

Reproductive Health (Theory)

PGDMCH-102

DIRECTORATE OF DISTANCE EDUCATION

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4. COMPLICATIONS IN LATE PREGNANCY

67-76

Structure

Learning Objectives

- 4.1 Introduction
- 4.2 Objective
- 4.3 Introduction Abortions
- 4.4 Ectopic pregnancy
- 4.5 Tubal pregnancy
- 4.6 Hydatidiform Mole
- 4.7 Hyperemesis Gravidarum
- 4.8 Urinary retention

5. LABOR

77-134

Structure

Learning Objectives

- 5.1 Introduction
- 5.2 Normal Labor & Its Management
- 5.3 Anatomy
- 5.4 Physiology of Labour
- 5.5 Stages of labor
- 5.6 True and False Labor
- 5.7 Examination of a Woman in Labour
- 5.8 History, Examination, Procedures on Admission
- 5.9 Monitoring Labour
- 5.10 Management of labor
- 5.11 Examination of Placenta and Membrances
- 5.12 Post Delivery Management
- 5.13 Normal Puerperium and Postnatal Care
- 5.14 Physiological Change in Normal Puerperium
- 5.15 Postnatal Care
- 5.16 Breech Presentation
- 5.17 Transverse Lie
- 5.18 Twin Pregnancy
- 5.19 Abnormal Progress of Labour
- 5.20 Obstructed Labour
- 5.21 Rupture uterus
- 5.22 Abnormal Puerperium

6. INFERTILITY

135-141

Structure

Learning Objectives

- 6.1 Introduction
- 6.2 Diagnosing infertility
- 6.3 causes of infertility
- 6.4 Risk factors of infertility
- 6.5 Management infertility

SYLLABUS

REPRODUCTIVE HEALTH

1. Pregnancy and Antenatal Care

Objective, Introduction, Antenatal care, Initial comprehensive evaluation-diagnosis of pregnancy, History, Physical examination, Assessment of gestational age, Instruction, Health education, Follow-up of antenatal care, Drug prescription during pregnancy-teratogenesis, Guidelines for drug administration for common conditions.

2. Maternal Nutrition on Pregnancy and Lactation

Nutrition during pregnancy-Nutritional requirements during pregnancy, Dietary intake, Nutritional status outcome of pregnancy, Factors associated with deterioration in maternal nutritional status, Dietary intake, Physical work and nutritional status, Nutrition and health consequences of adolescent pregnancies, Effect of food supplementation during pregnancy.

Nutrition during lactation-Nutritional requirements during lactation, Nutrition and health consequences of conception during lactation.

Nutritional status and reproductive performance of women gainfully employed outside home.

Contraception and nutrition, Nutrition-infection interactions, Emerging problem of over eating and obesity prevention and management of micronutrient deficiencies.

3. Medical Disorders Complication Pregnancy Anemia

Heart Disease in Pregnancy : Diagnosis and evaluation during pregnancy, Effect of heart disease on pregnancy, Effect of pregnancy on maternal heart disease, Management : care during pregnancy, Labour and puerperium.

Diabetes Mellitus-Definition : Diabetes and gestational diabetes, Diagnosis, Effect of Pregnancy on Diabetes, Effect of diabetes on Pregnancy, Management; Care during pregnancy, Labour and puerperium urinary tract infections-Asymptomatic Bacteriuria, Pyelonephritis, Management of UTI in pregnancy malaria-Effect on pregnancy, Treatment in pregnancy Pulmonary Tuberculosis-Diagnosis, Treatment in pregnancy Jaundice-Causes, Diagnosis.

4. Complications in Late Pregnancy

Objective, Introduction : Abortions, Ectopic Pregnancy, Ectopic Pregnancy other than tubal pregnancy, Hydatidiform mole hyperemesis gravidarum, Retention of Urine.

5. Labour (I) Normal and its management : Normal Puerperium and Post Natal Care

Anatomy and Physiology : Anatomy of maternal pelvis and foetal skull-Anatomy of maternal Pelvis (passage), Anatomy of foetal skull (passenger), Physiology of labour-Physiology of uterine contractions (power), Physiology of onset of labour, Physiology of placental separation mechanism of normal labour.

Management : Definition, Onset and stages of Labour-Definition, Onset of labour, True and false labour, Stages of labour, Examination of a women in labour, History, Examination, Procedures on Admission, Monitoring labour, Management of labour, Management during first stage, Management during second stage, Management during third stage, Examination of placenta and membranes, Post delivery management.

Normal Puerperium and Postnatal Care : Objectives, Introduction, Definition of Normal Puerperium, Physiological changes in normal puerperium-Changes in genital tract, Changes in breast and lactation, Changes in other systems, Postnatal care-Postnatal check UP, Management of Normal Puerperium, Treatment of Minor Ailments, Postnatal Exercises.

(II) Breech : Breech Presentation, Transverse Lie and Twins : Breech presentation-Aetiology and types, Diagnosis and differential diagnosis, Mechanism of Normal breech delivery, Risks of breech delivery, Management during pregnancy and labour transverse lie-etioloogy, Diagnosis, Complications management Twin Pregnancy-Aetiology, Diagnosis, Complications, Management.

(III) Prolonged Labour, Obstructed labour and Ruptured Uterus : Abormal progress of labour-diagnosis of Abnormal progress of labour, Management obstructed labour-causes of obstructed labour, Clinical features and diagnosis, Management, Complications of Obstructed Labour, Rupture uterus-etiology of rupture uterus, Clinical feautures and diagnosis, Management

Abnormal Puerperium.

6. Infertility

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Pregnancy and Antenatal Care

STRUCTURE

- 1.1 Introduction
 - 1.2 Objective, Introduction, Antenatal Care
 - 1.3 Initial Comprehensive Evaluation
 - 1.4 Gestational Age Assessment
 - 1.5 Health Education
 - 1.6 Follow-up of Antenatal Care
 - 1.7 Drug Prescription during Pregnancy
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LEARNING OBJECTIVES

- ❖ Understanding to pregnancy & antenatal care
 - ❖ Know about initial comprehensive evaluation of pregnancy.
 - ❖ Know about history and physical examination of pregnancy
 - ❖ Know about assessment of gestational age.
 - ❖ Know about health education.
 - ❖ Know about antenatal care.
 - ❖ Know about drug prescription during pregnancy.
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1.1 INTRODUCTION

Reproductive health refers to the diseases, disorders and conditions that affect the functioning of the male and female reproductive systems during all stages of life. Disorders of reproduction include birth defects, developmental disorders, low birth weight, preterm birth, reduced fertility, impotence, and menstrual disorders. Within the framework of WHO's definition of health as a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity, reproductive health addresses the reproductive processes, functions and system at all stages of life. Reproductive health, therefore, implies that people are able to have a responsible, satisfying and safe sex life and that they have the capability to reproduce and the freedom to

decide if, when and how often to do so. Implicit in this are the right of men and women to be informed of and to have access to safe, effective, affordable and acceptable methods of fertility regulation of their choice, and the right of access to appropriate health care services that will enable women to go safely through pregnancy and childbirth and provide couples with the best chance of having a healthy infant.

Research has shown that exposure to environmental pollutants may pose the greatest threat to reproductive health. Exposure to lead is associated with reduced fertility in both men and women, while mercury exposure has been linked to birth defects and neurological disorders. A growing body of evidence suggests that exposure to endocrine disruptors, chemicals that appear to disrupt hormonal activity in humans and animals, may contribute to problems with fertility, pregnancy, and other aspects of reproduction.

1.2 OBJECTIVE, INTRODUCTION, ANTENATAL CARE

Pregnancy, Labor and birth of a child are important milestones in a couple's life. Regular medical care, knowledge of your choices, and understanding the unknown events during pregnancy can make childbirth an extremely enriching and joyful event. A woman's health and behavior in pregnancy affect her baby. A poor diet, smoking, intake of alcohol, certain drugs, and severe illnesses can hold back the baby's development. Hence during pregnancy, you should not only take good care of your own health but also go for regular checkups with your doctor. This is antenatal care and it is absolutely necessary because it makes sure that you and the baby are fit and well.

Antenatal care is the care you receive from healthcare professionals during your pregnancy. You'll be offered a series of appointments with a midwife, or sometimes with a doctor who specialises in pregnancy and birth (an obstetrician).

They will check that you and your baby are well, give you useful information to help you have a healthy pregnancy (including healthy eating and exercise advice) and answer any questions you may have.

You will also be offered antenatal classes, including breastfeeding workshops. You need to book antenatal classes in advance, so ask your midwife about when you should book classes in your area.

Objective of Antenatal Care

Antenatal-care refers to care of pregnant women. The main objectives of antenatal-care are:

- Maintenance of health of mother during pregnancy.
- Promote physical, mental and social well being of mother and child.
- Ensure delivery of a full term healthy baby.
- Early detection of high risk cases and minimize risks by taking appropriate management.
- Prevent development of complications through health education, adequate nutrition, exercise, vitamin intake and appropriate medical and pharmaceutical intervention.
- Screening for conditions and diseases such as anemia, STIs, HIV infection, mental health problems, and domestic violence.
- Teach the mother about child care, nutrition, sanitation and hygiene.
- Decrease maternal and infant mortality and morbidity.

- Remove the stress and worries of the mother regarding the delivery process.
- Provide safe delivery for mother and educate mother about the physiology of pregnancy and labor by demonstrations, charts and diagrams so that fear is removed and physiology improved.
- Advice family planning and motivate the couple about the need of family planning.
- Predict possible problems during pregnancy and provide an appropriate treatment.
- Provide information on pregnancy and birth and discuss with the couple about the place, time and mode of the delivery provisionally and care of the newborn.
- Ensure continued medical surveillance and prophylaxis.
- Advice the mother about breast feeding, post natal care and immunization.
- Advice and support to the women and her family for developing healthy home behaviors.

1.3 INITIAL COMPREHENSIVE EVALUATION

Diagnosing Pregnancy

The diagnosis of pregnancy requires a multifaceted approach using 3 main diagnostic tools. These are history and physical examination, laboratory evaluation, and ultrasonography. Currently, physicians may use all of these tools to diagnose pregnancy at early gestation and to help rule out other pathologies.

How can you confirm that a patient is pregnant?

The common symptoms of pregnancy are amenorrhoea (no menstruation), nausea, breast tenderness and urinary frequency. If the history suggests that a patient is pregnant, the diagnosis is easily confirmed by testing the urine with a standard pregnancy test. The test becomes positive by the time the first menstrual period is missed.

A positive pregnancy test is produced by both an intra-uterine and an extra-uterine pregnancy. Therefore, it is important to establish whether the pregnancy is intra-uterine or not.

How do you diagnose an intra-uterine pregnancy?

The characteristics of an intra-uterine pregnancy are:

The size of the uterus is appropriate for the duration of pregnancy.

There is no lower abdominal pain or vaginal bleeding.

There is no tenderness of the lower abdomen.

How do you diagnose an extra-uterine pregnancy?

The characteristics of an extra-uterine (ectopic) pregnancy are:

The uterus is smaller than expected for the duration of pregnancy.

Lower abdominal pain and vaginal bleeding are usually present.

Tenderness over the lower abdomen is usually present.

History and Physical Examination

The diagnosis of pregnancy has traditionally been made based on history and physical examination findings. Important aspects of the menstrual history

must be obtained. The woman should describe her usual menstrual pattern, including date of onset of last menses, duration, flow, and frequency. Items that may confuse the diagnosis of early pregnancy are an atypical last menstrual period, contraceptive use, and a history of irregular menses. Additionally, as many as 25% of women bleed during their first trimester, further complicating the assessment.

Be alert for rising human chorionic gonadotropin (hCG) levels, an empty uterus observed on sonogram, abdominal pain, and vaginal bleeding because these may signal an ectopic pregnancy. Ectopic pregnancies are the primary cause of first trimester maternal mortality and should be diagnosed early, before the pregnancy ruptures or the patient becomes unstable.

Other historical factors related to ectopic pregnancies include prior tubal manipulation, pelvic inflammatory disease, previous ectopic pregnancy, tubal disease, use of an intrauterine device for contraception, fertility therapies, and tubal ligation. See *Ectopic Pregnancy* for a full description and details.

The classic presentation of pregnancy is a woman with menses of regular frequency who presents with amenorrhea, nausea, vomiting, generalized malaise, and breast tenderness.

Upon physical examination, one may find an enlarged uterus after bimanual examination, breast changes, and softening and enlargement of the cervix (Hegar sign; observed at approximately 6 wk). The Chadwick sign is a bluish discoloration of the cervix from venous congestion and can be observed by 8-10 weeks. A gravid uterus may be palpable low in the abdomen if the pregnancy has progressed far enough, usually by 12 weeks. Currently, through the use of chemical assays and ultrasonography, physicians are capable of making the diagnosis of pregnancy before many of the physical signs and symptoms are evident.

What history should be taken?

A full history, containing the following:

1. The previous obstetric history.
2. The present obstetric history.
3. A medical history.
4. HIV status.
5. History of medication and allergies.
6. A surgical history.
7. A family history.
8. The social circumstances of the patient.

What is important in the previous obstetric history?

Establish the number of pregnancies (gravidity), the number of previous pregnancies reaching viability (parity) and the number of miscarriages and ectopic pregnancies that the patient may have had. This information may reveal the following important factors:

Grande multiparity (i.e. five or more pregnancies which have reached viability).

Miscarriages: 3 or more successive first-trimester miscarriages suggest a possible genetic abnormality in the father or mother. A previous midtrimester miscarriage suggests a possible incompetent internal cervical os.

Ectopic pregnancy: ensure that the present pregnancy is intra-uterine.

Multiple pregnancy: non-identical twins tend to recur.

The birth weight, gestational age, and method of delivery of each previous infant as well as of previous perinatal deaths are important.

Previous low-birth-weight infants or spontaneous preterm labours tend to recur.

Previous large infants (4 kg or more) suggest maternal diabetes.

The type of previous delivery is also important: a forceps delivery or vacuum extraction may suggest that a degree of cephalopelvic disproportion had been present. If the patient had a previous Caesarean section, the indication for the Caesarean section must be determined.

The type of incision in the uterus is also important (this information must be obtained from the patient's folder) as only patients with a transverse lower segment incision should be considered for a possible vaginal delivery.

Having had one or more perinatal deaths places the patient at high risk of further perinatal deaths. Therefore, every effort must be made to find out the cause of any previous deaths. If no cause can be found, then the risk of a recurrence of perinatal death is even higher.

Previous complications of pregnancy or labour.

In the antenatal period, e.g. pre-eclampsia, preterm labour, diabetes, and antepartum haemorrhage. Patients who develop pre-eclampsia before 34 weeks gestation have a greater risk of pre-eclampsia in further pregnancies.

First stage of labour, e.g. a long labour.

Second stage of labour, e.g. impacted shoulders.

Third stage of labour, e.g. a retained placenta or a postpartum haemorrhage.

