin (Pitocin)
 - d) Misoprostol
2. The following are the causes of prolonged third stage of third stage except
 - a) Failure of the uterus to contract well
 - b) Abnormal placenta insertion. e.g. placenta accreta
 - c) Cord prolapse.
 - d) Failure of the placenta to separate normally.
3. Which ONE of the following options outlines the causes of postpartum haemorrhage in third stage of labour?
 - a) Uterine atony, uterine inversion and Full bladder
 - b) Not well repaired episiotomy, clitoral tears, recto prolapse
 - c) Vaginal tears, perineal tears and contracted uterus
 - d) None of the above.
4. Normal third stage will involve the following stages except
 - a) placenta separation,
 - b) placenta descent
 - c) placenta expulsion
 - d) placenta insertion
5. Answer the following questions with true or false
 - a) In active management of third stage of labour oxytocin should be given immediately after childbirth without palpating to find out if there is another baby.
 - b) Retained placenta is not a danger sign in third stage of labour.
 - c) Postpartum haemorrhage is defined as blood loss of 500mls in spontaneous vaginal delivery and 1000mls in caesarean section.
 - d) Prolonged third stage is when the placenta fails to separate within 2 hours after child birth.

- e) Full bladder causes postpartum haemorrhage.
 - f) Controlled cord traction is not contra-indicated before the signs of placenta separation are noticed.
6. Answer the following questions with true or false
- a) In active management of third stage of labour oxytocin should be given immediately after childbirth without palpating to find out if there is another baby.
 - b) Full bladder causes postpartum haemorrhage.

Key Unit Competence: Provide immediate care to the newborn

Introductory activity 6

Observe the following pictures showing the care provided to the newborn immediately after birth.



1. What do you think about these images demonstrating the care given to the baby immediately after birth?
2. What do you think that it is necessary to have stethoscope and thermometer while providing immediate newborn care?
3. What do you reflect to the image showing a health care provider injecting the new-born baby?
4. What do you reflect about eye care to new born baby?
5. What do you think about the advantages of putting the baby on the mother's chest immediately after birth?

6.1. Concept of immediate care and components of essential newborn care.

Learning Activity 6.1

As associate nurse, you are called to care and provide essential newborn care for a baby who was born just 3 minutes ago. While caring for that baby what can be done to prevent hypothermia from evaporation, conduction and convection?

Based on the case described above,

1. When do you think immediate newborn care start from?
2. What do you think could be done to prevent hypothermia?
3. What do you think about the terminology of early breastfeeding in the immediate newborn care?
4. What do you think are essential newborn care?

Key components of the essential new born care at birth:

- Thermal care or maintenance of baby's body temperature.
- Clearing of airways only when necessary not as routine.
- Eye care
- Cord care
- Breastfeeding with in the first hour of birth
- Administration of vitamin k
- Weighing the baby and record weight.
- Routine monitoring
- Additional care if the baby was exposed to HIV or HBV.

Newborn immediate care is the care given to the neonate after birth by qualified personnel in the delivery room.

Essential newborn care refers to key routine practices in the care of the newborn, particularly at the time of birth and over the first hours of life, whether in the health facility or at home.

Essential newborn care includes:

- Thermal care (including prompt drying and maximizing skin-to-skin contact and covering the baby at birth, delayed bathing, maintaining “warm chain”)
- Early initiation and exclusive breastfeeding
- Hygiene practices (including cord-care and caregiver hand washing).

There is good evidence that adherence to recommended essential newborn care practices substantially reduce mortality risk, especially for very small newborns.

Health service contacts (notably associated with antenatal care and the hospital admission for childbirth) are important opportunities to influence these practices. In some settings, community health workers (CHWs) can serve as important channels to influence adoption of these practices among pregnant women.

Thermal protection and care of newborns:

All measures used by healthcare providers to prevent or manage hypothermia to the newborn baby. Hypothermia contributes to neonatal morbidity and mortality. Thermal protection and care is recommended as it reduces hypothermia, a condition in which the body temperature falls below 36 degree Celsius. The recommended thermal care practices include immediately drying and wrapping of the baby; bathing practices such as delaying for at least 6 hours and using warm water; day to day care such as covering the baby's head; and keeping the baby skin-to-skin.

The newborn loses heat in four ways:

- Evaporation: when amniotic fluid evaporates from the skin.
- Conduction: when the baby is placed naked on a cooler surface, such as the floor, table, weighing scales, cold bed.
- Convection: when the baby is exposed to cool surrounding air or to a draught from open doors and windows or a fan.
- Radiation: when the baby is near cool objects, walls, tables, cabinets, without actually being in contact with them.

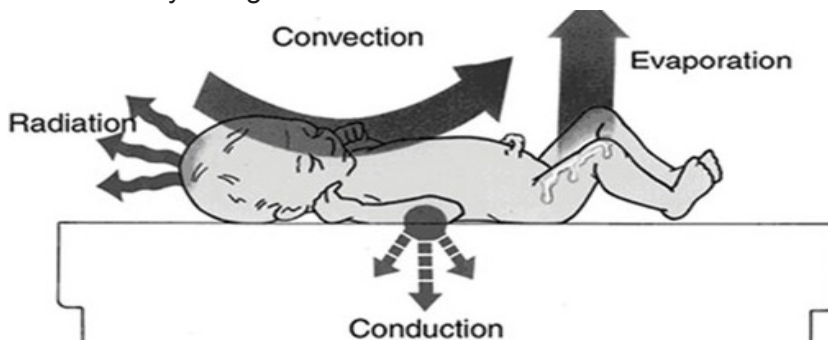


Figure 6.1: Ways of heat loss in newborn

Early initiation of breastfeeding: is referred as the provision of mother's breast milk to infants within one hour of birth. This helps to ensure that the infant receives the colostrum, or "first milk", which is rich in protective factors. Early initiation of breastfeeding, within one hour of birth, protects the newborn from acquiring infection and reduces newborn mortality.

It facilitates emotional bonding of the mother and the baby and has a positive impact on duration of exclusive breastfeeding.

Newborn eye care

Newborn eye care is providing antibiotic eye drops or ointment in a newborn's eyes after birth. This is to protect babies from getting bacterial eye infections that can be acquired during birth. Untreated, these infections can cause serious problems including blindness. The antibiotic erythromycin and tetracycline are used most often.

Umbilical Cord Care

The umbilical cord is the baby's lifeline to the mother during pregnancy. However, it's no longer needed once the baby is born. Within a few minutes after birth, the cord is clamped and cut close to the navel. The clamp helps stop bleeding from the blood vessels in the umbilical cord.

Administration of vitamin K to newborn

Administering one intramuscular (IM) dose of vitamin K (0.5 mg for infants weighing $\leq 1,500$ g or 1.0 mg for infants weighing $> 1,500$ g) routinely to all newborns within the first 6 hours post-birth and following initial stabilization and appropriate maternal/newborn interaction, is now the recommended best practice. Vitamin K helps the blood to clot and prevents serious bleeding. In newborns, vitamin K injections can prevent a now rare, but potentially fatal, bleeding disorder called 'vitamin K deficiency bleeding' (VKDB), also known as 'hemorrhagic disease of the newborn' (HDN).

Weighing the new born

According to the WHO, the average weight of a baby born at 37–40 weeks ranges from 2.5 to 4 kg. Newborns often lose around 226.8 g in the first 4 to 5 days after birth but regain it by about 10 to 12 days of age. In the first month, the typical newborn gains about 20 g a day, or about 110 g to 8 226.8 g a week.

Self-assessment 6.1

1. What are the key components of essential newborn care?
2. What is the importance of applying antibiotics drop/ ointments in the newborn baby's eyes immediately after birth?
3. What is done to protect the newborn baby against hypothermia?
4. Describe the 4 ways of losing heat to the newborn baby after birth.

6.2 APGAR score assessment

Learning Activity 6.2 APGAR SCORE

Observe these images illustrating an associate nurse assessing APGAR SCORE

 Pink	 Extremities blue	 Pale or blue
> 100 bpm	< 100 bpm	No pulse
Cries and pulls away	Grimaces or weak cry	No response to stimulation
 Active movement	 Arms, legs flexed	 No movement
Strong cry	Slow, irregular	No breathing

From the observation of above pictures,

1. Have you come in contact with word APGAR SCORE previously? If yes What is it?
2. What do you think about the importance of assessing APGAR score to the newborn baby immediately after birth?
3. what do you think about APGAR at 5 minutes?

History and description of APGAR SCORE

One of the first assessments is a baby's Apgar score. At one minute and five minutes after birth, infants are checked for heart and respiratory rates, muscle tone, reflexes, and color. This helps identify babies that have difficulty breathing or have other problems that need further care.

Apgar is a quick test performed on a baby at 1 and 5 minutes' score after birth, the 1 minute score determines how well the baby tolerated the birth process. The 5 minutes' score tells the healthcare provider how well the baby is doing outside the mother's womb.

Dr. Virginia Apgar was an obstetrical anesthesiologist designed and introduced the APGAR Score, the first standardized method for evaluating a new-born's transition to life outside the womb. She created a system in 1952 and used her name as MNEMONIC for each of the 5 elements that a person will score.