1.4 GESTATIONAL AGE ASSESSMENT

Assessing a baby's physical maturity is an important part of care. Maturity assessment is helpful in meeting a baby's needs if the dates of a pregnancy are uncertain. For example, a very small baby may actually be more mature than it appears by size, and may need different care than a premature baby.

An examination called the Dubowitz/Ballard Examination for Gestational Age is often used. A baby's gestational age often can be closely estimated using this examination. The Dubowitz/Ballard Examination evaluates a baby's appearance, skin texture, motor function, and reflexes. The physical maturity part of the examination is done in the first 2 hours of birth. The neuromuscular maturity examination is completed within 24 hours after delivery.

Gestational age assessment means figuring out the number of weeks of your pregnancy. A full-term pregnancy is usually 40 weeks. It is important to assess if gestational age is uncertain or if your baby is smaller or larger than expected.

Ballard Maturational Assessment

The Ballard Maturational Assessment, Ballard Score, or Ballard Scale is a commonly used technique of gestational age assessment. It assigns a score to various criteria, the sum of all of which is then extrapolated to the gestational age of the fetus. These criteria are divided into Physical and Neurological criteria. This scoring allows for the estimation of age in the range of 26 weeks-44 weeks. The New Ballard Score is an extension of the above to include extremely pre-term babies i.e. up to 20 weeks.

The scoring relies on the intra-uterine changes that the fetus undergoes during its maturation. Whereas the neurological criteria depend mainly upon muscle tone, the physical ones rely on anatomical changes. The neonate (less than 37 weeks of age) is in a state of physiological hypotonia. This tone increases throughout the fetal growth period, meaning a more premature baby would have lesser muscle tone. It was developed in 1979.

The new Ballard score

The new Ballard score is commonly used to determine gestational age. Here's how it works:

- Scores are given for 6 physical and 6 nerve and muscle development (neuromuscular) signs of maturity. The scores for each may range from -1 to 5.
- The scores are added together to determine the baby's gestational age. The total score may range from -10 to 50.
- Premature babies have low scores. Babies born late have high scores.

Physical Maturity

The components of the physical maturity assessment are skin, lanugo, plantar surface, breast, eye/ear, and genitals. Base your scores for these parameters on your assessment findings.

The skin ranges from translucent and friable in preterm newborns to leathery, cracked, and wrinkled in post-term newborns. Assess the skin for transparency, cracks, veins, peeling, and wrinkles.

Lanugo is very fine body hair. Extremely premature newborns have none. During the middle of the third trimester, most fetuses have plentiful lanugo. Closer to term, this body hair begins to thin. Term newborns have very little, and it is nearly absent in post-term newborns.

Inspect the plantar surface of the foot for creases. Term newborns have creases over the entire plantar surface, while the creases of a preterm newborn range from absent to faint red markings.

Inspect the breast to assess the size of the breast bud in millimeters and the development of the areola. Preterm newborns lack developed breast tissue. Term newborns have a raised to a full areola with breast buds that are 3 to 10 millimeters in diameter.

The eye/ear assessment is an analysis of the ear cartilage and shape of the pinna. The pinna is less curved in preterm newborns, while term newborns have a well-curved pinna with firm cartilage. Determine ear recoil by folding the pinna down and assessing how quickly it returns to its previous position. Also, very preterm newborns may have fused eyelids. You'll score the degree of fusion for these newborns.

Observe the genitals for physical maturity. With males, the testes usually descend near term and rugae (ridges or folds) are visible on the scrotum. Palpate the testes to determine if they have descended and note the rugae. With extreme prematurity, the scrotum is flat and smooth. With female newborns at term, the labia majora are larger than the clitoris and the labia minora. Preterm newborns have a prominent clitoris and small labia minora. Base your scores on the degree of development of the labia.

Neuromuscular Maturity Assessed

The neuromuscular assessment includes an exam of the following:

- Posture. How the baby holds his or her arms and legs.
- Square window. How far the baby's hands can be flexed toward the wrist.
- Arm recoil. How well the baby's arms spring back to a flexed position.
- Popliteal angle. How well the baby's knees bend and straighten.
- Scarf sign. How far the elbows can be moved across the baby's chest.
- Heel to ear. How close the baby's feet can be moved to the ears.

Gestational age assessment is an important way to learn about your baby's well-being at birth. By identifying any problems, your baby's healthcare provider can plan the best possible care.

1.5 HEALTH EDUCATION

Health education is any combination of learning experiences designed to help individuals and communities improve their health, by increasing their knowledge or influencing their attitudes. Health education is a type of education designed for individuals or the public at large to gain the knowledge, skills, value, and attitudes necessary to promote, maintain, improve, and restore their, or another person's, health. Let's go over the historical foundation, philosophy, and function of health education in society. Health education is one strategy of health promotion and is focused on helping individuals learn and use health-enhancing skills. Health education is often very visible and tangible (i.e., it's what most health education programs are "known for"), and it may often include educational programs, activities and skill-building group or individual sessions. Health education is part of health promotion, but health promotion is more than health education.

History

The history of organized modern health education goes back just a few decades. However, the entire field of health education and promotion has been around for millennia in one shape or another. The roots of health education lie with the ancient Greeks. These guys were super smart. They were the first people to, at least partially, realize that a person's health was not influenced by some supernatural mumbo jumbo and that things like a person's activities, environment, and diet played a role in diseases. Inasmuch, the ancient Greeks organized concepts related to public health policy, education, and the development of skills related to promoting an individual's and a community's health.

In terms of a contemporary view, health education in its modern form started to come into existence around the 1970s, with the creation of the President's Committee on Health Education. This was created by none other than President Richard Nixon. Thereafter, more important developments began to occur, including the creation of a National Center for Health Education in 1975, as well as the creation of the Department of Education and the modern version of the Department of Health and Human Services around 1980. Thus began the true modern era of health education in the U.S.

Importance of Health Education

Many are the blessings of imparting health education. Health education enables a person to remain physically fit and in proper health.

Health education also teaches about the emotional and mental health of the student. A healthy person is the happiest person in the world.

A healthy person can enjoy life fully. He can carry out his duties in a responsible manner. He is an asset to the family, the society and to the entire nation. He is always full of energy. He lives a long and happy life. A healthy peasant is happier than a monarch without health.

Health education encourages a person to make healthy choices. They are instructed to avoid unhealthy habits. 'A sound mind lives in a sound body'. Rabindranath Tagore and C.V. Raman, if they were confined to sick bed, could not have won the Nobel Prize. In fact, a sickly student with all his talents and abilities lags behind in the race of life.

Health education brings positive changes in the mind of the student. There are high chances that they would never get caught in the deadly habits of smoking, alcoholism, drug addition, etc.

Neglect of the laws of health is the cause of misery. An unhealthy man lives a miserable life. With all his riches, pomp and power he is the poorest of the poor. He can neither enjoy peace of mind nor sound sleep at night. The world has no charm for him.

Through health education, students are encouraged to follow the rules for the preservation of health. Healthy habits should be formed in childhood and youth. We should be moderate in eating and drinking. We should be wise in the choice of plain, wholesome and simple food. Over-eating is worse than no eating. We should get plenty of sleep and get up early in the morning. It is our duty to take regular physical exercise, and to have regular baths for keeping our bodies clean.

Health education is important because health is a great boon to human life. Through health education, students are instructed to adapt the habit of good health and to improve the individual and public health of the country.

1.6 FOLLOW-UP OF ANTENATAL CARE

Historically, the traditional antenatal care service model was developed in the early 1900s. This model assumes that frequent visits and classifying pregnant women into low and high risk by predicting the complications ahead of time, is the best way to care for the mother and the fetus. The traditional approach was replaced by focused antenatal care (FANC) — a goal-oriented antenatal care approach, which was recommended by researchers in 2001 and adopted by the World Health Organization (WHO) in 2002. FANC is the accepted policy in Ethiopia.

FANC aims to promote the health of mothers and their babies through targeted assessments of pregnant women to facilitate:

- Identification and treatment of already established disease
- Early detection of complications and other potential problems that can affect the outcomes of pregnancy
- Prophylaxis and treatment for anaemia, malaria, and sexually transmitted infections (STIs) including HIV, urinary tract infections and tetanus. Prophylaxis refers to an intervention aimed at preventing a disease or disorder from occurring.

FANC also aims to give holistic individualised care to each woman to help maintain the normal progress of her pregnancy through timely guidance and advice on:

- Birth preparedness (described later in this study session),
- Nutrition, immunization, personal hygiene and family planning (Study Session 14)

Counselling on danger symptoms that indicate the pregnant woman should get immediate help from a health professional (Study Session 15).

A woman and her husband discuss postnatal care and future childcare issues

In FANC, health service providers give much emphasis to individualised assessment and the actions needed to make decisions about antenatal care by the provider and the pregnant woman together. As a result, rather than making the traditional frequent antenatal care visits as a routine activity for all, and categorising women based on routine risk indicators, the FANC service providers are guided by each woman's individual situation.

This approach also makes pregnancy care a family responsibility. The health service provider discusses with the woman and her husband the possible complications that she may encounter; they plan together in preparation for the birth, and they discuss postnatal care and future childbirth issues. Pregnant women receive fundamental care at home and in the health institution; complications are detected early by the family and health service provider; and interventions are begun in good time, with better outcomes for the women and their babies.

Basic Principles of Focused Antenatal Care

Antenatal care service providers make a thorough evaluation of the pregnant woman to identify and treat existing obstetric and medical problems.

They administer prophylaxis as indicated, e.g. preventive measures for malaria, anaemia, nutritional deficiencies, sexually transmitted infections, including prevention of mother to child transmission of HIV (PMTCT, see Study Session 16), and tetanus.

With the mother, they decide on where to have the follow-up antenatal visits, how frequent the visits should be, where to give birth and whom to be involved in the pregnancy and postpartum care.

Provided that quality of care is given much emphasis during each visit, and couples are aware of the possible pregnancy risks, the majority of pregnancies progress without complication.

However, no pregnancy is labelled as 'risk-free' till proved otherwise, because most pregnancy-related fatal and non-fatal complications are unpredictable and late pregnancy phenomena.

Pregnant women and their husbands are seen as 'risk identifiers' after receiving counselling on danger symptoms, and they are also 'collaborators' with the health service by accepting and practising your recommendations.

Importance of early attendance

You may be carrying some diseases such as Toxoplasmosis before pregnancy without any visible symptom. In such a case, it is important to identify and treat it early to avoid complications.

The trip to the gynaecologist has other benefits too. Your blood pressure can be checked and your weight can be monitored. Besides, any factors that could influence the baby's development such as nutritional deficiencies (including excessive vomiting), infections and potentially hazardous drug therapy can be detected.

Complications like intra uterine growth retardation can be screened and prevented.

The gynaecologist will also help you plan for the delivery, advice you on the care of the newborn and your future reproductive health.

Examination

The doctor will examine you to record your condition in the initial stage of pregnancy in order to be able to compare it later as the pregnancy grows.

After a general examination, he will check your height as this gives a rough estimate of the size of the pelvis. A woman with an average height of 5 feet and above usually has an adequate pelvis to bear a child.

He will also check your weight and then during each visit to calculate your weight gain. The total average weight gain should be around 10 to 12 kilograms. A low calorie balanced diet is important in pregnancy to watch out for excessive weight gain.

The blood pressure recording during the first visit is used to compare it with subsequent readings. A rise in blood pressure is a bad sign in pregnancy and may indicate complications like pregnancy induced hypertension. Early detection of hypertension can prevent further complications leading to fits in pregnancy which may lead to intra uterine foetal and maternal death.

He then checks your pulse rate and lungs, and then your abdomen to assess the growth of the baby, its position, the condition of the scar left by any previous operation, any abdominal hernia and the foetal heart rate.

Vaginal Examination During Pregnancy

Earlier, the gynaecologist used to do a routine checkup of the vagina for the following reasons:

To confirm the pregnancy.

- To confirm that the size of uterus corresponds to the period of pregnancy.
- To exclude the presence of any tumours or other abnormalities in the pelvis.
- To diagnose any infections in the vagina or cervix.
- To diagnose the presence of any ulcer or erosion in the cervix (mouth of the uterus).
- To take a routine cervical smear to rule out any disease.
- To assess the size of the pelvic cavity. Nowadays a vaginal checkup is considered an intrusion and an ultrasound is used instead to keep abreast of the foetal growth. However, a vaginal examination cannot be avoided at the end of the 36th week of pregnancy.
- Since it confirms the presentation of the baby.
- It helps the doctor to assess the condition of the cervix.
- It gives a fair idea of the pelvis in comparison to the presenting part of the baby.

Investigations

Few investigations are done during the first antenatal visit and then at intervals throughout pregnancy to ensure that it is proceeding normally. The following blood tests are of vital importance during pregnancy:

Haemoglobin estimation: The normal haemoglobin level in pregnancy is 11 grams to 13 grams (lower than the non pregnant woman) and any value less than 11 grams is considered anaemic.

Blood grouping: There are four major blood groups – A, B, AB or O. The knowledge about your blood group is important as an incompatible mother and baby could bring about complications.

Rhesus factor and antibodies: The rhesus compatibility of the mother and child is equally important. If she is rhesus negative, the doctor will recommend several tests to check for antibodies and suggest precautions that need to be taken during labour.

Rubella and other viral illnesses: A blood test will confirm whether you have had German measles (Rubella). Other virus tests include Toxoplasmosis, Cytomegalovirus, Herpes Simplex.

Hepatitis: Tests for Hepatitis antigen is equally important.

HIV (AIDS virus): Tests for the HIV virus is done with the patient's consent.

Other blood tests include blood sugar test and V.D.R.L. test (test for sexually transmitted disease like Syphilis).

A routine examination of urine will provide information about any infection, presence of protein or sugar in urine.

Supplements

You will be prescribed a dose of folic acid everyday for the first three months of pregnancy. This meant to aid the proper development of the baby's nervous system and to prevent a particular type of anaemia which occurs during pregnancy. To prevent anaemia, the doctor will recommend an iron supplement from the fourth month of pregnancy and ask you to continue it even after delivery when you will be feeding the baby. Besides iron, you will have to take some calcium and multivitamin supplements too since most women do not pay much attention to their diet.

Subsequent Tests

Your blood will be tested to check haemoglobin levels at regular intervals. The doctor will do a second ultrasound scan in the 16th week to exclude any congenital anomaly of the baby and to also confirm the duration of pregnancy and growth of the baby. The third ultrasound scan will be around the 38th week to see the growth of the baby, position of the baby (normally it is head down position), condition of the placenta and position of the umbilical cord.

Immunisation

You will be given two doses of tetanus toxoid during the sixth and seventh months. If you have conceived within three years of your previous delivery, a single dose is enough.

1.7 DRUG PRESCRIPTION DURING PREGNANCY

A prescription medicine is medicine a health care provider says you can take to treat a health condition. You need a prescription (an order from your provider) to get the medicine. Many pregnant women (about 7 in 10 or 70 percent) take at least one prescription drug during pregnancy. For example, they may need a medicine to treat a long-term health condition, like diabetes or high blood pressure. But not all prescription medicine is safe to use during pregnancy. If you're pregnant, check with your health care provider before you take any kind of medicine to make sure it's safe for you and your baby.

During pregnancy, it's very important to know which medications, both OTC and prescription, are safe. Women with chronic conditions such as epilepsy

or MS should discuss this with their doctors prior to becoming pregnant if possible. Even vitamins and supplements should be evaluated by your doctor to be sure they are safe for your baby. Follow the links below to find WebMD's comprehensive coverage about how drugs and medications can affect mother and baby during pregnancy.

Doctors usually tell women to avoid medicines during pregnancy, if possible, especially during the first 3 months. That is when a baby's organs form. But sometimes you have to take medicine to treat a health problem, such as high blood pressure or asthma.

So first your doctor or midwife will look at the risk. Is the risk of taking a medicine higher than the risk of not treating your illness? If you or your baby would face worse problems without treatment, then your doctor or midwife will prescribe medicine or recommend an over-the-counter one. He or she will also look at which medicine to give you. For example, some antibiotics are safe for pregnant women. And some are not.

In general, doctors say it is usually safe to take:

- Acetaminophen (such as Tylenol) for fever and pain.
- Penicillin and some other antibiotics.
- HIV medicines.
- Some allergy medicines, including loratadine (such as Alavert and Claritin) and diphenhydramine (such as Benadryl).
- Some over-the-counter cold medicines.
- Some medicines for high blood pressure.
- Most asthma medicines.
- Some medicines for depression.

Some of the medicines that increase the chances of birth defects are:

- The acne medicine isotretinoin (such as Amnesteem and Claravis). This medicine is very likely to cause birth defects. It should not be taken by women who are pregnant or who may become pregnant.
- ACE inhibitors, such as benazepril and lisinopril. They lower blood pressure.
- Some medicines to control seizures, such as valproic acid.
- Some antibiotics, such as doxycycline and tetracycline.
- Methotrexate. It is sometimes used to treat arthritis.
- Warfarin (such as Coumadin). It helps prevent blood clots.
- Lithium. It is used to treat bipolar depression.
- Alprazolam (such as Xanax), diazepam (such as Valium), and some other medicines used to treat anxiety.
- Paroxetine (such as Paxil). This medicine is used to treat depression and other conditions.
- Over-the-counter pain medicines like aspirin and ibuprofen (such as Advil and Motrin) and naproxen (such as Aleve). The risk of birth defects with these medicines is low.

Teratogenic

A teratogenic substance, or teratogen, are chemicals that affects the normal growth and development of a fetus. These abnormalities or malformation can even affect the viability of the pregnancy. It does not only apply to pharmaceutical drugs. Any substance that is dangerous to the fetus falls into this category, including alcohol, tobacco, illicit substances (street drugs), herbal medicines and certain nutritional substances. Some pesticides and certain food additives are also potentially teratogenic substances.

Teratogenic agents can also include certain infectious agents like viruses that can affect the fetus, physical factors like abnormal shape or size of the uterus that may impede fetal growth, and electromagnetic waves like ionizing radiation. However, in terms of teratogenic substances it specifically refers to chemicals. The focus of this article is on pharmaceutical drugs which are potential teratogens. Some are well known as potential teratogens, others have not been conclusively identified as such.

Guidelines

Although some medicines are considered safe during pregnancy, the effects of other medicines on your unborn baby are unknown. Certain medicines can be most harmful to a developing baby when taken during the first three months of pregnancy, often before a woman even knows she is pregnant.

Illegal drugs

Street drugs are not good for your health, but they are even worse for your unborn baby's health, since drugs are passed to your baby while you are pregnant. Illegal drugs such as angel dust, cocaine, crack, heroin, LSD, marijuana, and speed increase the chance that your baby is born with addictions or serious health problems, or is born prematurely or underweight at birth. If you have been thinking about quitting drugs, now is the time to do it.

Let your health care provider (e.g., physician, pharmacist) know if you have ever used illegal drugs or if you have an addiction to any drugs so he or she can minimize the risk to your baby. You may also call 1.800.662.4357 (National Drug and Alcohol Treatment Referral Service) for more information.

Prescription medicine guidelines

If you were taking prescription medicines before you became pregnant, please ask your health care provider about the safety of continuing these medicines as soon as you find out that you are pregnant.

Your health care provider will weigh the benefit to you and the risk to your baby when making his or her recommendation about a particular medicine. With some medicines, the risk of not taking them might be more serious than the potential risk associated with taking them.

For example, if you have a urinary tract infection, your health care provider might prescribe an antibiotic. If the urinary tract infection is not treated, it could cause long-term problems for both the mother and her baby.

If you are prescribed any new medicine, please inform your health care provider that you are pregnant. Be sure to discuss the risks and benefits of the newly prescribed medicine with your health care provider.

Non-prescription (over-the-counter) medicine guidelines

Prenatal vitamins, now available without a prescription, are safe and recommended to take during pregnancy. Ask your health care provider about the safety of taking other vitamins, herbal remedies, and supplements during pregnancy. Most herbal preparations and supplements have not been proven to be safe when taken during pregnancy. Generally, you should not take any over-the-counter medicine unless it is necessary.

The following medicines and home remedies have no known harmful effects during pregnancy when taken according to the package directions. If you want to know about the safety of any other medicine not listed here, please contact your health care provider.

2

Maternal Nutrition on Pregnancy & Lactation

STRUCTURE

- 2.1 Introduction
 - 2.2 Nutrition During Pregnancy
 - 2.3 Nutritional Status outcome of Pregnancy
 - 2.4 Pregnancy in adolescence
 - 2.5 Effect of Food Supplementation During Pregnancy
 - 2.6 Nutrition during Lactation
 - 2.7 Nutrition and Health Consequences of Conception during Lactation
 - 2.8 Contraception and Nutrition
 - 2.9 Nutrition-infection interactions
 - 2.10 Problem of Overeating and Obesity Prevention
 - 2.11 Management of Micronutrient Deficiencies
-

LEARNING OBJECTIVES

- ❖ Understanding to maternal nutrition on pregnancy & lactation.
 - ❖ Know about nutritional requirements during pregnancy.
 - ❖ Know about nutritional status outcome of pregnancy.
 - ❖ Know about physical work and nutritional status.
 - ❖ Know about nutrition and health consequences of adolescent pregnancies.
 - ❖ Know about effect of food supplementation during pregnancy
 - ❖ Know about nutrition during lactation
 - ❖ Know about nutrition and health consequences of conception during lactation.
 - ❖ Know about nutrition-infection interaction.
 - ❖ Know about emerging problem of overeating and obesity during pregnancy.
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2.1 INTRODUCTION

Pregnancy is a demanding physiological state. In India, it is observed that diets of women from the low socioeconomic groups are essentially similar

during prepregnant, pregnant and lactating periods. Consequently, there is widespread maternal malnutrition leading to high prevalence of low birth weight infants and very high maternal mortality. Additional foods are required to improve weight gain in pregnancy (10-12 Kg) and birth weight of infants (about 3 Kg). It is hence important to ensure provision of extra food and healthcare to pregnant and lactating women.

2.2 NUTRITION DURING PREGNANCY

Determination of nutrient needs during pregnancy is complicated because nutrient levels in tissues and fluids available for evaluation and interpretation

Nutrient	Dietary Reference Intakes (DRI) ¹			Calculated cumulative expenditure (9 mo)			Percentage increase over nonreproducing adult women	
	Adult women	Pregnancy	Lactation	Adult women	Pregnancy	Lactation	Pregnancy %	Lactation %
Energy, ² kJ/50 y	19-2340	2500	variable	75,000-	128,000	?	?	?
	kcal/d	2nd trimester	kcal/d 0-8 mo	80,000				
		2400						
		2452	kcal/d 7-9 mo					
		kcal/d 3rd trimester						
Protein, ³ g	46	71	71	12,420	19,170	19,170	54.35	54.35
Vitamin C, ⁴ mg	75	85	120	20,250	22,950	32,400	13.33	60.00
Thiamin, ⁵ mg	1.1	1.4	1.4	297	378	378	27.27	27.27
Riboflavin, ⁵ mg	1.1	1.4	1.6	297	378	432	27.27	48.48
Niacin, ⁵ mg NE	14	18	17	3,780	4,880	4,890	28.87	21.43
Vitamin B ₆ , ⁶ mg	1.3	1.9	2	351	513	540	46.16	53.88
Folate, ⁷ µg DFE	400	600	800	108,000	162,000	138,000	50.00	28.00
Vitamin B ₁₂ , ⁸ µg	2.4	2.6	2.8	648	702	766	8.33	18.67
Pantothenic acid, ⁹ mg	5	6	7	1,350	1,620	1,880	20.00	40.00
Biotin, ¹⁰ µg	30	30	35	8,100	8,100	9,480	0.00	16.67
Choline, ¹¹ µg	425	450	550	114,750	121,800	148,800	5.88	29.41
Vitamin A, ¹² µg RAE	700	770	1300	189,000	207,000	351,000	10.00	85.71
Vitamin D, ¹³ µg	5	5	5	1,350	1,350	1,350	0.00	0.00
Vitamin E, ¹⁴ mg α-TG	15	15	19	4,050	4,050	5,130	0.00	26.67
Vitamin K, ¹⁵ µg	90	90	90	24,300	24,300	24,300	0.00	0.00
Calcium, ¹⁶ mg	1000	1000	1000	270,000	270,000	270,000	0.00	0.00
Phosphorus, ¹⁷ mg	700	700	700	189,000	189,000	189,000	0.00	0.00
Magnesium, ¹⁸ mg	310	350	310	63,700	84,500	83,700	12.80	0.00
Iron, ¹⁹ mg	16	27	9	4,860	7,290	2,430	60.00	-50.00
Zinc, ²⁰ mg	8	11	12	2,160	2,970	3,240	37.50	50.00
Iodine, ²¹ µg	150	220	200	40,500	59,400	78,300	46.67	93.33
Selenium, ²² µg	55	60	70	14,860	16,200	18,900	9.09	27.27
Fluoride, ²³ mg	3	3	3	810	810	810	0.00	0.00

are normally altered by hormone-induced changes in metabolism, shifts in plasma volume and changes in renal function and patterns of urinary excretion. Nutrient concentrations in blood and plasma are often decreased because of expanding plasma volume, although total circulating quantities can be greatly increased. Individual profiles vary widely, but in general, water-soluble nutrients and metabolites are present in lower concentrations in pregnant than in nonpregnant women whereas fat-soluble nutrients and metabolites are present in similar or higher concentrations. Homeostatic control mechanisms are not well understood and abnormal alterations are ill-defined.

1. Values are from the Institute of Medicine (9–13).
2. Calculations are based on recommended intakes per day, assuming 9 months is equivalent to 270. Abbreviations NE, niacin equivalents; DFE, dietary folate equivalents; RE, retinol equivalents; TE, tocopherol equivalents.
3. and 4 are, respectively, Recommended Dietary Allowance (RDA), the average daily dietary intake level that is sufficient to meet the nutrient requirements of nearly all (97 to 98 percent) individuals in a life stage and gender group and based on the Estimated Average Requirement (EAR); and Adequate Intake (AI), the value used instead of an RDA if sufficient scientific evidence is not available to calculate an EAR.

Dietary Reference Intakes for pregnant and lactating women in comparison with those of adult, nonreproducing women are presented in Table. Also presented in Table are comparative cumulative energy and nutrient expenditures of adult, pregnant and lactating women. The recommended intakes for pregnant adolescents generally would be increased by an amount proportional to the incomplete maternal growth at conception. The percentage increase in estimated energy requirement is small relative to the estimated increased need for most other nutrients. Accordingly, pregnant women must select foods with enhanced nutrient density or risk nutritional inadequacy.

According to ACOG, you and your baby need these key nutrients for a healthy pregnancy:

- Calcium: Helps to build strong bones and teeth. Main sources include milk, cheese, yogurt, and sardines. During pregnancy you need 1,000 milligrams (mg) daily.
- Iron: Helps red blood cells deliver oxygen to your baby. Sources include lean red meat, dried beans, peas, and iron-fortified cereals. During pregnancy you need 27 mg daily.
- Vitamin A: You need this vitamin for healthy skin, eyesight, and bone growth. Carrots, dark, leafy greens, and sweet potatoes are good sources. During pregnancy you need 770 micrograms daily.
- Vitamin C: Promotes healthy gums, teeth, and bones, and helps your body absorb iron. Good sources include citrus fruit, broccoli, tomatoes, and strawberries. During pregnancy you need 85 mg daily.
- Vitamin D: Aids your body in the absorption of calcium to help build your baby's bones and teeth. Sources include exposure to sunlight, fortified milk, and fatty fish, such as salmon. During pregnancy you need 600 international units (IUs) daily.
- Vitamin B6: Helps form red blood cells and helps your body use protein, fat, and carbohydrates. You can find vitamin B6 in beef, liver, pork, whole-grain cereals, and bananas. During pregnancy you need 1.9 mg daily.
- Vitamin B12: Helps form red blood cells and maintains your nervous system. You can find this vitamin only in animal products. Good sources

include liver, meat, fish, poultry, and milk. During pregnancy you need 2.6 micrograms daily.

- Folate (Folic Acid): A B vitamin important in the production of blood and protein, it also reduces the risk of neural tube defects (a birth defect of the brain and spinal cord). You can find folate in green, leafy vegetables, liver, orange juice, legumes (beans, peas, lentils), and nuts.

Just because you are eating for two doesn't mean you should eat twice the amount of food. If you are a healthy weight before your pregnancy, you only need to eat an average of about 300 extra calories a day.

Recent recommendations by the Institute of Medicine for pregnancy weight gain begin your pre-pregnancy body mass index (BMI).

BMI category	Weight gain goal: single	Weight gain goal: twins
BMI < 18.5: underweight	28-40 lbs	Not enough data
BMI: 18.5-24.9: healthy weight	25-35 lbs	37-54 lbs
BMI: 25-29.9: overweight	15-25 lbs	31-50 lbs
BMI: >30: obese	11-20 lbs	25-42 lbs

Adapted from IOM guidelines, 2009

Multiple Births: If you are expecting more than one baby, you should discuss what and how much to eat with your health care provider. Your nutrient and calorie needs are higher than those of women carrying one baby.

Prenatal Vitamins: Vitamin and mineral supplements cannot replace a healthy diet. Most doctors recommend that pregnant women take a prenatal vitamin and mineral supplement every day in addition to eating a healthy diet.

Taking a supplement ensures that you and your baby get enough important nutrients like folic acid and iron. But don't overdo it — taking too much can be harmful for you and your baby.

Alcohol, Caffeine, and Fish: Pregnant women and women who may become pregnant should not drink alcohol. Drinks containing alcohol include beer, wine, liquor, mixed drinks, and malt beverages.