A = APPEARANCE

0 Points = Bluish-gray or pale all over

1 Point = Normal color (but hands and feet are bluish)

2 Points = Normal color all over (hands and feet are pink)

P = PULSE

0 Points = Absent (no pulse)

1 Point = Pulse below 100 beats per minute (bpm)

2 Points = Pulse over 100 beats per minute (bpm)

G = GRIMACE

0 Points = Absent, no response to stimulation

1 Point = Facial movement only, grimacing with stimulation

2 Points = Pulls away, sneezes, coughs, or cries with stimulation

A = ACTIVITY

0 Points = No movement, or “floppy” tone

1 Point = Flexed arms and legs with little movement

2 Points = Active, spontaneous movement

R = RESPIRATION

0 Points = Absent, no breathing

1 Point = Slow or irregular breathing, weak crying

2 Points = Normal rate of breathing and effort, good crying

Apgar score







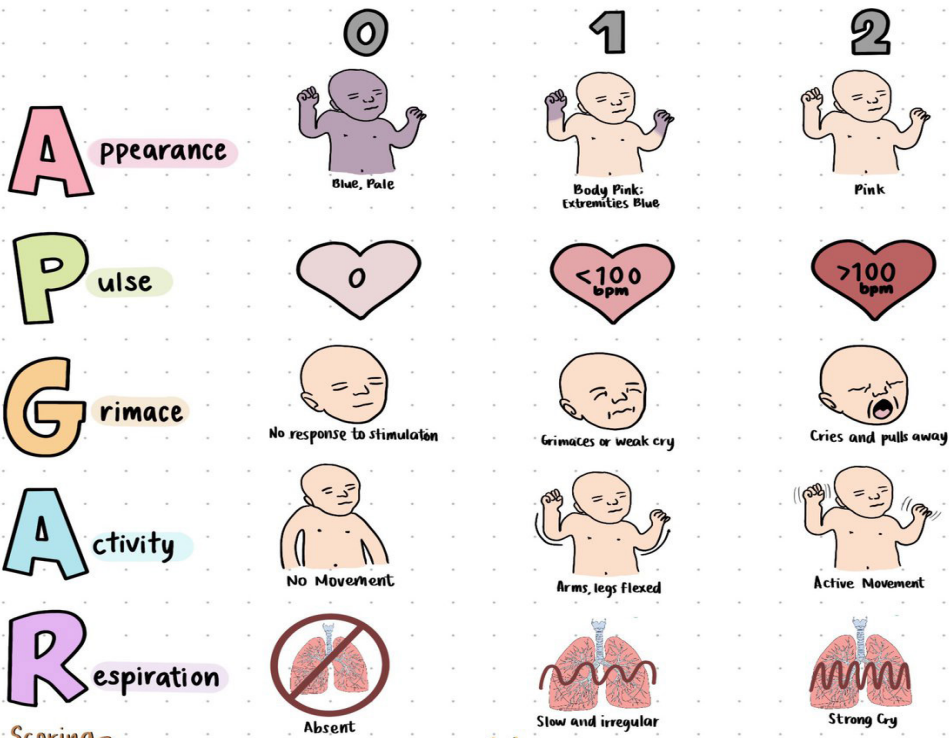
	Score 2	Score 1	Score 0
A	 Pink	 Extremities blue	 Pale or blue
P	> 100 bpm	< 100 bpm	No pulse
G	Cries and pulls away	Grimaces or weak cry	No response to stimulation
A	 Active movement	 Arms, legs flexed	 No movement
R	Strong cry	Slow, irregular	No breathing

Figure 6.2: APGAR score



Scoring

- ✓ 7-10 Good Prognosis
- △ 4-6 Impending Respiratory Arrest
- 0-3 Needs Supplemental Oxygen



• APGAR score assess newborns 1 minute and 5 minutes after they are born.

@PTflashcards
 @PTflashcards
 @PTflashcards

Figures 6.3: APGAR score

Self-assessment 6.2

1. What is APGAR score?
2. What does mean the mnemonic APGAR in full words?
3. Who discovered APGAR?
4. In which year DR Virginia Apgar created the system?

6.3. Requirements, aims and importance of the assessment of the newborn immediately after birth.

Learning Activity 6.3

As an associate nurse, you are called to perform assessment for a newborn baby boy who was born in past 10 minutes. In that call, you are told to examine the baby from head to toes

From the above call,

1. What do you think will be the materials that you will use to assess that newborn baby?
2. What do you think about the aim and importance of assessing that newborn baby immediately after birth?
3. What do you think about the role of health care provider in examination of newborn?

Roles of the associate nurse in assessing/examining the newborn baby immediately after birth.

The role of the nurse/midwife is:

- To carry out good interpersonal communication.
- To take complete history about the mother and neonate.
- To be sure that the neonate has identification band.
- To perform complete physical assessment (General appearance, vital signs, growth measurements, gestational age assessment).
- Prevention of hemorrhage (administer vitamin K if not given in the delivery room).
- Documentation.

Aims of assessing/examining the newborn baby immediately afterbirth

The aim of assessing/examining the newborn baby immediately afterbirth is to:

- To describe and carry out an examination of a baby soon after birth
- To screen for malformations
- To observe smooth transition to extra uterine life
- An ass overall of baby's condition

Principles of examination of the newborn baby immediately afterbirth

The Principles of examination of the newborn baby immediately afterbirth include:

- Assess
- Ask, Check, Record
- Look, Listen, Feel
- Classify
- Treat/refer or advise

Types and stages of newborn assessment

The following are types and stages of newborn assessment:

1. The initial assessment: done in the 1st 10 minutes
APGAR scoring system

Purpose: is to assess the newborn's immediate adjustment to extra-uterine life.

2. Transitional assessment (Periods of reactivity):

- i) First period of reactivity:

Stage 1: During the first 30 minute through which the baby is characterized as physiologically unstable, very alert, cries vigorously, may suck a fist greedily, & appears very interested in the environment.

Stage 2: It lasts for about 2-4 hours, through this period; all V.S & mucus production are decreased. The newborn is in state of sleep and relative calm.

- ii) Second period of reactivity: It lasts for about 2-5 hours,

In Second period of reactivity the newborn is alert and responsive, heart & respiratory rate, gastric & respiratory secretions are increased & passage of meconium commonly occurs.

Following this stage is a period of stabilization through which the baby becomes physiologically stable & a vacillating pattern of sleep and activity

Minimum prerequisites of examination of the newborn baby immediately afterbirth:

The Minimum Requirements of examination of the newborn baby immediately afterbirth includes:

- Mother & baby together
- Warm room, fresh clean sheet/clothes
- Thermometer
- Weighing scale
- Watch with seconds
- Stethoscope

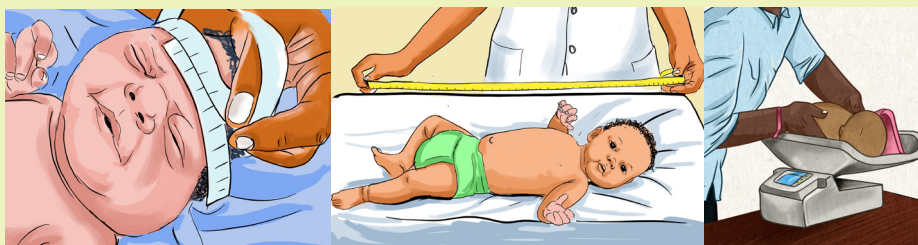
Self-assessment 6.3

1. Outline 3 roles of the associate nurse in assessing/examining the newborn baby immediately after birth?
2. What is the Aim of assessing/examining the newborn baby immediately after birth?
3. What are the minimum requirements of examination of the newborn baby immediately afterbirth?
4. What includes the first period of reactivity?

6.4 Anthropometric measurements

Learning Activity 6.4

Observe these images illustrating an associate nurse taking measurements to the newborn baby.



From the observation of above pictures,

1. What measurements do you think the nurse is taking to that baby?
2. What do you think about the importance of weighing baby after birth?
3. What do you think about about normal head circumference?

Weight measurement

Birth weight is an important marker of health. Full-term babies are born between 37 and 41 weeks of pregnancy. The normal birth weight ranges between 2500-4000grams. In general, very small babies and very large babies are at greater risk for problems. Babies are weighed every day in order to look for growth. If the baby weighs less than 2500 gm or more than 4000grams, the associate nurse must quickly refer the baby for further advanced care.

While taking the baby's weight, the associate nurse must keep in mind that the new born baby loses 10% of their birth weight in the first 10 days. Thereafter, the babies gain about 25-30gms/day. Babies will usually gain this weight back within the first 2 weeks after birth. Premature and sick babies may not begin to gain weight right away.

Length measurement

This is the measurement taken from crown of head to the heel. The normal range is 45 to 50 cm.

Head circumference

This is the distance around the baby's head. Immediately after birth, molding of the skull may give inaccurate measurement of the head circumference. So it should be measured after 48 hours after birth. The normal range of head circumference is 33 to 37 cm and it may be larger in case of hydrocephalus and smaller in case of microcephaly.

Chest circumference

This is the distance around the baby's chest and it is about 2-3cm less than head circumference. Head and chest circumference may be equal for the first 24 to 48 hours of life.



Figure 6.4: Head circumference

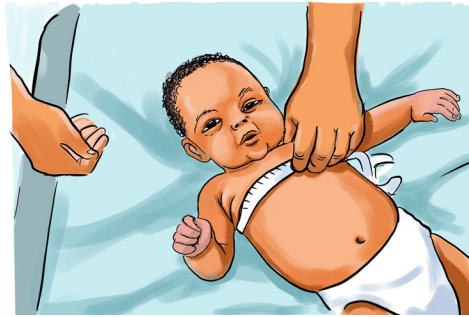


Figure 6.5: Chest circumference



Figure 6.6: Weight



Figure 6.7: length

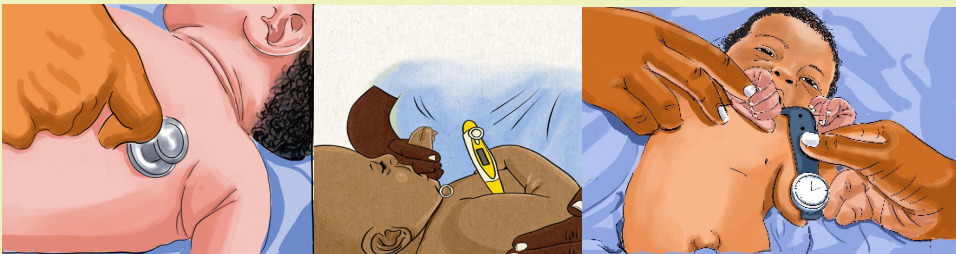
Self-assessment 6.4

- What are the essential measurements that are taken when the baby is born?
 - What are the normal range findings for those measurements?
- How molding can affect results of head circumference measurement?
- What will the associate nurse do if the baby weighs less than 2500 gm or more than 4000grams?
- The newborn loses weight during the first week of life at which percentage in the following
 - 5%
 - 15%
 - 10%
 - 20%
 - None of the above

6.5 Vital signs measurements of the newborn

Learning Activity 6.5

Observe these images illustrating an associate nurse taking vital signs to the newborn baby.



From the observation of above pictures,

- What vital signs do you think the nurse is taking to that baby?
- What do you think can be normal regarding body temperature of newborn?
- What do you think to be normal range of respiratory rate in new born?

Vital Signs and Measurements

- Temperature: Normal range 36.5 to 37.5 axillary

Common variations:

Crying may elevate temperature

Stabilizes in 8 to 10 hours after delivery

Signs of potential distress or deviations from expected findings:

Temperature is not reliable indicator of infection

A temperature less than 36.5 oc

- Heart rate: Normal range: 120 to 160 beats per minute

Common variations:

Heart rate range to 100 when sleeping to 180 when crying

Color pink with acrocyanosis

Heart rate may be irregular with crying

Signs of potential distress or deviations from expected findings:

- Although murmurs may be due to transitional circulation-all murmurs
- should be followed-up and referred for medical evaluation
- Deviation from range
- Faint sound
- Respiration rate: Normal range 30 to 60 breaths per minute

Common variations:

- Bilateral bronchial breath sounds
- Moist breath sounds may be present shortly after birth

Signs of potential distress or deviations from expected findings:

- Asymmetrical chest movements
- Apnea >15 seconds
- Diminished breath sounds
- Seesaw respirations
- Grunting
- Nasal flaring
- Retractions
- Deep sighing

- Tachypnea - respirations > 60
- Persistent irregular breathing
- Excessive mucus
- Persistent fine crackles
- Stridor (Crowing respiratory sound)

Blood Pressure - not done routinely

Self-assessment 6.5

1. When does the temperature stabilize after birth?
2. What is the heart rate of the crying baby?
3. What changes may occur regarding the baby's body temperature when the baby is crying
4. Enumerate signs of potential distress.

6.6 Head and neck assessment

Learning Activity 6.6

Observe these images illustrating an associate nurse that is assessing the newborn's head and neck.



From the observation of above pictures,

1. What elements do you think the nurse will assess to that baby's head and neck?
2. Have you heard a word fontanel? If yes, when do you think anterior fontanel closes?
3. What do you understand by the word fontanel?

Head: It consists of skulls bones that are not closed completely, due to this, the skull is easily molded during the passage through the birth canal at the time of birth where the suture lines are joined and form the fontanelles.

Fontanel is a space between the bones of the skull in an infant, where ossification is not complete and the sutures not fully formed.

Sutures are fibrous bands of tissue that connects the borns of the skull.

Anterior fontanel	Posterior fontanel
Bounded by the parietal and frontal bones: <ul style="list-style-type: none"> • It is diamond in shape • It is about 2.5 cm long and 4 cm wide • It is closed at 12-18 month of age • It is also called bregma 	Bounded by occipital and parietal bones: <ul style="list-style-type: none"> • It is triangular in shape • It is about 2.5 cm wide and 2.5 cm long. • It is closed at 2 month of age • It is also called lambda

Table 6.1 Difference between fontanelles

Fontanelles

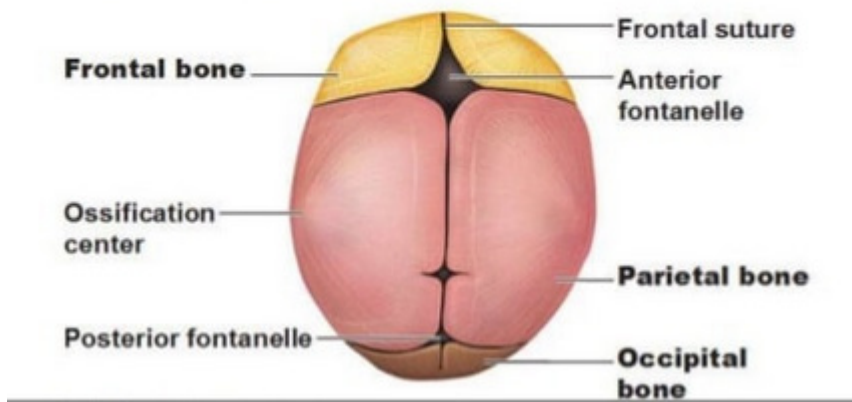


Figure 6.1: Fontanelles

If the sutures are wide and fontanelles are bulged, this indicates the increased intracranial pressure which is commonly seen in hydrocephalus condition. When fontanel is depressed, it indicates dehydration. The associate nurse should also observe the caput succedaneum and cephalohematoma.

Face

The associate nurse looks at the eyes, ears, nose, and cheeks. He/ She he also examines the face for any asymmetry or obvious malformations.

Neck

For the neck, the associate nurse will palpate for masses and the clavicles are palpated for crepitus, which could indicate an injury. Neck of the new born is short and has various folds and it should be checked for mobility, and webbing of the neck.

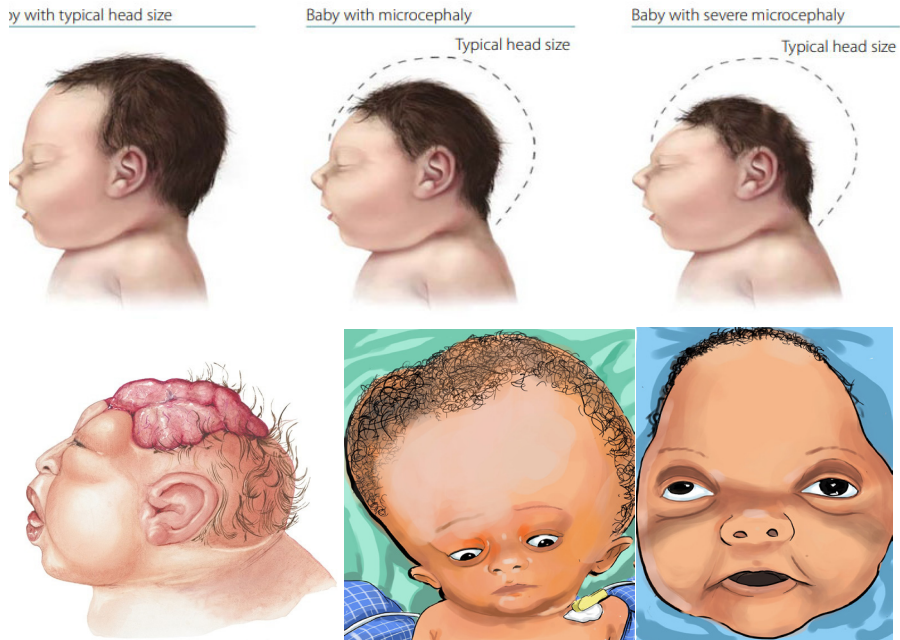


Figure 6.9: head and neck abnormalities

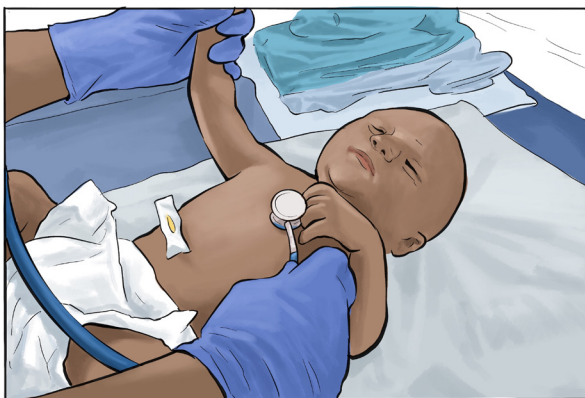
Self-assessment 6.6

1. When the anterior fontanel closes?
2. When the posterior fontanel closes?
3. What will the associate nurse check on newborn's eyes?
4. What will the associate nurse observe on newborn's face?
5. Define the word sutures?