Even moderate drinking during pregnancy can cause behavioral or developmental problems for a baby. Heavy drinking during pregnancy can result in serious problems for the baby, including malformation and mental retardation.

While it's unclear whether or not high caffeine intake leads to miscarriage, it appears moderate caffeine intake (about two 8-ounce cups of coffee) does not.

Still, it's probably a good idea to limit caffeine in your diet during your pregnancy. Too much caffeine can interfere with sleep, contribute to nausea, and lead to dehydration. Fish can be a great source of protein, omega-3 fatty acids, and other healthy nutrients. But pregnant women should take care to avoid certain kinds of fish because they contain high levels of mercury, which can harm a growing baby. Fish you should avoid include shark, swordfish, king mackerel, and tilefish.

Dietary Intake

It is important to choose a wide variety of healthy foods to make sure that the nutritional needs of both mother and baby are met.

You can eat well during pregnancy by:

- enjoying a variety of fruits and vegetables of different types and colours
- increasing your intake of grain and cereal foods to 8-8½ serves a day. Choose mostly wholegrain and high fibre options
- choosing foods that are high in iron, such as lean red meat or tofu. Iron-rich foods are important for pregnant women
- making a habit of drinking milk, and eating hard cheese and yoghurt, or calcium-enriched alternatives. Reduced-fat varieties are best
- drinking plenty of water (fluid needs are about 750 to 1,000 ml extra per day)

Foods and drinks that are high in saturated fat, added sugar and salt are not a necessary part of a healthy diet and should be limited.

The table below outlines the number of serves of foods from each food group that pregnant women need to make sure they have enough energy and nutrients for themselves and for the growing baby.

Food group	Serves required during pregnancy	Examples of one standard serve
Vegetables and legumes/beans	18 years or under: 5 19–50 years: 5	½ cup cooked vegetables ½ cup cooked or canned* beans, peas or lentils 1 cup green leafy or raw salad vegetables ½ cup cooked vegetables ½ cup sweet corn ½ medium potato or other starchy vegetables 1 medium tomato
Fruit	18 years or under: 2 19–50 years: 2	1 medium fruit, such as apple, banana, orange 2 small fruits, such as apricots, kiwi fruits or plums 1 cup diced or canned fruit (no added sugar) Or only occasionally 125ml (½ cup) fruit juice (no added sugar) 30g dried fruit (such as 4 apricot halves, 1 ½ tablespoons sultanas)
Grain (cereal) foods, mostly wholegrain and	18 years or under: 8 19–50 years: 8½	1 slice bread, ½ medium roll or flat bread (40 g) ½ cup cooked rice, pasta, noodles, barley, buckwheat, semolina,

Food group	Serves required during pregnancy	Examples of one standard serve
Lean meats and poultry, fish, eggs, tofu, nuts and seeds and legumes/beans	18 years or under: 3 ½ 19–50 years: 3 ½	polenta, burghul or quinoa /or high-fibre varieties ½ cup cooked porridge, 2 3 cup wheat cereal flakes, ¼ cup muesli 3 crispbreads 1 crumpet, small English muffin or scone 65 g cooked lean meats, such as beef, lamb, veal, pork, goat or kangaroo (90–100 g raw) 80 g cooked lean poultry, such as chicken, turkey (100 g raw) 100 g cooked fish fillet (115 g raw) or one small can of fish 2 large eggs 1 cup cooked or canned* legumes/beans, such as lentils, chickpeas or split peas 170 g tofu 30 g nuts or seeds, nut seed paste*
Milk, yoghurt, cheese and/or alternatives, mostly reduced fat	18 years or under: 3 ½ 19–50 years: 2 ½	1 cup (250 ml) fresh, UHT long life, reconstituted powdered milk or buttermilk ½ cup (120 ml) evaporated milk 2 slices (40 g) hard cheese, such as cheddar ¾ cup (200 g) yoghurt 1 cup (250 ml) soy, rice or other cereal drink, with at least 100 mg of added calcium per 100 ml

*Canned foods should preferably be with no added salt.

No need to eat for two

During pregnancy, both you and your growing baby need extra nutrients, so eating healthy foods from the five food groups is important. During the first trimester, a woman's energy (kilojoule, kJ) intake should remain about the same as it was prior to the pregnancy, which means that extra food is not required.

During the second and third trimester, the energy needs of pregnant women increase. To meet energy and nutrient needs during this time, pregnant women are recommended to increase their intake of grain foods (an extra 2 ½ serves per day), and lean meats and alternatives (one extra serve per day).

Some suggestions to help you meet these additional energy needs include:

- a wholegrain sandwich with fillings such as roast beef, hard-boiled egg, tinned fish (see recommendations about fish below), hummus
- a small bowl of pasta with meat or bean sauce
- a small bowl of stir-fried rice with tofu.

2.3 NUTRITIONAL STATUS OUTCOME OF PREGNANCY

Nutrition plays a major role in maternal and child health. Poor maternal nutritional status has been related to adverse birth outcomes; however, the association between maternal nutrition and birth outcome is complex and is influenced by many biologic, socioeconomic, and demographic factors, which vary widely in different populations. Understanding the relation between maternal nutrition and birth outcomes may provide a basis for developing nutritional interventions that will improve birth outcomes and long-term quality of life and reduce mortality, morbidity, and health-care costs. There are a range of adverse health effects associated with maternal under-nutrition. It can affect both the pregnant woman and developing baby in the short and long-term.

Under-nutrition can be classified as either:

- malnutrition; or
- micronutrient deficiency.

Malnutrition occurs when an individual consistently consumes less energy (measured in calories and obtained from proteins and carbohydrates) than they expend. Malnutrition results in the individual being underweight and experiencing greater ill-health.

Micronutrient deficiency is a condition which occurs when an individual consumes enough food overall, but does not consume enough of the specific micronutrients they need to maintain the growth and function of specific body parts and systems. For example, calcium deficiency can affect the growth of bones and teeth.

Health Risks Associated with Malnutrition before Pregnancy

Under-nutrition during pregnancy A woman's nutritional status at the time she becomes pregnant influences her health during pregnancy and the health of her baby. It is determined largely by her nutritional intake before pregnancy. If a woman is under-nourished prior to conception because she does not eat enough, she may be malnourished and underweight at the time she conceives. This will have an ongoing effect on her nutritional status throughout the pregnancy. Her nutritional status at the time she becomes pregnant is also an important factor influencing the health of the foetus, as well as the long term health of the infant.

Health Risks for the Mother

Women who are under-nourished (have a BMI of $<18.5\text{kg/m}^2$) at the time of conception are unlikely to improve their nutritional status during pregnancy, when their bodies have additional demands due to the growing baby. They may fail to gain sufficient weight during pregnancy and have a higher risk of maternal mortality (dying whilst pregnant) than normal weight women.

Health Risks for the Foetus and Newborn Baby

Under-nourished women may also lack the nutritional stores required to support embryo growth. Embryo refers to a fertilised egg, before it begins to take on human characteristics (at which stage it is referred to as a foetus). In the first few days after conception the embryo exists in the woman's womb but has not yet implanted into the lining of the womb where it will grow throughout the pregnancy. This is known as the pre-implantation period and is the period of pregnancy in which cells divide and replicate most rapidly. Maternal malnutrition can adversely affect the division and replication of cells in the embryo at this stage, impairing its development. Impaired embryo development in turn adversely effects the development of the foetus in the later stages of pregnancy.

A woman's nutritional status at the time she becomes pregnant also influences the differentiation of cells in the embryo into foetal and placental cells. When the embryo implants into the wall of a woman's uterus, it develops two types of cells, those that will become the foetus and those which will become the placenta (the structure which nourishes and supports the foetus during pregnancy). In undernourished women, a greater number of cells are likely to form the placenta compared to the foetus, meaning that the foetus begins its life smaller than it should do. This can lead to restricted foetal growth and increases the risk of the baby being born at a low-birth weight ($<2.5\text{kg}$). Low birth weight is in turn associated with a range of adverse outcomes in childhood and later in life.

Foetus

Foetal development is also affected by maternal nutritional status before pregnancy. It is during the first five weeks of pregnancy when the foetus develops most of its organs (e.g. heart, brain, lungs). At this stage the foetus is most vulnerable to the mother's malnutrition. Nutritional deficiencies at this time may retard the growth of the foetus's organs. As the woman is usually unaware she is pregnant at this early stage, she can only ensure she is well nourished by eating properly before she becomes pregnant.

Health Risks for the Child in the Long Term

When a foetus is malnourished in the early (and later) stages of pregnancy it may also have a lifelong programming effect which predisposes the baby to chronic health conditions later in life. For example, the foetus may adapt its metabolism to cope with malnutrition by reducing the amount of insulin and glucose produced. Such adaptation has been shown to permanently program the metabolic system and increase the risk of chronic health conditions later in life such as type 2 diabetes.

Health Risks Associated with Micronutrient Deficiency before Pregnancy

Micronutrient status at the time of conception is also determined by historic nutrient consumption, and deficiency in one or more micronutrients can detrimentally affect the health of the mother and her baby.

Health Risks for the Mother

Under-nutrition before pregnancy Women who experience deficiencies in specific micronutrients before pregnancy have an increased risk of the following health conditions:

Iron-deficiency – is a common cause of anaemia which is thought to affect up to 20% of pregnant women in industrialised countries. Anaemia often develops during pregnancy as a result of long-term under-consumption of iron. Anaemia in turn increases the risk of:

- Maternal morbidity and mortality (illness or death during pregnancy) for example women with anaemia have an increased risk of death from bleeding during childbirth;
- Preterm birth;
- Neurological dysfunction;
- Vitamin A deficiency – is associated with night-blindness (difficulty seeing at night) in pregnancy (although this is mainly a problem in developing countries). Night-blindness is influenced both by the availability of vitamin A stores in the liver (which develop through pre-pregnancy consumption) and vitamin A consumption during pregnancy;
- Increased risk of micronutrient deficiency during pregnancy – women who have micronutrient deficiencies when they become pregnant are unlikely to improve their micronutrient status during pregnancy. They are therefore more likely to experience a range of health complications which are associated with micronutrient deficiency during pregnancy.

Foetal and Neontatal Health Risk

Maternal deficiency in particular micronutrients can also affect the development and health of the foetus. For example:

Folate deficiency in early pregnancy is associated with deficits in the development of the neural tube (the tube from which the brain and spinal cord develop) which may result in conditions such as spina bifida. Folate status in early pregnancy depends on preconception nutrition;

Calcium deficiency which restricts foetal skeletal development may occur if a woman does not have adequate calcium stores in her bones (developed through long-term calcium consumption), from which the foetus can receive this important micronutrient; and

Iron deficiency which causes maternal anaemia is associated with intrauterine growth retardation (restricted foetal growth) and low birth weight. Iron deficiency can also affect the absorption of folate. As folate absorption is most critical in the early stages of pregnancy, ensuring adequate preconception iron status is also important.

Health Risks for the Child in the Long-Term

The effects of pre-pregnancy micronutrient deficiency may be long term. For example, neural tube defects often cause life long health conditions such as spina bifida. Those born at low birth weight have an increased risk of impaired physical and mental development. They may grow shorter than and have more learning difficulties than babies born at a healthy weight (=2.5kg).

Health Risks Associated with Malnutrition During Pregnancy

Health Risks for the Mother

Pregnant women who receive inadequate nutrition experience greater maternal morbidity (are more likely to be ill whilst pregnant) and have a higher risk of poor pregnancy outcomes (e.g. premature birth, miscarriage). They also have an increased risk of developing the following conditions:

- Anaemia;
- Infection;
- Lethargy and weakness;
- Lower productivity.

Health Risks for the Foetus and Newborn Baby

Under-nutrition during pregnancy Under-nutrition in pregnant women is associated with a range of detrimental effects to the developing foetus, including intrauterine growth retardation (under-growth) and low-birth weight. Maternal under-nutrition during pregnancy, IUGR and low birth weight are in turn associated with a range adverse outcomes for the developing foetus and/or newborn baby, including an increased risk of:

- Premature birth;
- Perinatal mortality (death of the infant within seven days of birth) – infants who weigh <2.5kg are 5-30 times more likely to die within the first seven days of life compared to normal weight infants ($\geq 2.5\text{kg}$). Infants who weigh $<1.5\text{kg}$ have a 70-100 times increased risk of dying within seven days of birth;
- Infant neurological, intestinal, respiratory and circulatory disorders;
- Birth defects;
- Underdevelopment of some organs;
- Cretinism (a congenital condition affecting the thyroid gland which results in lack of coordination, dull facial expression and dry skin);
- Brain damage.

Health Risks for the Child in the LongTerm

As mentioned above, maternal under-nutrition causes metabolic and other changes in the foetus, which program its metabolic responses following birth. For example, a foetus that is malnourished adapts by reducing insulin and glucose production. This is thought to program and permanently alter the individual's glucose and insulin metabolism throughout their life and increase the risk of chronic nutritional disorders including type 2 diabetes mellitus, metabolic syndrome and obesity. For example, one study showed that the lower the birth weight of an infant, the higher the risk of developing type 2 diabetes. Men who were born at a very low weight were seven times more likely to develop diabetes compared to men born at a high weight.

Under-nutrition during pregnancy However, the effects of maternal under-nutrition vary depending on the stage of pregnancy at which under-nutrition is experienced. For example, one study reported that exposure to maternal malnutrition in the first trimester of pregnancy was associated with an increased risk of obesity and coronary heart disease, while malnutrition in the second or third trimester was associated with poor glucose metabolism.

The offspring of women who experienced under-nutrition during pregnancy have an increased risk of developing:

Metabolic disorders including:

- Type 2 diabetes mellitus;
- Dyslipidaemia (abnormal concentration of lipids in the blood);
- Glucose intolerance (a pre-diabetes condition in which the body is unable to metabolise glucose normally);
- Impaired energy homeostasis (when the body does not function as it should to regulate its energy levels);
- Obesity;
- Mitochondrial dysfunction (dysfunction of the mitochondria, which is found in the cell nucleus and provides the cell energy);
- Oxidative stress (a state in which the body has too many reactive molecules which can cause cell damage);
- Ageing;
- Cardiovascular disorders including:
 - Hypertension;
 - Atherosclerosis (narrowing of the blood vessels);
 - Stroke; and
 - Coronary heart disease;
 - Osteoporosis;
 - Breast cancer;
 - Chronic obstructive lung disease;
 - Chronic kidney failure;
 - Polycystic ovarian syndrome;
 - Psychiatric disorders including schizophrenia;
 - Organ dysfunction or abnormal development of organs including the testes, ovaries, brain, heart, liver, small intestine and mammary gland;
 - Reduced adolescent health, especially for females;
 - Reduced health during adulthood;
 - Infectious disease.

Under-nutrition during pregnancy Individuals who are born at a low weight have a greater risk of poor development outcomes during infancy and childhood. The mother's nutritional intake before, during and after pregnancy influences their child's immediate and long-term mental development and performance.