6.7 Chest and lungs assessment

Learning Activity 6.7

Observe these images illustrating an associate nurse assessing the newborn's chest.



From the observation of above pictures,

1. What elements do you think the nurse will assess newborn 'chest'?
2. What do you think about inter costal retractions during breathing?

Normally, the chest is barrel shaped. A malformed chest could indicate a problem. Retractions may be observed with respiratory difficulty.

The associate nurse observes the nipple and breast tissue. Breast size and location should be assessed. He/she observes witch's milk (milky discharge due to effect of maternal hormones). Parents of the baby should not be worry because it will be resolved slowly and there is no treatment for it.

Check the rate and rhythm of the respiration, neonate's abdomen rises and falls during each breathe. The lungs should be auscultated while the infant is quiet. Respirations should be observed and counted for a full minute. Heart rate should be assessed with a stethoscope while listening for murmurs.

Clinical evaluation of breath sounds is the first and most common method of assessing lung health. The stethoscope placed on the back and chest lets the physician listen to the breath sounds. This process is called auscultation.

Intercostal retractions: One of the most important physical findings to be able to recognize in a new-born is the presence of retractions. Sepsis, pulmonary pathology, cardiac disease, metabolic disorders, polycythaemia, cold stress, and others can all cause retractions -- it is a sign of a new-born in distress.

In the photo, taken during inspiration, the shadows between the ribs can be clearly seen. Retractions may or may not occur in combination with other signs of distress: nasal flaring, grunting, and tachypnea.



Figure 6.10: abnormalities on the chests

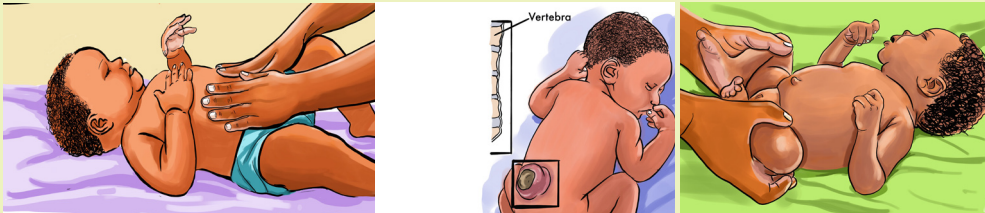
Self-assessment activity 6.7

1. What the associate nurse assesses on the newborn's chest?
2. What the associate nurse tells and explains to the mother is worried about the witch's milk found on his baby?
3. What is normal shape of the chest?
4. When to auscultate the lungs of the newborn?

6.8 Abdomen, back and genitalia assessment

Learning Activity 6.8

Observe these images illustrating an associate nurse assessing the newborn 'abdomen, back and genitalia.



From the observation of above pictures,

1. What elements do you think the nurse will assess to the back, abdomen, spine and genitalia of the newborn?
2. What do you think to be observed on umbilical cord after birth?

Abdomen

On abdomen, the associate nurse will check for the shape and distension. He/she will also check for bowel sounds, and observe the umbilical cord for infection and any discharge, redness and observe two arteries and one vein. Check for any hernia or any abnormalities. Abdomen should feel soft during palpation.

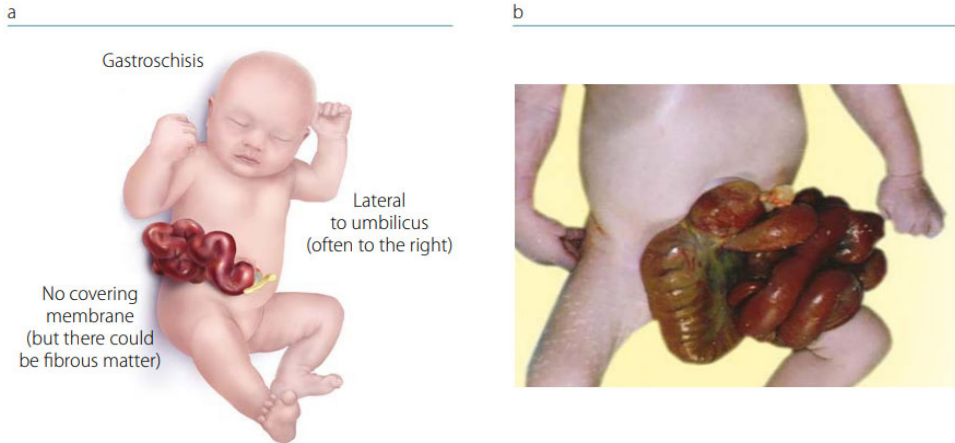


Figure 6.11: Gastroschisis

Back and spine

On the back, the associate nurse will check for any abnormal spinal curvature, hair on the skin, depression in the spine, spina bifida, meningocele, meningomyelocele

Buttocks: Buttocks should be observed for any mass. Perineal area should be checked for anal opening, anal fissure or any other abnormalities.

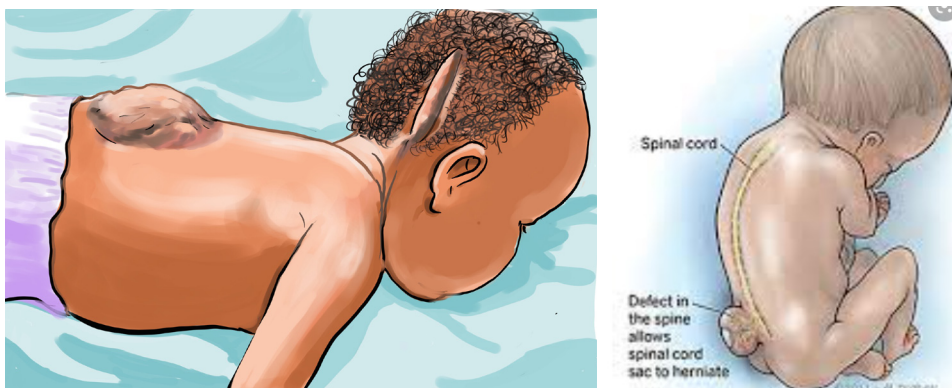


Figure 6.12: spina bifida

Genitalia

On female genitalia the associate nurse will check if the labia major cover the labia minor (sign of maturity) and if the clitoris is visible on separating the labia. Urethral opening should be below the clitoris. Pink red mucous vaginal discharge may be found during the first week due to sudden decrease of maternal hormones, which is known as pseudomenstruation.

On male neonates, testes should be inspected and palpated for descend; scrotum appears pigmented and wrinkled with rugae. Penis should be inspected for urethral opening. Check for hydrocele and inguinal hernia.

Self-assessment activity 6.8

1. What will the associate nurse assess on umbilical cord of the newborn?
2. What will the associate nurse assess on back and spine of the newborn?
3. What will the associate nurse assess on male neonate's genitalia?
4. Define the term pseudo menstruation?

6.9 Assessment of the limbs

Learning Activity 6.9

Observe these images illustrating an associate nurse assessing the newborn 'upper and lower limbs.



From the observation of above pictures,

1. What elements do you think the nurse will assess newborn 'limbs'?
2. Define the term polydactyl?

Each newborn baby is carefully checked at birth for signs of problems or complications. The healthcare provider will do a complete physical exam, on limbs, the associate nurse assesses arms, Legs, Hands, and Feet. He/she checks for any symmetricity, abnormal length and deviations, fractures, paralysis, and weakness. He/she also assesses if there is polydactyly, syndactyly and abnormal skin creases. Polydactyl condition of having more than the normal number of fingers or toes.

Hips: On hips, the associate nurse assesses the range of motion adequate and click. If any deviation, it indicates congenital hip dislocation through these maneuvers;

The Barlow manoeuvre involves flexing the new-born's hips and knees at 90 degrees and applying gentle pressure downwards. The Barlow test is considered to be positive if the examiner feels the head of the femur slip out of the hip socket.

The Ortolani manoeuvre is performed after the Barlow manoeuvre. It confirms hip displacement and returns the displaced bone back into the hip socket. The Ortolani manoeuvre involves abducting (moving apart) the flexed legs while applying a gentle forward pressure with the middle finger against the head of the femur. An audible 'clunk' can be heard when the femoral head returns to the hip socket.

Plantar creases: These are creases on the soles of the feet. They can range from absent to covering the entire foot, depending on the maturity.

Various Congenital malformations that can be detected while doing limbs assessment.



Figure 6.13: Limbs abnormalities

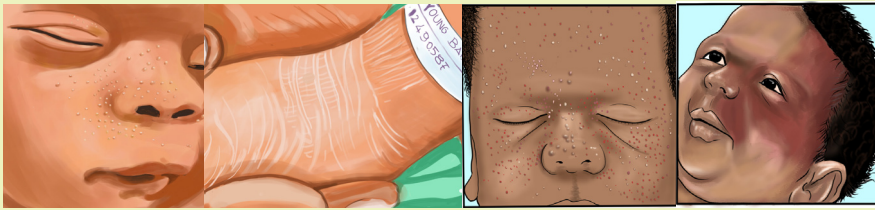
Self-assessment 6.9

1. What the associate nurse assesses on the newborn's hands?
2. What the associate nurse assesses on the newborn's legs and feet?
3. What will the associate assess on the newborn's hips?
4. Define the term plantar creases?

6.10 Assessment of the skin

Learning Activity 6.10

Observe these images illustrating the newborn 'skin



From the observation of above pictures,

1. What elements do you think the nurse will assess for the newborn 'skin'?
2. What do you think about lanugo hair?

The skin of a healthy newborn at birth has:

- Deep red or purple skin and bluish hands and feet. The skin darkens before the infant takes their first breath (when they make that first vigorous cry).
- A thick, waxy substance called vernix covering the skin. This substance protects the foetus's skin from the amniotic fluid in the womb. Vernix should wash off during the baby's first bath.
- Fine, soft hair (lanugo) that may cover the scalp, forehead, cheeks, shoulders, and back. This is more common when an infant is born before the due date. The hair should disappear within the first few weeks of the baby's life.
- New-born skin will vary, depending on the length of the pregnancy. Premature infants have thin, transparent skin. The skin of a full-term infant is thicker.
- By the baby's second or third day, the skin lightens and may become dry and flaky. The skin still often turns red when the infant cries. The lips, hands, and feet may turn bluish or spotted (mottled) when the baby is cold.

The associate nurse assesses the following on the newborn's skin:

Normal - Short-term (resolves in days to months)

For normal short-term skin conditions, the associate nurse checks for

- Miliaria (Heat Rash)
- Petechiae on scalp and face after vertex delivery
- Vernix Caseosa (Cheesy white skin covering present at birth)
- Transient vascular phenomena like skin mottling related to cold exposure and positional erythema on the dependent side of the body)

Normal - Short-term (resolves in days to months):

The associate nurse checks for:

- Erythema toxicum neonatorum (Yellow papules on red base affected face and trunk, disappearing within days to a week)
- Neonatal Pustular Melanosis (Milky fluid filled Vesicles without erythema, <5 mm on torso, buttock, forehead, chin)
- Milia (Pinpoint white, keratin-filled Papules (blocked sebaceous glands) on nose and cheeks)
- Lanugo (Fine hair on Shoulders and back). If too much, it can indicate prematurity)
- Spontaneous Fat Necrosis
- Acne Neonatorum

Normal - Birthmarks, Long-term (Persists for months to years - some do not resolve)

- See abnormal or risk-associated Birthmarks below (e.g. Congenital Melanocytic Nevi)
- Mongolian Spots (Large up to 10 cm bluish-gray pigment patches on extremities as well as lumbar, sacral and buttock region)
- Nevus Simplex (Macular pink to red capillary dilations that fade with time, occurring on upper Eyelids, forehead, nape of neck)
- Hemangioma (Benign vascular lesions)

Important skin infection related lesions

- Neonatal Herpes Simplex Virus (Vesicular Lesions in infant born to mother with HSV)
- Congenital Syphilis (Lesions on palms and soles)
- Staphylococcal Scalded Skin
- Impetigo

Abnormal or lesions that require evaluation, specific management or observation

- Pallor (indicates bleeding or Anemia)
- Jaundice onset within first day of life (indicates Hemolytic Disease of the Newborn and Neonatal Jaundice)
- Cyanosis (can indicate respiratory distress, cardiovascular disorders, hypoxia, etc)
- Mottling (can indicate Sepsis, or Hypothermia)

- Gray Skin Coloration(is a sign of metabolic Acidosis)
- Vesicles(can indicate Neonatal HSV)
- Bullae
- Nevus Sebaceus.It is a yellow hairless Plaque on scalp or face. It may be associated with epidermal nevus syndrome and carries risk of future skin cancer in 10-15% of cases
- Hyperpigmentation
- Cafe-Au-Lait Macule”Coffee with milk” (tan to brown) colored flat
- Macule, <4 cm located on trunk



Figure 6.14: Neonatal herpes

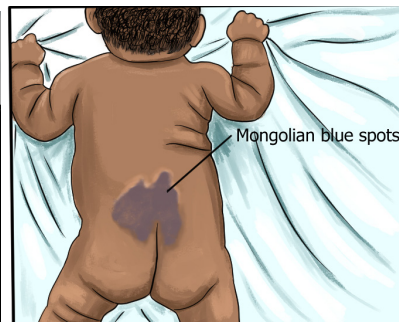


Figure 6.15: Mongolian spots



Figure 6.16: Acne neonatorum



Figure 6.17: Milia

© MAYO FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH. ALL RIGHTS RESERVED

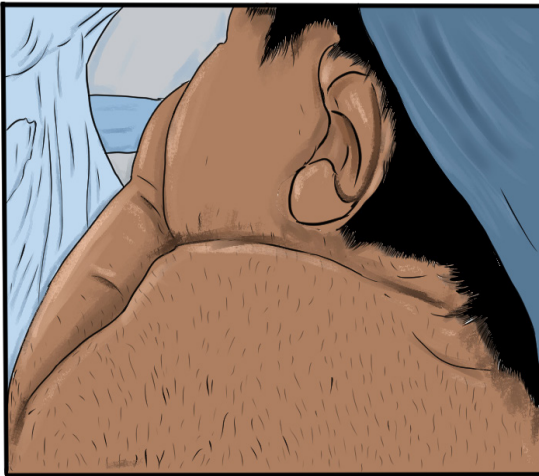


Figure 6.18: Lanugo

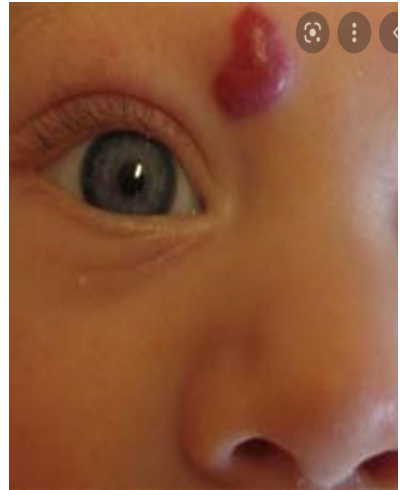


Figure 6.19: Hemangioma

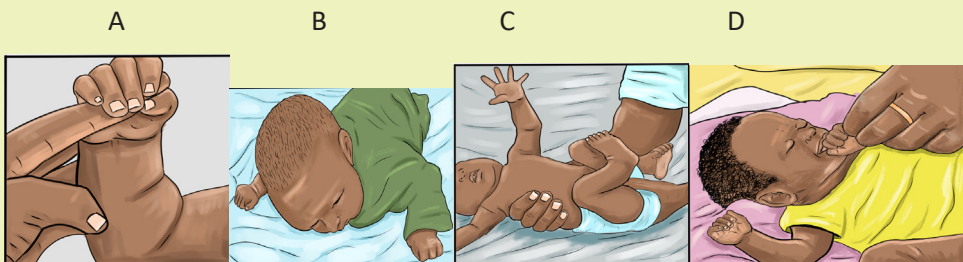
Self-assessment 6.10

1. What are the normal short-term skin conditions that the associate nurse checks on the newborn?
2. What are the Normal Birthmarks that the associate nurse checks on the newborn?

6.11 Reflexes assessment

Learning Activity 6.11

Observe these images illustrating an associate nurse taking measurements to the newborn baby.



From the observation of above pictures,

1. What reflex do you think the nurse is taking to that baby in the picture A, B, C, D?
2. What do you think about necessity of assessing reflexes on baby?