The greatest brain growth occurs between the 3 months before birth and 2 years of age. It is at these stages that the development of the brain's nerve system and the connection between nerves is at its peak and so the brain requires the most energy to maintain its growth. The nerve system made during this time impacts the way the brain is structurally and functionally organised (cortical organisation) throughout life.

Poor foetal development has been associated with the following adverse health and development outcomes later in life:

- Poor performance at school, learning and developing skills;
- Reduced ability to perform physical work; and
- Reduced economic productivity.

Health Risks Associated with Micronutrient Deficiency During Pregnancy

There are also numerous maternal and foetal health risks associated with micronutrient deficiency during pregnancy, that is, deficiency in particular micronutrients such as folate, and vitamin B12.

Health Risks for the Mother

Under-nutrition during pregnancy Maternal health risks which may arise as a result of deficiency in particular micronutrients include:

- Vitamin B12 deficiency is associated with the following risks for pregnant women:
- Anaemia and its symptoms;
- Neurological complications;
- Vitamin K deficiency is associated with blood clotting disorders, including increased clotting time which presents particular risks during delivery when women lose substantial amounts of blood, even when blood clotting functions normally;
- Iron deficiency during pregnancy is associated with iron deficiency anaemia;
- Iodine deficiency is associated with poor pregnancy outcomes including:
- Miscarriage;
- Stillbirth;

Zinc deficiency is associated with:

- Pre-eclampsia (high blood pressure and urinary protein concentrations during pregnancy);
- Premature rupture of membranes (when a woman's amniotic sac or pregnancy waters break before she experiences contractions); and
- Preterm delivery.
- Magnesium deficiency increases the risk of:
- Pre-eclampsia;
- Pre-term delivery.

Health Risks for the Baby

A woman's deficiency in particular micronutrients whilst she is pregnant has detrimental effects on particular aspects of foetal development.

Under-nutrition during pregnancy Foetal health risks which arise as a result of deficiency on particular micronutrients include:

- Maternal vitamin D deficiency is associated with foetal rickets (a condition which weakens the bones);
- Maternal folate deficiency is associated with an increased risk of neural tube defects in the infant;
- Maternal iodine deficiency is associated with the following complications in the infant:
- Congenital abnormalities;
- Increased risk of infant mortality;
- Neurological cretinism (a congenital condition of poor thyroid hormone secretion which impairs cognitive development);
- Mental deficiency;
- Spastic diplegia (spastic paralysis of the limbs) and squint;
- Myxoedematous cretinism (a type of cretinism in which physical development is impaired) and dwarfism (very short stature);
- Psychomotor effect (affected movement).

Maternal zinc deficiency is associated with:

- Foetal growth retardation;
- Congenital abnormalities.

6.4 PREGNANCY IN ADOLESCENCE

Pregnant adolescents need more of some nutrients than adult women, because they are still growing themselves. Adolescents may give birth to smaller infants, because they are competing with the growing foetus for nutrients.

It is important for pregnant adolescents to make sure they are getting enough iron. Calcium intake is also important, because young women have not yet reached their peak bone mass, and inadequate calcium intake may increase the risk of osteoporosis developing later in life.

Pregnant adolescents should eat around 3½ serves of milk, yoghurt, cheese or calcium-fortified alternatives each day to make sure they are meeting their calcium needs.

Risks

Infants born to teenage mothers are at increased risk for a number of health risks, including the following:

Teenage mothers are less likely to gain adequate weight during their pregnancy, leading to low birthweight. Low birthweight is associated with several infant and childhood disorders and a higher rate of infant mortality. Low-birthweight babies are more likely to have organs that are not fully developed, which can result in complications, such as bleeding in the brain, respiratory distress syndrome, and intestinal problems.

Teenage mothers have a higher rate of poor eating habits than older women and are less likely to take recommended daily prenatal multivitamins to maintain adequate nutrition during pregnancy. Teens also are more likely to smoke cigarettes, drink alcohol, or take drugs during pregnancy, which can cause health problems for the baby.

Teenage mothers receive regular prenatal care less often than older women. Prenatal care is essential for monitoring the growth of the fetus and the health of the mother. During prenatal care, medical professionals provide important information about good nutrition and about other ways to ensure a healthy pregnancy. According to the American Medical Association (AMA), babies born to women who do not have regular prenatal care are 4 times more likely to die before the age of 1 year.

Children Born to Teenage Mothers

In addition to increased health risks, children born to teenage mothers are more likely to experience social, emotional, and other problems. These problems may include the following:

Children born to teenage mothers are less likely to receive proper nutrition, health care, and cognitive and social stimulation. As a result, they are at risk for lower academic achievement.

Children born to teenage mothers are at increased risk for abuse and neglect.

Boys born to teenage mothers are 13 percent more likely to be incarcerated later in life.

Girls born to teenage mothers are 22 percent more likely to become teenage mothers themselves.

Nutritional Needs

A balanced and nutritious diet is a cornerstone of good prenatal care and healthy nutrition becomes even more crucial if you're a teenage mother-to-be.

Folate

Folate is the natural form of folic acid. You can get it from pulses, papaya, oranges, green leafy vegetables like spinach and edamame.

Don't like veggies? Make a green smoothie — no, you won't taste the greens — by blending a banana, 1-2 cups of spinach (or any green veggie), your favourite fruit and a cup of water. You can also add some raw cocoa powder and some nuts. Or throw some veggies in your stews or soups.

On a budget? Buy fruit or veggies that are in season or go shopping at the farmer's market. You can also use your vouchers from Healthy Start to buy fruit and vegetables.

Calories

As your body changes weekly you may feel tempted to restrict your intake but if you do, remember that this can hamper your baby's development and your own. Without sufficient calories, your body won't be able to efficiently use the nutrients from your diet — this could cause your baby to be malnourished.

So, How Many Calories will you Need?

An extra daily 200kcal in your third trimester. If you were underweight prior to pregnancy, you may need more than that. Talk to your GP or midwife if you're concerned about your weight.

What's in 200kcal?

1/3 cup mixed nuts and dried fruits; ½ whole grain English muffin with 1 tablespoon of peanut butter 1 slice of whole-wheat bread with ½ portion of chicken salad and an apple

Not all Calories are Equal

Sure, foods like crisps, coke, chips, cookies and pizzas can help you meet your energy requirements but these processed foods are empty calories — they contain only calories and are devoid of the vitamins, minerals and antioxidants found in fresh foods. In other words, these foods won't contribute to the healthy growth and development of your baby. In fact, they might actually impair the baby's health as they are usually loaded with chemical additives. And they also come with lots of added fats and sugars that can cause excessive weight gain.

Healthier Alternatives

Instead of coke, try adding a few lemon wedges and honey to a glass of cold sparkling water. Diet versions of soft drinks are not healthier alternatives — they contain artificial sweeteners, some of which may harm your baby (like aspartame, saccharin and cyclamate).

Instead of fruit juices, savour a cold fruit smoothie made using some milk or yogurt, a banana and a portion of your favourite fruit.

Instead of pizza, spread some tomato salsa on wholegrain pita bread, top with veggies and meat and sprinkle some cheese before pan-grilling for a few minutes.

Protein and Iron

Most teenagers can easily meet their protein requirements from fresh chicken, turkey, beef, fish, eggs, dairy products, pulses, beans and nuts. These

foods are also rich in iron but since teenagers are prone to iron-deficiency anaemia, your GP may recommend an iron tablet.

To maximise iron absorption, include a vitamin C containing food (any fruit or veggie with a yellow, orange, red or green colour) at each meal and avoid drinking tea or coffee 1-2 hours before and after your meals.

Avoid taking high-protein supplements: routine ingestion of these products has been linked to an increased risk for preterm birth.

Vitamin D

Taking a vitamin D tablet will ensure that your body can absorb and use calcium properly. You can get the supplement from Healthy Start.

Calcium

You will need this mineral to help your baby grow strong bones, so try to consume a dairy product once or twice a day or have at least three servings of green leafy veggies daily. Calcium fortified products can also do the trick.

A few more tips:

- Don't skip your three main meals and have at least two healthy snacks every day.
- Eat a balanced diet — refer to the Eatwell Guide for serving size.
- Eat two fruits and at least three veggies every day.
- Drink lots of water — your urine should be clear and odourless.
- Enjoy sweet and fatty foods as treats, not daily.
- Never hesitate to ask for support.

2.5 EFFECT OF FOOD SUPPLEMENTATION DURING PREGNANCY

Pre-eclampsia and eclampsia are among the leading causes of maternal and neonatal morbidity and mortality.¹ Despite growing knowledge of the pathophysiology of pregnancy induced hypertensive disorders, no preventive measures have been shown to be effective.² The underlying cause of pre-eclampsia/eclampsia is thought to be abnormal placentation, characterised by defective invasion of trophoblast cells and remodelling of the uterine vasculature,³ resulting in reduced utero-placental perfusion, which leads to activation of mechanisms promoting maternal vasoconstriction and activation or damage of endothelial cells.⁴ The endothelium is believed to be a primary target of mediators generated by the placenta. Damage is amplified by other factors such as reactive oxygen species.

Nitric oxide is a potent endothelium derived vasodilator,⁶ and defective synthesis of nitric oxide has been documented in pre-eclampsia.⁷ The main site of production of nitric oxide is nitric oxide synthase in endothelial cells, which uses circulating L-arginine as a substrate. Hence, the local availability of this amino acid may be critical to the endothelial adaptive regulatory mechanisms opposing the vasoconstrictors in pre-eclampsia. L-arginine is considered to be a semi-essential amino acid because under increased demands endogenous synthesis is not sufficient to fulfil requirements.⁸ Moreover, pregnancy has been reported to be a state of relative arginine deficiency,⁷ imposed by the increased formation of nitric oxide, supporting the adaptive vasodilatation of pregnancy, and use of L-arginine by the fetus.⁹ Pre-eclampsia is also associated with increased concentrations of factors that inhibit nitric oxide production. Concentrations of asymmetric dimethyl arginine, a

competitive inhibitor of nitric oxide synthase, are raised in women with pre-eclampsia.¹⁰ Concentrations of soluble fms-like tyrosine kinase 1, which antagonises vascular endothelial growth factor dependent activation of nitric oxide synthase, have also been shown to be increased in pre-eclampsia.¹¹ Endoglin, which impairs activation of nitric oxide synthase mediated by transforming growth factor β , is also increased.

In the past, the role of nutrition in the development of pre-eclampsia has been a subject of considerable discussion. Although little evidence exists to show that dietary manipulations can prevent pre-eclampsia, the notion that they might moderate the secondary features of the syndrome remains in favour.¹³ Substantial experimental data in animals and humans indicate that L-arginine could have a beneficial effect on haemodynamics.^{14 15 16} Of particular note, an expanding literature documents that administration of L-arginine improves vascular function in people with atherosclerosis and peripheral vascular disease.^{17 18 19 20} The oral administration of L-arginine to patients with cardiovascular disease has not been associated with any significant adverse side effects. This includes previous reports in the literature of use of L-arginine in pregnant women. Facchinetto et al and Neri et al infused L-arginine into women whose pregnancies were complicated by intrauterine growth retardation and reported reduced myometrial activity.^{21 22} These observations raised the possibility that supplemental L-arginine in the diet could provide a source of substrate for nitric oxide synthesis during pregnancy, which could promote vasodilatation. More clinical studies are needed in this area because we have limited experience in the use of L-arginine and other nitric oxide donators for preventing pre-eclampsia, as stated in the Cochrane review by Meher and Duley.²³ On the other hand, evidence of endothelial damage mediated by reactive oxygen species has been proposed as another mechanism of endothelial damage in pre-eclampsia.^{24 25 26} Consequently, antioxidants have been proposed as prophylactic agents for pre-eclampsia and several trials with antioxidants including vitamin C and tocopherols in pre-eclampsia have been published.^{27 28 29} At the time this clinical trial was started, insufficient evidence existed for us to discard the use of antioxidants for prevention of pre-eclampsia. However, recent trials and Cochrane reviews do not support the use of antioxidants for this purpose.^{30 31} We did a three arm clinical trial to test the hypothesis that a combination of L-arginine and antioxidant supplementation would reduce the risk of pre-eclampsia in a high risk population in Mexico City.

2.6 NUTRITION DURING LACTATION

Though lactation is a normal physiological process, it makes considerable nutritional demands on the mother. The physiological developments for lactation begins during the later part of pregnancy. Apart from the growth and development of mammary glands, energy reserves are laid down in the form of fat in the body of the mother and this may become available in part to provide the extra energy during lactation.

The demands on the mother during lactation are greater than during pregnancy, because the mother nourishes a fully developed and rapidly growing baby whose food needs are increased day by day. She must have accumulated a store of nutrients in readiness for satisfactory breast feeding. If the mother is known to have gone through pregnancy successfully on a faulty and an insufficient diet, it means that she has freely drawn upon her own

tissue to build her baby and she will continue to do so as long as she nurses her baby. In such cases, it is essential that the maternal diet be rectified, in order that she and her infant may be saved from malnutrition and its consequences.

The diet of nursing mothers in poor Indian communities does not differ appreciably from that consumed by them during pregnancy. With the exception of cereals, that is consumed in slightly increased amounts, there is often no other change in the diet. According to survey a report only a small percentage of them were consuming milk. The diet of a nursing mother in India suffers from the same drawbacks as the diet consumed by them while they were pregnant. Unlike pregnancy, the woman who is breast feeding her baby requires not only large quantities of building and protective foods, but also requires additional energy yielding foods to facilitate the formation and copious secretion of breast milk. Unfortunately, the prevalent diet in lower and even middle class is lacking in energy yielding and protective foods. In India, it is customary to breast feed for prolonged periods, extended till second or even third year. This is done in the belief that nursing prevents another pregnancy, although, the mother frequently becomes pregnant again. She continues to suckle the baby until the new one arrives. Most of our women are thus in a continuous state of lactation throughout the child bearing period of their lives. Studies carried out among lactating women revealed that when they were given extra amounts of body building foods, they produced a large amount of breast milk for their infants. Direct evidence of the amount of milk these women can produce is difficult to get, but the indirect evidence of its insufficiency is in the form of inadequate weight gain of the baby after the fourth month. Many mothers can produce 700ml of milk a day during the period of six months to a year and 100-150 ml during the second year. On the other hand, it is fortunate that despite a faulty and insufficient maternal diet, the quality of breast milk does not suffer. It compares well with that of nursing mothers consuming excellent diets in other parts of the world. It can only be explained by assuming that the Indian nursing mothers keeps up quality by withdrawing nutrients from her own bones, blood and muscles for the formation of milk, since her own diet is inadequate in providing the nutrients required for satisfactory milk production. It may well be, that there is a limit even for the continuous withdrawal of nutrients from the maternal body and this may result in deterioration of quality and reduction in quantity of the milk. The quality of the milk, however, will be affected in severe maternal malnutrition and the concentrations of vitamin A,B and C is lower than the well fed women. The concentrations of iron and calcium, however, seems normal.