Reflexes are involuntary movements or actions. Some movements are spontaneous and occur as part of the baby's normal activity. Others are responses to certain actions. Healthcare providers check reflexes to determine if the brain and nervous system are working well. The presence and strength of a reflex is an important sign of nervous system development and function. Many infant reflexes disappear as the child grows older, although some remain through adulthood

Exam 1: Foot

- a. Stroke Inner Sole: Toes curl around ("grasp") examiner's finger
- b. Stroke Outer Sole (Babinski): Toes spread, great toe dorsiflexion

Exam 2: Doll's Eyes and grasping reflexes

- A. Give one forefinger to each hand - baby grasps both
 1. Pull baby to sitting with each forefinger
- B. Eyes open on coming to sitting (Like a Doll's)
 1. Head initially lags
 2. Baby uses Shoulders to right head position

Exam 3: Primitive Stepping (Walking Reflex)

- A. Hold baby up with one hand across chest
- B. As feet touch ground, baby makes walking motion

Exam 4: Protective Reflex

- a. Soft cloth is placed over the baby's eyes and nose
- b. Baby arches head and turns head side to side
- c. Brings both hands to face to swipe cloth away

Exam 5: Rooting and sucking reflexes

- a. Touch newborn on either side of cheek
- b. Baby turns to find Breast
- c. Sucking mechanism on finger is divided into 3 steps
 1. Front of Tongue laps on finger
 2. Back of Tongue Massages middle of the finger
 3. Esophagus pulls on tip of finger

Exam 6: Tonic Neck (Fencing) Reflex

- A. If the Babies' head is rotated leftward
 1. The left arm (face side) stretches into extension
 2. The right arm flexes up above head
- B. Opposite reaction if head is rotated rightward

Exam 7: Moro Reflex (Startle Reflex)

- A. Hold supine infant by arms a few inches above bed
 - 1. Gently drop infant back to elicit startle
- B. Baby throws Arms out in extension and baby grimace

Exam 8: Hand-to-Mouth (Babkin) Reflex

- A. Stroke newborns cheek or put finger in baby's palm
- B. Baby will bring his fist to mouth and suck a finger

Exam 9: Swimmer's (Gallant) Response

- A. Hold baby prone while supporting belly with hand
 - 1. Stroke along one side of babies' spine
- B. Baby flexes whole body toward the stroked side

Exam 10: Crawling Reflex

- A. Newborn placed on Abdomen
- B. Baby flexes legs under him and starts to crawl



Figure 6.20: Different newborn reflexes

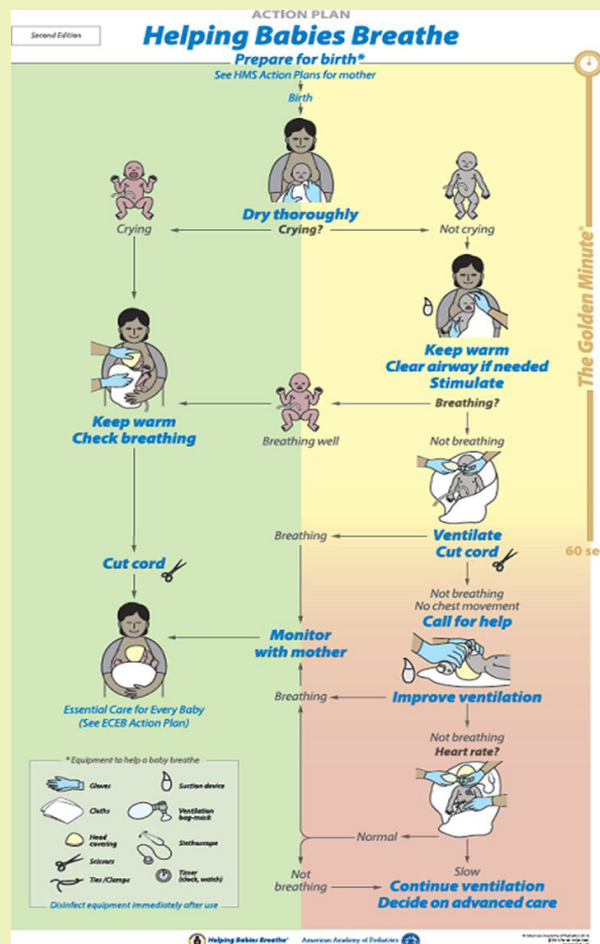
Self-assessment 6.11

1. How will the associate nurse to check for Babinski reflex?
2. How the associate nurse checks for Moro Reflex (Startle Reflex)
3. Define the term reflex?
4. What does it mean when reflexes are present?

6.12 Helping the Baby Breathe (HBB)

Learning Activity 6.12

Observe these images illustrating steps of Helping the Baby Breathe (HBB)



1. What do you think about the Helping the Baby Breathe (HBB) program?
2. What do you think will be done to help the baby breathe in the first minute (Golden) of birth?

The first minutes after birth are critical to reducing neonatal mortality. Helping Babies Breathe (HBB) is a simulation-based neonatal resuscitation program for low resource settings.

The Golden Minute:

A key concept of HBB is The Golden Minute. Within one minute of birth, a baby should be breathing well or should be ventilated with a bag and mask. The Golden Minute identifies the steps that a birth attendant must take immediately after birth to evaluate the baby and stimulate breathing.

HELPING BABY BREATHE INCLUDE:

Routine care

- Dry thoroughly
- Is the baby crying?
- Keep warm, check for breathing
- Clamp or tie the umbilical cord

Before delivery

- Identify a helper and review emergency plan
- Prepare the area for delivery
- Wash hands
- Prepare the area for ventilation
- Assemble disinfected equipment and supply
- Test the ventilation bag, mask

Materials

- Gloves
- Suction device
- Cloths
- Ventilation bag mask
- Head covering
- Stethoscope
- Scissors
- Ties or cord clamp
- Timer

Procedure

Dry the baby thoroughly at birth. Drying help keeping the baby to stay warm and stimulates breathing. A newly born baby is wet and may become cold even in a warm room.

- Dry the body, head, arms, and legs by rubbing gently with a cloth
- Drying the back provides important stimulation to breathe. Wipe the face, clean of feces and blood.
- Drying can be done on the mother's abdomen.
- Place a clean cloth on the mother's abdomen before birth.
- Position the baby on the cloth and dry thoroughly.
- Remove the wet cloth and place the baby on skin to skin with the mother and cover with a dry one. A baby who is crying is receiving routine care and kept warm and check breathing.
- If the baby is not crying after drying he needs help to breathe in the golden minute.
- Keep warm on mother abdomen or chest, or a warm area with dry blanket beside the mother and cover the head
- Clear airway if needed
- Position the head. Position the neck slightly extended to keep airway open.
 - The nose will be as far forward as possible.
 - If the neck is flexed or extended too far, air may not enter freely.
 - If secretions are not seen and there is no meconium, move directly to stimulate breathing. Some babies will have a shallow, irregular, slow, or noisy breathing immediately after birth. Other may have chest in-drawing or retractions. These babies with abnormal breathing will require continued monitoring or their breathing, heart rate, and color to decide if they need more help to breathe
- Decide what care the baby needs after clearing the airway and stimulation.

If the baby is breathing well, the baby can receive routine care. Continue to check the breathing. Clamp or tie and cut the umbilical cord. Encourage breastfeeding in the first hour.

If the baby is not breathing well (gaspings or not breathing at all), begin ventilation with bag and mask. Quickly move the baby to the area for ventilation. Delaying ventilation may result in death or brain damage.

Self-assessment 6.12

1. What would happen within one minute of birth?
2. What are the routine cares provided in HBB?
3. Why is it important to dry thoroughly the baby in the golden minute?
4. What are preparations of delivery area before delivery?

6.13 Breastfeeding

Breastfeeding is when baby is feed with breast milk, it is also called nursing. Breast milk is the ideal food for infants. It is safe, clean and contains antibodies which help protect against many common childhood illnesses. Breast milk provides all the energy and nutrients that the infant needs for the first months of life, and it continues to provide up to half or more of a child's nutritional needs during the second half of the first year, and up to one third during the second year of life. It's best to try to breastfeed the baby in the first hour after birth because by latching on and sucking rhythmically, the breast begins switching on the cells to initiate the body's breast milk supply. is Exclusive breastfeeding recommended for 6 months. Even, after the introduction of other foods, it recommends continuing to breastfeed through the baby's first year of life. Normally, newborns often want to feed every 2-3 hours.

Signs showing that the baby is hungry

One of the most common ways to know that the baby is hungry is "cry". Other signs showing that the baby wants to breastfeed include:

- Licking their lips or sticking out their tongue
- Rooting, which is moving their jaw, mouth, or head to look for your breast
- Putting their hand in their mouth
- Opening their mouth
- Fussiness
- Sucking on things.

Benefits of breastfeeding for the Baby

Breast milk provides the ideal nutrition for infants. It has a nearly perfect mix of vitamins, protein, and fats it has everything that baby needs to grow. And it's all provided in a form more easily digested than infant formula.

- Breast milk contains antibodies that help your baby fight off viruses and bacteria.
- Breastfeeding lowers your baby's risk of having asthma or allergies. Plus, babies who are breastfed exclusively for the first 6 months, without any formula, have fewer ear infections, respiratory illnesses, and bouts of diarrhoea.

- They also have fewer hospitalizations and trips to the health care provider; Breastfeeding has been linked to higher intellectual quotient (IQ) scores in later childhood in some studies.
- What's more, the physical closeness, skin-to-skin touching, and eye contact all help your baby bond with you and feel secure. Breastfed infants are more likely to gain the right amount of weight as they grow rather than become overweight children.

Benefits of breastfeeding for the mother

- Breastfeeding burns extra calories, so it can help losing pregnancy weight faster. It releases the hormone oxytocin, which helps uterus to return to its pre-pregnancy size and may reduce uterine bleeding after birth. Breastfeeding also lowers risk of breast and ovarian cancer.
- Breastfeeding is economic because no need to measure formula, sterilize nipples, or warm bottles, it saves time and money.
- It also gives regular time to relax quietly to the mother with the newborn as they bond.

The first few days after birth, breasts make ideal “first milk.” It's called colostrum.

Colostrum is thick, yellowish, and there's not a lot of it, but there's plenty to meet the baby's nutritional needs. Colostrum helps a new-born's digestive tract develop and prepare itself to digest breast milk.

Colostrum is the first phase of breast milk, which changes over time the baby grows. The second phase is called transitional milk. The colostrum is gradually replaced with the third phase of breast milk, called mature milk.

The transitional milk starts few days after birth. By 10 to 15 days after birth, the body make mature milk, which gives to the baby all the nutrition they need.

LATCHMENT

Position the baby facing the mother, so the baby is comfortable and doesn't have to twist the neck to feed. With one hand, the mother cups the breast and gently strokes her baby's lower lip with the nipple. The baby's instinctive reflex will be to open the mouth wide. With the mothers' hand supporting the baby's neck, brings the mouth closer around her nipple, trying to centre the nipple in the mouth above the baby's tongue.

The mother will know the baby is “latched on” correctly when both lips are pursed outward around the nipple. The baby should have all of nipple and most of the areola in the mouth. While the mother feels a slight tingling or tugging, breastfeeding should not be painful.

If the baby isn't latched on correctly and nursing with a smooth, comfortable rhythm, the mother gently nudges her pinky between the baby's gums to break the suction, remove the nipple, and try again. Good “latching on” helps prevent sore nipples.

Signs of a Good Latch

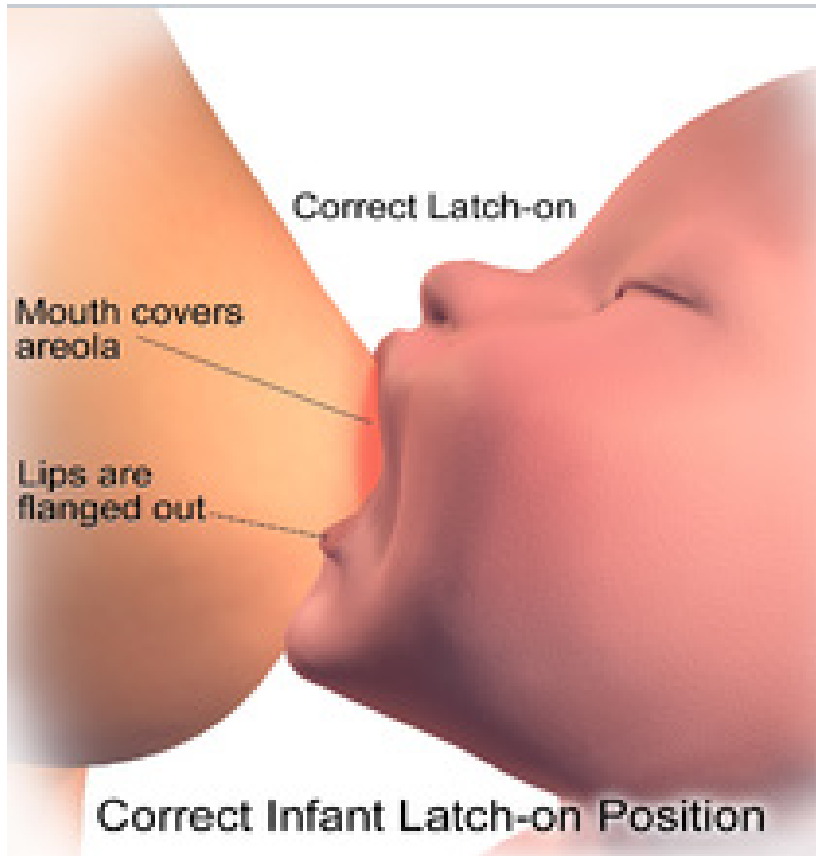


Figure 6.21: Good latch

- The latch is comfortable and pain free.
- The baby's chest and stomach rest against your body, so that baby's head is straight, not turned to the side, the chin touches your breast.
- The baby's mouth opens wide around your breast, not just the nipple.
- The baby's lips turn out.

Breast feeding positions

The associate nurse must teach and assist the mother to be in best, comfortable and relaxed position and the mother must not strain to hold the position or keep nursing. Here are some common positions for breastfeeding the baby:

Cradle position: The mother rests on the side of the baby's head in the crook of her elbow with the whole baby's body facing the mother. The mother positions the baby's belly against her body so they feel fully supported. Other, "free" arm can wrap around to support the baby's head and neck or reach through the baby's legs to support the lower back.



Figure 6.22: breastfeeding position (cradle)

Football position: The mother lines the baby's back along the mother's forearm to hold the baby like a football, supporting the head and neck in her palm.

This works best with new-borns and small babies. It's also a good position for the mother recovering from a cesarean birth and need to protect the belly from the pressure or weight of the baby.

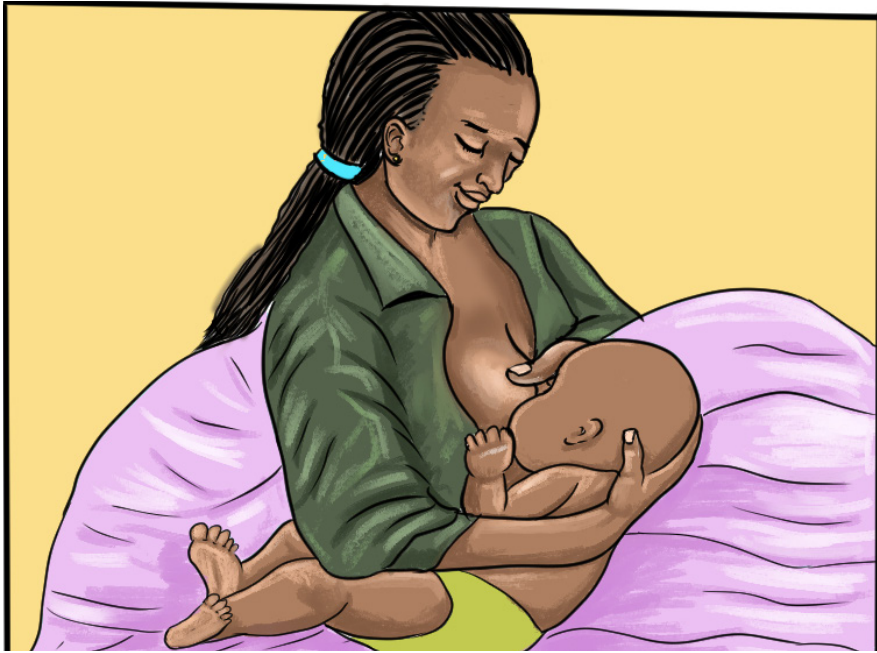


Figure 6.23: Breastfeeding position (football)

Side-lying position: This position is great for night feedings in bed. Side-lying also works well if the mother is recovering from an episiotomy, an incision to widen the vaginal opening during delivery. The mother uses pillows under head to get comfortable. Then snuggle close to the baby and the mother use her free hand to lift the breast and nipple into the baby's mouth. Once the baby is correctly "latched on," the mother supports the baby's head and neck with her free hand so there's no twisting or straining to keep nursing.



Figure 6.24: Breastfeeding position (side-lying)

Cross-cradle hold: The mother sits straight in a comfortable chair that has armrests. The mother holds her baby in the crook of her arm that's opposite the breast she will use to feed them. The mother supports the baby's head with her hand. She brings the baby across her body in a way that her tummies face each other. She uses her other hand to cup the breast in a U-shaped hold. She brings the baby's mouth to her breast and cradles them close, and does not lean forward.



Figure 6.25: Breastfeeding position (cross-cradle hold)

Laid-back position: This position, also called biological nurturing, is a lot like it sounds. It's meant to tap into the natural breastfeeding instincts the mother and baby have. The mother leans back, but not flat, on a couch or bed. The mother ensures good supports of her head and shoulders. She holds the baby in entire fronts touch. She lets the baby take any position they're comfortable in as long as cheek rests near her breast. The mother helps the baby latch on if he needs it.