Nutritional Requirements of Lactating Mother

The WHO expert committee assumed the optimal daily milk output of mother's milk to be 850 ml. This would provide 600 Kcal., 10.2 g protein, 290 mg calcium, 0.25 to 3.1 mg iron, 420 mcg Vitamin A, 22 to 44 mg ascorbic acid, 1.6 mg niacin, 0.52 mg riboflavin, 0.12 mg thiamine, 9.0 mcg folic acid, and 0.2 mcg vitamin B12. The efficacy of conversion of food energy into milk solids is believed to be about 80 per cent, while that of protein about 50 per cent and that of calcium about 30 per cent. The efficiency of absorption and secretion of dietary vitamins in milk is not known. It is, therefore evident that the lactating mother will need extra amounts of all nutrients at levels somewhat greater than those present in milk, depending on the efficiency of incorporation in milk of the nutrients present in the diet. The I.C.M.R. Nutrition Expert

Committee assumed the average amount of milk secreted by lactating mother in India and other developing countries to be 600 ml. According to this information, the nutritional needs of lactation will be less than those of WHO Expert Committee.

Energy: The lactating mother needs an additional amount of 550 cals. During the first six months of lactating and for the next six months, she requires an additional 400 cals. This extra amount can be supplied by whole grain cereals, pulses, milk, curd and its products, fruit juices, soups, vegetables etc.

Protein: The requirement is at its highest when lactation reaches its maximum, but it is a need which should be anticipated and planned during pregnancy. The nursing mother needs about 20-30 g of protein over and above her normal requirements. This extra protein can be obtained by including protein rich foods like milk and milk products, egg, meat, fish, poultry and cereal pulse combination.

Minerals: The I.C.M.R. Nutrition Expert Committee recommended an additional 0.6 g of calcium, i.e. a total of 1g calcium during lactation. This can be provided by extra milk and milk products, cereals and green leafy vegetables. If calcium and protein are adequate in the diet, phosphorus is also bound to be adequate. Some amount of iron is secreted in milk, but otherwise milk is a poor dietary source of iron. No additional requirements have been advised by I.C.M.R. Nutrition Expert Group. Because of lactational amenorrhoea, 1 mg. of iron which would have otherwise been lost, is saved and this would compensate for the iron secreted in milk.

Vitamins: Additional need of vitamin A during lactation is calculated on the basis of vitamin A secreted in milk, which is 350 mcg of retinol per day. Vitamin D requirements may be higher during lactation but in the absence of any experimental data, no definite additional intake has been suggested. The additional need of 40 mg vitamin C has been calculated on the basis of vitamin C secreted in milk in an average yield of 850 ml/day in a well nourished mother. The additional need of thiamin, riboflavin and nicotinic acid is based on the additional energy intake. Additional intake of vitamin B6' folic acid and vitamin B12 are recommended to the tune of 0.5mg, 50mcg, 0.5mcg respectively.

Factors Affecting Meal Planning of a Lactating Mother

Meals are planned according to the nutritional requirements which includes needs for the mother and for milk production. A modification of normal basic diet is worked out for a nursing mother. Additional amounts of protein and energy foods are included in this diet. In most regions, it is customary to feed the nursing mother, additional amount of fat (ghee), which supplies energy and vitamin A or some special preparations (Lahia, Ladoos of Methi, mung, garden cress seeds) which contain sources of protein, iron, calcium and vitamin B. Besides, green leafy vegetables and at least two servings of citrus fruit make up the demand of other vitamins.

Condiments should be sparingly used, since, apart from being harmful, if used in excess, they may give a flavour to the milk which may be repulsive to the baby.

Besides three large meals, two small in between meals may be planned to meet the increased requirements.

Fluid intake should be adequate to meet the requirements for milk production.

Socio-economic status of the family should be considered, and the selection of food stuffs should be according to the budget of the family e.g. groundnuts, pulses-cereals may be taken instead of meat and milk products for protein sources. Similarly green leafy vegetables may be selected instead of egg and meat products for bringing down the cost of the diet.

Variety should be provided in terms of color, texture and flavour.

Likes and dislikes of the mother should be taken into consideration.

Age of the mother be taken into consideration. An adolescent mother, who has not completed her own growth, will need additional food for her own growth requirements.

The food should be served in a pleasant atmosphere.

Since some of the medicines can be absorbed into the mother's blood stream and secreted in the milk, use of medication should be under medical supervision.

2.7 NUTRITION AND HEALTH CONSEQUENCES OF CONCEPTION DURING LACTATION

Successful breastfeeding of twins or triplets is possible. The maternal diet should be increased by at least 800 calories/day, and continuation of prenatal vitamins or multivitamins is advised.¹⁷ Mothers of twins or triplets who do not ingest sufficient calories for the extra energy needed for milk production may have increased mobilization of endogenous fat stores and earlier return to pre pregnancy weight.⁷⁸

Many twins or triplets are born prematurely and spend time in the newborn intensive care unit. In addition to information and support, breast pumping is recommended to stimulate and maintain milk production until the infants can use some or all of the mother's milk.

Prematurity

The nutritional needs of the preterm infant differ from those of the term infant and the immaturity of these infants may cause problems such as malabsorption, poor suck and swallow reflexes, and necrotizing enterocolitis.⁷²

The estimated in utero accretion requirements for sodium, potassium, chloride, protein, vitamin D, calcium, phosphorus, and potassium may not always be met by human milk alone. In the infant less than 32 weeks gestation or weighing less than 1500 g, current recommendations are to supplement human milk with a fortifier designed for premature infants.⁷³ Commercially available breast milk fortifiers (Enfamil® Human Milk Fortifier (Mead Johnson Nutrition) and Similac® Human Milk Fortifier (Abbott Laboratories) are available to add to breast milk to increase the caloric content from 20 kcal per ounce to 22 or 24 kcal per ounce as well as supply additional vitamins and minerals.

Other advantages of using human milk for the premature infant are a decrease in necrotizing enterocolitis; decreased diarrhea, increased gastric emptying and reduced antibiotic usage.⁷⁴ The amount of breast milk produced may not be adequate because of the infant's poor suck reflex, infrequent breast stimulation by the infant, and maternal anxiety about the infant.⁷² Frequent, consistent pumping or hand expression may be useful in maintaining the maternal milk supply. It is recommended the mother pump at least every 3 hours during the daytime and at least every 5 hours at night. Pumped milk should be obtained in a sanitary manner and immediately refrigerated or frozen.

Refrigerated human milk should be used within 48 hours (24 if mixed with fortifier). Frozen milk can be stored in a home freezer for 3 months and should be used within 24 hours of being thawed. Frozen milk should be thawed in the refrigerator, or under running warm water, but never microwaved. Nonfortified human milk may be used exclusively when the infant reaches term size or after 36 weeks' gestation. Metoclopramide 10 mg orally every 8 hours may increase milk production. It also increases prolactin levels through a dopamine antagonist mechanism.

Milk produced by mothers of premature infants in the first few weeks after birth differs from the milk they produce later and from the milk produced by mothers of term infants.⁷⁶ The initial milk of mothers of premature infants born before 31 weeks' gestation is usually higher in protein, sodium, fatty acids, and energy.

The well-nourished mother of a premature infant should follow a dietary plan based on recommended dietary allowances for lactation. Maternal anxiety may be high, and additional emotional support often is needed. With time, practice, and emotional support, mothers of premature infants often provide for most, if not all, of their infant's nutritional needs.

2.8 CONTRACEPTION AND NUTRITION

Oral contraceptives agents (OCA) have been in use for more than two decades, and at the present time, 150 to 200 million women are using the preparations. Apart from their gynecologic influence, the hormones have been shown to affect a number of metabolic and nutritional processes, some advantageously and others disadvantageously. Concern over the nutritional status of females consuming OCA prompted this review. Eight vitamins and three minerals were investigated. Contraceptive steroid ingestion was shown to depress the physiologic levels of six nutrients (riboflavin, pyridoxine, folacin, vitamin B12, ascorbic acid and zinc), elevate the levels of three others (vitamin K, iron and copper) and provide little or no change in one (alpha tocopherol) and questionable increases in another (vitamin A). It was concluded that females consuming OCA should pay particular attention to vitamin and mineral intake and, if warranted, consume physiologic supplements of needed nutrients.

While many women take oral contraceptives to prevent pregnancy, there are many other reasons women choose to take oral contraceptives. Treating hormonal imbalances, ovarian cysts, and irregular periods as well as preventing pregnancy are all scenarios where the benefit of taking oral contraceptives may outweigh the risks.

Considering many women begin taking oral contraceptives in early adolescence and continue their usage for many years, it is important to look at the possible nutritional effects of oral contraceptives on a woman's body especially when it comes to the depletion of vital nutrients.

The World Health Organization (WHO) points out the influence of nutrient depletion caused by being on oral contraceptives is a great cause for concern and should be of high clinical relevance. Oral contraceptives may affect levels of folic acid, vitamins B1, B2, B6, B12, vitamin C and E and the minerals magnesium, selenium and zinc. They also can decrease levels of the antioxidant CoQ10 and the amino acid Tyrosine.

The B vitamins and CoQ10 can be especially important in some individuals with certain genetic traits that may increase the need for these vitamins. For

instance, someone who carries a certain copies of genes coding for MTHFR – an enzyme that “activates” folic acid in the body, may benefit by supplementing with a specific form of folic acid as opposed to what you may find in other supplements and even in prescription levels of folic acid.

Vitamins play a key role in the function of the body. Vitamins support the immune system, the nervous system, convert nutrients into energy, contribute to growth and help process carbohydrates, proteins and fat. Vitamins also serve as helpers when it comes to the natural processes of detoxification, and as protectors when it comes to the stress on your metabolism that drugs can initiate. So if a certain class of drugs is known to deplete them, I take notice.

The effects of vitamin deficiencies can present a multitude of negative effects on the body. Minerals are essential nutrients that the body needs to survive and carry out daily functions and processes. Minerals keep you healthy and have key roles in several body functions. Interestingly, the symptoms of nutrient depletion often mirror the side effects of the drugs that deplete them.

There is a reason that your doctor may recommend that you take 3-6 months of prenatal supplements following the discontinuation of oral contraceptives before trying to conceive. There are reasons why it can take 1-3 menstrual cycles for your cycle to come back to normal after you discontinue birth control. It is because you need time for your body to restore its nutritional reserves and for your hormones to function again normally on their own.

While there are many reasons to take or not to take oral contraceptives, I wish that all women at least were aware of the potential depletion of key nutrients, so that they may correct deficiency when present through diet or supplements.

Folic Acid Deficiency

The most common effects caused by folate deficiency result in neural tube defects in developing embryos, anemia, and peripheral neuropathy. Furthermore, a typical consequence of folate deficiency is implicated as one of the causes of cardiovascular disease. Carriers of certain genetic markers, as determined by a profile such as 23andMe.com, may be at higher risk for folic acid deficiency – and possibly higher susceptibility to some of these health problems and complications. There are a lot of subtleties to the interactions of folate, B12, and their role in the methylation cycle of the body. But for this article’s purpose, just know that oral contraceptives can complicate genetic susceptibilities to methylation cycle defects even further.

Vitamin B1 Deficiency

B1 or thiamin is involved in nervous and muscle system function as well as digestion and metabolism. Severe deficiency can lead to complications involving the brain and nervous system, as well as the muscular and cardiovascular system (your heart is a muscle after all). A severe B1 deficiency can be triggered by chronic alcoholism – possibly contributing to an acute disorder known as Wernicke-Korsakoff syndrome. Wernicke-Korsakoff can manifest with vision changes, balance problems, memory problems in addition to the textbook Korsakoff psychosis and Wernicke’s Encephalopathy. While some of these complications can be rare. If a woman has a history of alcoholism, is taking birth control, and other medications that may also deplete B1, it’s not hard to see why she may experience some memory impairment and other complications even on sub-clinical levels.

Vitamin B2 Deficiency

Deficiency and sub-optimal levels of vitamin B2 (which occur in patients with inflammatory bowel disease, and chronic alcoholism) leads to a variety of clinical abnormalities that include degenerative changes in the nervous system, endocrine dysfunction, skin disorders and anemia. A deficiency in B2 may also be involved in migraine headaches.

Vitamin B6 Deficiency

Vitamin B6 is an important cofactor for many enzymatic reactions in the body – including hormone metabolism. B6 deficiency can be related to low energy, mood disruptions, confusion, skin disorders, high homocysteine levels and inflammation of the tongue and mouth. Supplementation with B6 may be useful for supporting symptoms of premenstrual syndrome, fibromyalgia and even carpal tunnel syndrome.

Vitamin C Deficiency

Vitamin C is one of the best known antioxidants and has been long used to support the immune system as well as cardiovascular and musculoskeletal health. Someone deficient in vitamin C may bruise more easily, and heal more slowly. You may remember reading about scurvy and Vitamin C, but it is actually very rare. Scurvy is a condition characterized by inflammation of the mouth and gums. Taking birth control is not likely to turn you into a limey – the word they used for ship passengers who would prevent scurvy by eating and sucking on limes which was providing them Vitamin C. You may be familiar with the work of Linus Pauling who linked low-level vitamin C deficiency to a wide variety of health problems – most notably atherosclerosis and heart disease.

Vitamin E Deficiency

Vitamin E is a fat-soluble antioxidant that is important in protecting our cell membranes from oxidative stress. There are various forms of vitamin E, such as alpha, beta and gamma tocopherol. Vitamin E is commonly used in support for heart disease, and even cancer. Vitamin E also promotes brain and eye health. A deficiency of vitamin E can contribute to muscle weakness, low muscle mass, as well as problems with vision and gait.

Selenium Deficiency

Since selenium is an important antioxidant nutrient, deficiency can increase the risk of cancer and cardiovascular disease. Several studies indicate that oral contraceptives interfere with selenium absorption. Selenium plays a role in the functioning of the thyroid gland and in every cell that uses thyroid hormone. It has been shown that selenium supplementation may be beneficial in the Hashimoto's thyroiditis. Selenium plays a role in various detoxification enzymes as well that may be important in the clearance of toxic metals and chemicals from the body.

Magnesium Deficiency

Inadequate magnesium intake frequently causes muscle spasms, and has been associated with cardiovascular disease, diabetes, high blood pressure, anxiety disorders, migraines, osteoporosis and strokes. Although deficiency of magnesium may be attributed to decreased dietary consumption and the use of diuretics, it has repeatedly been shown that magnesium levels are greatly reduced by oral contraceptives.

Coenzyme Q10

Coenzyme Q10 or Ubiquinol/Ubiuinone, is a fat soluble antioxidant enzyme that plays an important rule in energy creation in the cell. CoQ10 promotes heart health by protecting the body from oxidative stress. A deficiency of CoQ10 can be related to migraine headaches, muscle soreness, as well as cardiovascular symptoms. A woman taking both a statin drug as well as an oral contraceptive, may be at even greater risk of CoQ10 deficiency.