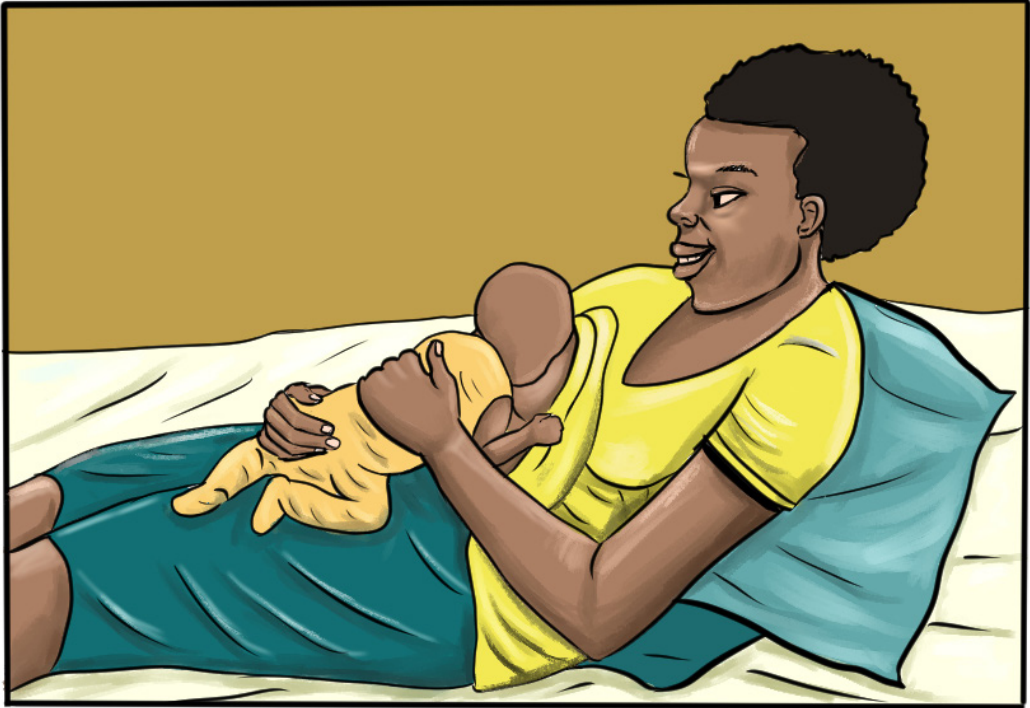


Figure 6.26: Breastfeeding position (laid-back)

Self-assessment 6.13

1. When the newborn has to start breastfeeding after birth
2. What are the advantages of breastfeeding to the mother?
3. Which period fit for exclusive breast feeding?
4. What is colostrum?
5. What are the advantages of breastfeeding to the baby?
6. Enumerate comfortable positions that the mother can take while breastfeeding.

End unit assessment 6

SECTION A. MULTIPLE CHOICE QUESTIONS

1. The associate nurse is assessing the one minute APGAR score of a newborn baby. On assessment, the associate nurse notices the following complains on the newborn patient: heart rate 130, pink body and hands with cyanotic feet, weak cry, flexion of the arms and legs, active movements and crying when stimulated. What is the newborn's APGAR score?

- a. APGAR 9
- b. B. APGAR 10
- c. APGAR 8
- d. APGAR 5

2. The associate nurse is assessing the one minute APGAR score of the newborn baby. On the assessment, he/ she notice the following problems on the newborn patient: heart rate 101, cyanotic body and extremities, no response to stimulation, no flexion of extremities, and weak cry. What is the newborn's APGAR score?

- a. APGAR 4
- b. APGAR 6
- c. APGAR 3
- d. APGAR 2

3. A newborn's fifth minute APGAR score is 5. Which of the following nursing interventions will the associate nurse provide to this newborn?

- a. Routine post-delivery care
- b. Continue to monitor and reassess the APGAR score in 10 minutes
- c. Some resuscitation assistance such as oxygen and rubbing baby's back and reassess APGAR score
- d. Full resuscitation assistance is needed and reassess APGAR score.

4. The associate nurse in a delivery room is assisting for the delivery of a newborn baby. After the delivery, which nursing intervention that the associate nurse should perform in order s to prevent the heat loss in the newborn as the result of result of evaporation:

- a. Warming the crib pad
- b. Turning on the overhead radiant warmer
- c. Closing the doors to the room
- d. Drying the infant in a warm towel

5. The associate nurse in a newborn nursery is performing an assessment of a newborn baby. The associate nurse is preparing to measure the head circumference of the baby and he/ she would most appropriately:

- a. Wrap the tape measure around the infant's head and measure just above the eyebrows.
- b. Place the tape measure under the infant's head at the base of the skull and wrap around to the front just above the eyes.
- c. Place the tape measure under the infant's head, wrap around the occiput, and measure just above the eyes.
- d. Place the tape measure at the back of the infant's head, wrap around across the ears, and measure across the infant's mouth.

6. During an assessment of the new born, the associate nurse notes that when the baby's head is turned to the right side, the leg and arm on the right side will extend, while the leg and arm on the left side will also flex. The associate nurse documents this as what type of reflex?

- a. Rooting Reflex
- b. Sucking Reflex
- c. Moro Reflex
- d. Tonic Neck Reflex

7. The associate nurse notes that when a finger is placed under the toes of the newborn, the toes will curl downward. This is known as the?

- a. Babinski reflex
- b. Plantar grasp reflex
- c. Tonic neck reflex
- d. Step reflex

8. When does the sucking reflex in an infant disappear and become voluntary?

- a. 6 months
- b. 2 months
- c. 4 months
- d. 12 months

9. Speeding of postpartum recovery is the one of the benefits of breastfeeding to the mother. Respond by True or False.

- a. True
- b. False

10. True or False: To maintain a schedule, a breastfed baby should only be fed every three hours.

- a. True
- b. False

c. SECTION B: SHORT ANSWERS

11. What is the difference between the baby's chest and head circumferences?

12. When the head and chest circumference may be equal?

13. How to check for audibility while assessing the newborn baby?

14. How will the associate nurse know the clavicle injury to the newborn?

15. What will the associate nurse check on newborn's nose?

16. What is hypotelorism and hypertelorism?

17. What is the pseudo menstruation?

18. What are the signs of potential distress or deviations from expected findings the associate nurse will notice while assessing the respiration patterns for the baby?

19. List 5 Abnormal findings or lesions on the newborn 'skin that require evaluation, specific management or observation

20. Why does the healthcare providers need to check for reflexes

21. In HBB, what is done by the health care provider before delivery?

22. What are the signs showing that the baby is hungry and needs to breastfeed?

REFERENCES

1. Annama, J. (2012). A Comprehensive Textbook Of Midwifery & Gynecological Nursing
2. Breastfeeding. A Guide for the Medical Profession Book • Ninth Edition • 2021. By Ruth A. Lawrence & Robert M. Lawrence
3. Committee, F. S. M. and N. H. (SMNH) (2012) 'Management of the second stage of labor', International Journal of Gynecology & Obstetrics, 119(2), pp. 111–116. doi: <https://doi.org/10.1016/j.ijgo.2012.08.002>.
4. Deitra, L., Shannon, E., Kitty, C. (2016). Maternity women's health care. 11th Edition
5. Durham, R. and Chapman, L. (2013) Maternal-newborn nursing: The critical components of nursing care. FA Davis.
6. Early essential newborn care. Clinical practice pocket guide. First Embrace. By World Health Organization
7. Edmonds, K. (2018) Dewhurst's Textbook of Obstetrics & Gynaecology. John Wiley & Sons.
8. Examination of the Newborn. A Practical Guide. By Helen Baston, Heather Durward. 2017.
9. Fuwa, K. et al. (2021) 'Umbilical cord milking versus delayed cord clamping in term infants: a systematic review and meta-analysis', Journal of Perinatology, 41(7), pp. 1549–1557.
10. Hadlow, N. (2017). Biochemical Changes in Pregnancy-What Should A Clinician Know ?, 4(1), 8–11. <https://doi.org/10.19080/JGWH.2017.04.555626>
11. Jacob, A. (2018) A Comprehensive Textbook of Midwifery & Gynecological Nursing. Jaypee Brothers Medical Publishers.
12. Kloser, N. jayn., & Hatfield, N. T. (2010). Introductory Maternity and Pediatric Nursing. China. Edition 2
13. Macdonald, S., & Magill-Cuerden, J. (2010). Mayer's Midwifery Fourteenth Edition. Bailliere Tindall Elsevier.
14. Marshall, H. K., John, H. K., & Phyllis, H. K. (2012). THE DOULA BOOK : How a trained Labor Companion can help you have a Shorter , Easier, and Healthier Birth (Third Edit). MERLOYD LAWRENCE BOOK DA CAPO PRESS.
15. Marshall, J., & Raynor, M. (2014). Myles TEXT BOOK FOR MIDWIVES (sixteen ed). Elsevier.
16. PCEP Maternal and Fetal Evaluation and Immediate Newborn Care (Book I) (3rd Edition). By Robert A. Sinkin, MD, MPH, FAAP; Christian A. Chisholm, MD, FACOG

17. Perry, L., & Alden, C. (2016). *Maternal & Women's Health Care*. (E. F. Olshansky, Ed.) (11th Edition). St. Louis, Missouri: Elsevier.
18. *Physical Assessment of the Newborn: A Comprehensive Approach to the Art of Physical Examination*, Fifth Edition. By Ellen P. Tappero & Marry Ellen Honeyfield.
19. Regan, J., VanPutte, C., & Russo, A. (2016). *SEELEY'S ESSENTIALS OF ANATOMY & PHYSIOLOGY* (Ninth edit). MC Graw Hill Education.
20. *The Student Guide to the Newborn Infant Physical Examination*. By Tracey Jones. 2020.
21. Weeks, A. (2007) 'Umbilical cord clamping after birth', *BMJ (Clinical research ed.)*, 335(7615), pp. 312–313. doi: 10.1136/bmj.39282.440787.80.
22. WHO (2009) WHO guidelines for the management of postpartum haemorrhage and retained placenta. World Health Organization.
23. WHO (2018) WHO recommendations on intrapartum care for a positive childbirth experience. World Health Organization.