Tyrosine

Tyrosine is involved in the production of neurotransmitters such as melatonin, dopamine, norepinephrine (noreadrenalin) and epinephrine (adrenalin). Because of its wide-reaching effects on hormone metabolism, tyrosine depletion can contribute to altered mood as well as food cravings. In fact clinical trials have suggested that anywhere from 16-56% of women taking oral contraceptives will experience depression!

Women on birth control who feel zombie-like, moody or depressed, or broadly, "just not myself", when taking birth control, may benefit from tyrosine supplementation prior to turning to pharmaceutical options (as well as possible B-complex supplementation, Magnesium, and others listed above).

Tyrosine has wide effects beyond just mood and can affect stress hormones as well, and so supplementation should be managed by a professional trained in clinical nutrition.

2.9 NUTRITION-INFECTION INTERACTIONS

The interaction between nutrition and infection has been considered one of the major problems for the development and survival of humans. Some of the main observations on the association between nutrition and bacterial infections have referred to the effects of typhoid fever and other enteric infections on the excretion of nitrogen (4,5).

Undernourishment is considered a major cause of the high prevalence of acquired immunodeficiency in the world, followed by high morbidity and mortality (30). Various natural biological factors, including illness causing micro and macro-organisms, such as viruses, bacteria, protozoa, and parasitic worms may have the power to infect and/or pathogenically modify individuals submitted to different diets (20). Serious illness and changes in metabolic equilibrium in a host could be associated to his nutritional state (1).

Infectious agents and parasites can interfere in the equilibrium between the external and internal environment, determining major or minor actuation of factors related to the nutritional state. Host nutritional state has an important role in susceptibility to bacteria, parasites, and viral infections. Infection precipitates the appearance of signs and symptoms of nutrition deficiencies in the undernourished; this can aggravate infection process evolution (20). Both interact synergistically and are a public health problem, mainly in areas of poor basic sanitation; poverty and ignorance also influence eating habits (12).

The infection process stimulates specific and non-specific host defense mechanisms; these are directly influenced by the nutritional state of micro and macronutrients (1). In addition, generalized infection is usually followed by hypercatabolism aggravated by anorexia resulting in the loss and consequent depletion of body nutrient reserves (9,12). The higher energy demand during infection is followed by marked alterations in host metabolism, preparing to

fight the aggressor agent. These alterations vary according to micro-organism type, disease severity, the presence of certain complications, or the compromise of certain organs or systems (20).

Alterations in protein synthesis and degradation, complex modifications in amino acid metabolism, alterations in nutrients including electrolytes, minerals, oligoelements and vitamins, and changes in the type and magnitude of cell energy production and its utilization have been seen (15). Hormone participation and the influence of fever contribute to these metabolic responses and alterations. Food consumption, body nutrient reserves, and their loss actively interfere in the nutrition balance and infection (9,15).

Immune alterations, which are closely related to nutritional status, markedly contribute to a higher susceptibility to infectious agents and can also contribute to worsening nutritional state, forming a vicious cycle (5,6,12,15,18,30).

The triangle formed by the interaction between nutrition, infection, and immunity must remain balanced, since alterations in these factors maybe responsible for high morbidity and mortality especially in poorer regions.

2.10 PROBLEM OF OVEREATING AND OBESITY PREVENTION

Overeating occurs when you consume, over the long term, more food than you actually need to maintain good health. Overeating usually leads to ill health effects, such as obesity, and its attendant health risks, including diabetes, hypertension and heart disease. Overeating is often regarded as an eating disorder.

Overeating can manifest itself as binge eating or compulsive eating, what some refer to as a food addiction. Binge eating is an eating disorder in which unusually large amounts of food are consumed on a regular basis; compulsive eaters can consume up to 60,000 calories in a single day. It's one of the most common eating disorders, and those who binge eat feel such a compulsive urge to binge that they can't control. Here are some of the signs of compulsive overeating:

- eating large amounts of food
- eating when you feel full
- eating rapidly during the binge
- feeling that your eating is out of control
- feeling ashamed of your eating, or feeling depressed, disgusted or upset about your eating
- depression
- anxiety
- frequent dieting without weight loss
- often eating alone
- hiding empty food containers
- hoarding food

Dangers of Overeating

With fast food restaurants on every corner and huge supermarkets within miles of most homes, you're not in danger of going hungry. You are, however, in danger of eating too much. It's not always easy to make the most nutritious food choices when you have so many tasty options to choose from, but making an effort to select healthy foods is a good way to protect yourself from chronic illness. Filling your plate with small portions of low-calorie, nutrient-dense foods, such as fruits, vegetables, whole grains and lean meats, is the best way to avoid overeating without feeling hungry.

Weight Gain

Unhealthy weight gain is one of the biggest dangers associated with eating too much. When you take in more calories than you're able to burn, you'll start packing on the pounds. In fact, a 2001 article published in "Obesity" notes that overeating is linked to obesity and people who overeat on a regular basis are less likely to get enough exercise. That exacerbates the problem, making weight gain even more likely.

Additional Physical Dangers

Gaining weight isn't the only physical complaint you're likely to experience if you overeat on a regular basis. If you overeat unhealthy foods, such as high-fat fast foods or sugary desserts, you'll get an initial rush of energy, but crash shortly after, leaving you feeling sluggish and fatigued. These unhealthy foods can also cause uncomfortable digestive problems such as bloating and gas. Overeating can also lead to bone and joint pain, according to Beth Israel Deaconess Medical Center. This occurs when you gain too much weight from overeating because the excess pounds put additional pressure on your skeleton, which can lead to pain and discomfort, particularly in the lower back and hips.

Mental Health Dangers

Chronic overeating can impact mental health. A large portion of your self-image and self-esteem is connected to how you feel about your looks. If you've gained extra weight from overeating, you might not feel confident about yourself. Over time, this can actually lead to depression, according to Brown University. Having a negative self-image can also lead to anxiety, sexual and intimacy difficulties and an unnatural preoccupation with food and calories. On the other hand, shedding excess weight can boost self-image and improve overall mental health.

Disease Dangers

The long-term dangers of overeating don't have anything to do with your appearance, but they can be equally as devastating. Overeating, particularly when you overeat high-fat, high-calorie foods, can increase your risk of heart disease and type 2 diabetes. When obesity is the result of overeating, you're also at an increased risk for certain types of cancer, gallbladder disease, high cholesterol and sleep apnea. You might also develop high blood pressure, which can contribute to an elevated risk of having a stroke.

Prevent Obesity

Obesity is a chronic disease affecting more and more children, adolescents and adults:

- Obesity rates among children in the U.S. have doubled since 1980 and have tripled for adolescents
- 15% percent of children aged six to 19 are considered overweight
- Over 60 percent of adults are considered overweight or obese

Healthcare professionals are seeing earlier onset of Type 2 diabetes (normally an adult-onset disease), cardiovascular disease and obesity-related depression in children and adolescents. The longer a person is obese, the more significant obesity-related risk factors become. Given the chronic diseases and conditions associated with obesity, and the fact that obesity is difficult to treat, prevention is extremely important.

A primary reason that prevention of obesity is so vital in children is because the likelihood of obese becoming obese adults is thought to increase from about 20 percent at four years of age to 80 percent by adolescence.

Preventing Obesity in Infants

The longer babies are breastfed, the less likely they are to become overweight as they grow older. Breastfed babies are 15 to 25 percent less likely to become overweight. For those who are breastfed for six months or longer, the likelihood is 20 to 40 percent less.

Preventing Obesity in Children and Adolescents

Young people generally become overweight or obese because they don't get enough physical activity in combination with poor eating habits. Genetics and lifestyle also contribute to a child's weight status.

There are a number of steps you can take to help prevent overweight and obesity during childhood and adolescence. (They'll help you, too!) They include:

Gradually work to change family eating habits and activity levels rather than focusing on weight. Change the habits and the weight will take care of itself.

Be a role model. Parents who eat healthy foods and are physically active set an example that increases the likelihood their children will do the same.

Encourage physical activity. Children should have an hour of moderate physical activity most days of the week. More than an hour of activity may promote weight loss and subsequent maintenance.

Reduce time in front of the TV and computer to less than two hours a day.

Encourage children to eat only when hungry, and to eat slowly.

Avoid using food as a reward or withholding food as a punishment.

Keep the refrigerator stocked with fat-free or low-fat milk and fresh fruit and vegetables instead of soft drinks and snacks high in sugar and fat.

Serve at least five servings of fruits and vegetables daily.

Encourage children to drink water rather than beverages with added sugar, such as soft drinks, sports drinks and fruit juice drinks.

Preventing Obesity in Adults

Many of the strategies that produce successful weight loss and maintenance will help prevent obesity. Improving your eating habits and increasing physical activity play a vital role in preventing obesity. Things you can do include:

Eat five to six servings of fruits and vegetables daily. A vegetable serving is one cup of raw vegetables or one-half cup of cooked vegetables or vegetable juice. A fruit serving is one piece of small to medium fresh fruit, one-half cup of canned or fresh fruit or fruit juice, or one-fourth cup of dried fruit.

Choose whole grain foods such as brown rice and whole wheat bread. Avoid highly processed foods made with refined white sugar, flour and saturated fat.

Weigh and measure food to gain an understanding of portion sizes. For example, a three-ounce serving of meat is the size of a deck of cards. Avoid super-sized menu items particularly at fast-food restaurants. You can achieve a lot just with proper choices in serving sizes.

Balance the food "checkbook." Eating more calories than you burn for energy will lead to weight gain.

Weigh yourself regularly.

Avoid foods that are high in "energy density" or that have a lot of calories in a small amount of food. For example, a large cheeseburger and a large order of fries may have almost 1,000 calories and 30 or more grams of fat. By ordering a grilled chicken sandwich or a plain hamburger and a small salad with low-fat dressing, you can avoid hundreds of calories and eliminate much of the fat intake. For dessert, have fruit or a piece of angel food cake rather than the "death by chocolate" special or three pieces of home-made pie.

Crack a sweat: accumulate at least 30 minutes or more of moderate-intensity activity on most, or preferably, all days of the week. Examples include walking a 15-minute mile, or weeding and hoeing the garden.

Make opportunities during the day for even just 10 or 15 minutes of some calorie-burning activity, such as walking around the block or up and down a few flights of stairs at work. Again, every little bit helps.

2.11 MANAGEMENT OF MICRONUTRIENT DEFICIENCIES

Extra minerals, vitamins and trace elements, even small doses, can mean the difference between life and death for mothers and children. Micronutrients such as iron, vitamin A, iodine and folate enhance the nutritional value of food and play a crucial role in the mother's survival in pregnancy and childbirth, and a child's ability to develop to their potential.

Rates of regular consumption of foods rich in iron and vitamin A are low in India, particularly among infants and young children. The proportion of children aged six to 24 months who regularly consume vitamin A-rich foods is 39 per cent, while the proportion of those who regularly consume iron-rich food is only 11 per cent. The number of children who regularly consume vitamin A and iron-rich foods is particularly low in poorer communities.

UNICEF works with governments and a wide range of public and private organizations to make sure essential micronutrients are delivered to mothers and children in India.

Prevention and treatment of micronutrient deficiencies. Micronutrient deficiencies, including deficiencies of vitamin A, iron, iodine, zinc and folic acid, are common among women and children in low- and middle-income countries. Ensuring that women of reproductive age, pregnant women and children have sufficient essential micronutrients improves the health of expectant mothers, the growth and development of unborn children, and the survival and physical and mental development of children up to five years old. UNICEF partners governments and organizations to address micronutrient deficiencies by seeing that supplements are delivered to specific vulnerable groups around India, and that home fortification of complementary foods (foods given in addition to breastmilk) takes place for children aged six to 24 months, along with fortification of staple foods and condiments in the family home. Vitamin A supplementation Globally, one in three preschool-aged children and one in six pregnant women are deficient in vitamin A due to inadequate dietary intake (1995–2005 data). Global evidence indicates that in regions where vitamin A deficiency is prevalent, vitamin A supplementation can reduce child mortality by an average 23 per cent. Vitamin A is necessary to support the response of the body's immune system, and children who are deficient face a higher risk of dying from infectious diseases such as measles and diarrhoea. Delivered periodically, Vitamin A supplementation to children

aged six months to five years has been shown to be highly effective in reducing deaths by any cause in countries where vitamin A deficiency is a public health problem. As in other developing countries, where coverage by the routine health system can be weak, in India vitamin A supplements are delivered to children through independent biannual rounds and during integrated health events, such as Village Health and Nutrition Days. This helps to sustain high coverage of vitamin A supplementation even in hard to reach areas.

Iron Supplementation

Iron deficiency predominantly affects children, adolescents and menstruating and pregnant women. Globally, the most significant contributor to the onset of anaemia is iron deficiency.

The consequences of iron deficiency include reduced school performance in children and decreased work productivity in adults. Anaemia is most prevalent in Asia and Africa, especially among poor populations. Global estimates from the World Health Organization (WHO) database suggest that about 42 per cent of pregnant women and 47 per cent of preschool-aged children suffer from anaemia.

3

Medical Disorders Complication Pregnancy Anemia

STRUCTURE

- 3.1 Introduction
- 3.2 Heart Disease in Pregnancy
- 3.3 Effect of Heart Disease on Pregnancy
- 3.4 Effect of Maternal Heart Disease on Pregnancy
- 3.5 Management: Care during Pregnancy, Labour and Puerperium
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- 3.10 Management: Care during Pregnancy, Labour and Pueperium
- 3.11 Urinary Tract Infections
- 3.12 Asymptomatic bacteriuria
- 3.13 Pyelonephritis
- 3.14 Malaria
- 3.15 Pulmonary Tuberculosis
- 3.16 Jaundice
- 3.17 Anemia in Pregnancy

LEARNING OBJECTIVES

- ❖ Understanding to medical disorders complication durinng pregnancy.
- ❖ Know about effect of heat disease on pregnancy.
- ❖ Know about effect of pregnancy on maternal heart disease.
- ❖ Know about how can you manage heat problem during pregnancy.

- ❖ Know about effects of diabetes on pregnancy.
- ❖ Know about how can you manage maternal diabetes
- ❖ Know about urinary tract infections during pregnancy.
- ❖ Know about malaria effects on pregnancy and its treatment.
- ❖ Know about diagnosis and treatment pulmonary tuberculosis during pregnancy.
- ❖ Know about effects of Jaundice during pregnancy.

Medical Disorders Complication
Pregnancy Anemia

3.1 INTRODUCTION

Complications of pregnancy are health problems that are caused by pregnancy. There is no clear distinction between complications of pregnancy and symptoms and discomforts of pregnancy. However, the latter do not significantly interfere with activities of daily living or pose any significant threat to the health of the mother or baby. Still, in some cases the same basic feature can manifest as either a discomfort or a complication depending on the severity. For example, mild nausea may merely be a discomfort (morning sickness), but if severe and with vomiting causing water-electrolyte imbalance it can be classified as a pregnancy complication (hyperemesis gravidarum).

In the immediate postpartum period, 87% to 94% of women report at least one health problem. Long term health problems (persisting after 6 months postpartum) are reported by 31% of women. Severe complications of pregnancy are present in 1.6% of mothers in the US and in 1.5% of mothers in Canada. The relationship between age and complications of pregnancy are now being researched with greater impetus.

In 2013, complications of pregnancy resulted globally in 293,000 deaths, down from 377,000 deaths in 1990. The most common causes of maternal mortality are maternal bleeding, maternal sepsis and other infections, hypertensive diseases of pregnancy, obstructed labor, and pregnancy with abortive outcome, which includes miscarriage, ectopic pregnancy, and elective abortion.

3.2 HEART DISEASSE IN PREGNANCY

There's a misconception that women living with a heart condition should never get pregnant, but in fact heart disease can be safely managed during pregnancy, says Stephanie Martin, D.O., medical director for labor and delivery and the obstetric intensive care unit at the Texas Children's Pavilion for Women in Houston. "An evaluation is important to determine whether pregnancy is a good idea, but it's very rare that a patient's heart condition would make pregnancy too risky." In some cases, "the hormonal changes in pregnancy actually help a compromised heart work better," adds John Folk, M.D., associate professor of Obstetrics and Gynecology at SUNY Upstate Medical University in Syracuse, NY. Women with high-risk a heart condition should always get expert counseling before they conceive, as well as specialized prenatal care to help increase their odds of having a healthy pregnancy.

Types of Heart Disease

Before discussing the different types of heart disease, it is helpful to try to understand a bit about the structure of the cardiovascular system. The cardiovascular system consists of the heart and blood vessels called veins and

arteries. The heart pumps blood throughout the body. It contains two upper chambers called atria and two lower chambers called ventricles. Veins bring blood to the vena cava and then to the heart. The aorta brings blood away from the heart to the arteries, where the blood is distributed to other areas of the body.

There are many different types of heart disease, and they can be categorized into three groups according to the risk of death that they pose to the mother in pregnancy.

Group 1: Heart disease with 1% or lower risk to the mother in pregnancy

- atrial septal defects: a hole between the two upper, or receiving, chambers of the heart, called the atria.
- ventricular septal defects: a hole between the two lower, or pumping, chambers of the heart, called the ventricles
- patent ductus arteriosus: a condition where an important fetal structure in the heart did not close properly after birth
- tricuspid disease: a narrowing of the flaps between the right atrium and right ventricle of the heart
- tetralogy of Fallot, corrected: a condition where there is a hole between the ventricles of the heart, there are obstructions between the right ventricle and the lungs, the aorta lies right over the hole between the ventricles, and the right ventricle tissue becomes thickened; in this case, the condition has already been corrected with surgery
- bioprosthetic valve: an artificial heart valve that has been implanted to replace a defective valve
- mitral stenosis, New York Heart Association class I or II: a mild to moderate narrowing of the valve between the left atrium and left ventricle of the heart

Group 2: Heart disease with 5% to 15% risk to the mother in pregnancy

- mitral stenosis, New York Heart Association class III or IV: a more serious narrowing of the valve between the left atrium and left ventricle of the heart
- aortic stenosis: a narrowing of the valve leading from the left ventricle to the aorta
- aortic coarctation without valve involvement: a narrowing of the aorta somewhere along its length
- tetralogy of Fallot, uncorrected: tetralogy of Fallot which was not corrected before pregnancy
- previous heart attack
- Marfan syndrome, normal aorta: a connective tissue disorder that affects the heart, blood vessels, skeleton, lungs, and eyes

Group 3: Heart disease with 25% to 50% risk to the mother in pregnancy

- pulmonary hypertension: high blood pressure in the arteries that move blood from the heart to the lungs
- aortic coarctation with valve involvement
- Marfan syndrome with valve involvement

Diagnosis and Evaluation During Pregnancy

Pregnancy stresses the cardiovascular system, often worsening known heart disorders; mild heart disorders may first become evident during pregnancy.

Stresses include decreased Hb and increased blood volume, stroke volume, and eventually heart rate. Cardiac output increases by 30 to 50%. These changes become maximal between 28 and 34 wk gestation.

During labor, cardiac output increases about 20% with each uterine contraction; other stresses include straining during the 2nd stage of labor and the increase in venous blood returning to the heart from the contracting uterus. Cardiovascular stresses do not return to prepregnancy levels until several weeks after delivery.

Symptoms and Signs

Findings resembling heart failure (eg, mild dyspnea, systolic murmurs, jugular venous distention, tachycardia, dependent edema, mild cardiomegaly seen on chest x-ray) typically occur during normal pregnancy or may result from a heart disorder. Diastolic or presystolic murmurs are more specific for heart disorders.

Heart failure can cause premature labor or arrhythmias. Risk of maternal or fetal death correlates with NYHA functional classification, which is based on the amount of physical activity that causes symptoms of heart failure.

Risk is increased only if symptoms

Occur during mild exertion (NYHA class III)

Occur during minimal or no exertion (NYHA class IV)

Diagnosis

- Clinical evaluation
- Usually echocardiography
- Diagnosis of a heart disorder during pregnancy is usually based on clinical evaluation and echocardiography.
- Because genetics can contribute to the risk of heart disorders, genetic counseling and fetal echocardiography should be offered to women with congenital heart disease.

Treatment

Avoidance of warfarin, ACE inhibitors, angiotensin II receptor blockers (ARBs), aldosterone antagonists, thiazide diuretics, and certain antiarrhythmics (eg, amiodarone)

For NYHA class III or IV, activity restriction and possibly bed rest after 20 wk

Most other usual treatments for heart failure and arrhythmias

Frequent prenatal visits, ample rest, avoidance of excessive weight gain and stress, and treatment of anemia are required. An anesthesiologist familiar with heart disorders in pregnancy should attend the labor and ideally should be consulted prenatally. During labor, pain and anxiety are treated aggressively to minimize tachycardia. Women are closely monitored immediately postpartum and are followed for several weeks postpartum by a cardiologist.

Before women with NYHA class III or IV status conceive, the disorder should be optimally treated medically and, if indicated (eg, if due to a valvular heart disorder), treated surgically. Women with class III or IV heart failure or another high-risk disorders (listed above) may be advised to obtain an early therapeutic abortion.

Some women with a heart disorder and poor cardiac function require digoxin 0.25 mg po once/day plus bed rest, beginning at 20 wk. Cardiac glycosides (eg, digoxin, digitoxin) cross the placenta, but neonates (and children) are relatively resistant to their toxicity. ACE inhibitors and ARBs are contraindicated because they may cause fetal renal damage. Aldosterone

antagonists (spironolactone, eplerenone) should be avoided because they may cause feminization of a male fetus. Other treatments for heart failure (eg, nonthiazide diuretics, nitrates, inotropes) may be continued during pregnancy depending on disease severity and fetal risk, as determined by a cardiologist and a perinatologist.

3.3 EFFECT OF HEART DISEASE ON PREGNANCY

Pregnancy stresses your heart and circulatory system. During pregnancy, your blood volume increases by 30 to 50 percent to nourish your growing baby. The amount of blood your heart pumps each minute also increases by 30 to 50 percent. Your heart rate increases as well. These changes cause your heart to work harder.

Labor and delivery add to your heart's workload, too. During labor — particularly when you push — you'll experience abrupt changes in blood flow and pressure. When your baby is born, decreased blood flow through the uterus also stresses your heart.

Risks

The risks depend on the nature and severity of the underlying heart condition. For example:

Heart rhythm issues. Minor abnormalities in heart rhythm are common during pregnancy. They're not usually cause for concern.

Heart valve issues. If you have an artificial heart valve or your heart or valves are scarred or malformed, you might face an increased risk of complications during pregnancy. If your valves aren't working properly, you might have trouble tolerating the increased blood flow.

In addition, artificial or abnormal valves carry an increased risk of endocarditis — a potentially life-threatening infection of the lining of the heart and heart valves. Mechanical artificial heart valves also pose serious risks during pregnancy due to the need to adjust use of blood thinners and the potential for life-threatening clotting (thrombosis) of heart valves.

Congestive heart failure. As blood volume increases, congestive heart failure can get worse.

Congenital heart defect. If you were born with a heart problem, your baby has a greater risk of developing some type of heart defect, too. You might also be at risk of premature birth.

3.4 EFFECT OF MATERNAL HEART DISEASE ON PREGNANCY

The presence of heart disease does appear to increase the risk of obstetric complication. In a retrospective study of 112 pregnancies in women with congenital heart disease, Ouyang et al. report a 32.6% rate of adverse obstetric outcomes.[68] Pre-term delivery and postpartum hemorrhage were the most frequent complications seen. Pre-term delivery was due to preterm premature rupture of membranes and indicated deliveries. The increased rate of postpartum hemorrhage is probably due to an increased rate of planned assisted delivery. However, the use of anticoagulation in the peripartum period and cyanosis are independent predictors of postpartum hemorrhage. The only cardiac lesion with specific increased risks is coarctation of the aorta, which is associated with an increased risk of pregnancy-induced hypertension.

If obstetric complications do occur, this can have significant impact on the outcomes of pregnancy. For example, pre-eclampsia increases the risk of cardiac decompensation and death and postpartum hemorrhage can lead to hypovolemic shock, which is often poorly tolerated. The relative immunocompromise of pregnancy increases the risk of infection (e.g., urinary tract infection). This can increase the heart rate, potentially worsening cardiac function.

Fetal & Neonatal Outcomes

The presence of maternal heart disease impacts on the fetus in a number of ways. First, the risk of spontaneous miscarriage and therapeutic abortion is increased in women with heart disease. The offspring of a mother with congenital heart disease are also at increased risk of inheriting a congenital heart disease. The overall risk of the offspring inheriting polygenic cardiac disease is quoted at 3–5%, compared with a 1% risk in the general population.[69] The risk is, in fact, dependent on the affected parent's condition and there is an increased risk if a previous sibling has been affected (Table 3). Certain cardiac medications can adversely affect the fetus (e.g., ACE inhibitors, warfarin and statins). ACE inhibitors are known to have teratogenic effects in the first trimester and should therefore be avoided during this period. Exposure in the second and third trimester can lead to marked fetal hypotension and decreased (fetal) renal blood. Where ACE inhibitors must be continued, the lowest possible dose should be used and amniotic fluid levels and fetal growth should be monitored carefully. Statins have been identified as potential teratogens on the basis of theoretical considerations. However, epidemiological data suggest that statins are not major teratogens. Given the scarcity of available data, it is still advisable to avoid statins during the first trimester.

The rate of neonatal complication is significantly increased in women with heart disease. Siu et al. in their prospective longitudinal study of pregnancy outcomes in women with heart disease reported neonatal outcomes in 302 pregnancies. Neonatal complications occurred in 18% of pregnancies. Preterm delivery occurred in 15%, fetal growth restriction in 4%, respiratory distress syndrome or intraventricular hemorrhage in 2% and neonatal death in 3% of pregnancies. Predictors of adverse neonatal outcomes were NYHA class greater than II, cyanosis, maternal leftventricular obstruction, maternal smoking, maternal age under 20 years or over 35 years, multiple gestation and anticoagulation during pregnancy.

Neonatal complications are particularly high in women with cyanotic heart disease and in women with a Fontan repair. Pregnancy is associated with a high incidence of fetal loss, stillbirth, fetal growth restriction and preterm delivery. In cyanotic heart disease, the risk increases significantly when maternal oxygen saturations fall below 85%. This should be discussed prepregnancy and the fetus should be monitored carefully throughout pregnancy.

3.5 MANAGEMENT: CARE DURING PREGNANCY, LABOUR AND PUERPERIUM

Heart failure. Signs and symptoms of heart failure in the pregnant patient with heart disease should be managed by decreased activity (or even a brief period of bed rest), decreased salt intake, digitalization, and diuresis. Afterload reduction may be administered in the form of oral hydralazine. Angiotensin-

converting enzyme inhibitors should not be given because they increase the incidence of stillbirths. Interruption of the pregnancy should be considered and discussed with the obstetrician if heart failure is refractory to medical therapy or difficult to manage. Patients with stabilized heart failure often fare best if hospitalized during the final 2 to 3 weeks of their pregnancy.

Cardiac arrhythmias. Pregnant patients with heart disease are prone to develop supraventricular and ventricular arrhythmias. Arrhythmias are usually best managed in the hospital with conventional therapies. Electrical cardioversion and pacemakers can be used as required, with the same indications and precautions as in nonpregnant patients. Amiodarone is contraindicated, but beta-blockers or verapamil may be administered.

Anticoagulation. Pregnant patients with deep venous thrombosis, pulmonary or arterial embolism, or prosthetic heart valves should be treated with anticoagulants. Heparin is the drug of choice: Because the molecule is too large to cross the placenta, the fetus is protected from simultaneous anticoagulation. Anticoagulation therapy should be discontinued for 1 to 3 days before delivery. Subcutaneous low-molecular-weight heparin is particularly useful in pregnant patients because of ease of administration and efficacy.

Long-term (greater than 1 to 2 months) heparin therapy results in osteoporosis. Therefore, patients with prosthetic heart valves or those in whom anticoagulation must continue for more than 2 months should receive oral anticoagulants (warfarin).

Because warfarin crosses the placenta, it should be avoided during the first trimester, when it predisposes to hemorrhage and fetal developmental abnormalities. The drug should be stopped again during the last 3 weeks before term to allow fetal clotting mechanisms to return to normal before delivery. Heparin (usually subcutaneous low-molecular-weight heparin) is substituted for warfarin during periods when the latter is discontinued.

Oral anticoagulants can be restarted after delivery, but patients should not breast-feed because warfarin is excreted in the milk.

Antibiotic prophylaxis. Patients with valvular and congenital heart disease (except atrial septal defect) and an infection involving the reproductive organs or vagina should receive 600,000 U of procaine penicillin twice a day, starting with the onset of labor, together with 1 g of intramuscular streptomycin daily, beginning immediately after delivery. Both antibiotics are continued for 3 days. Patients who do not have vaginal or reproductive organ infections do not require endocarditis prophylaxis.

Antihypertensive therapy. Patients who are hypertensive during pregnancy should be treated in an effort to prevent toxemia. The drug regimens used usually involve some combination of alpha-methyl-dopa, beta-blockers, diuretics, verapamil, and/or hydralazine.

Patients with toxemia should be admitted to the hospital and treated vigorously (antihypertensive or anti-heart failure regimens or both). Renal function should be monitored closely.

Treatment of Heart Disease During Pregnancy

Women with heart disease may need to be followed by a multidisciplinary team that specializes in heart disease in pregnancy. Some heart diseases need to be treated with specific drugs.

Women who have had a valve replacement usually require a drug called an anticoagulant, such as heparin, throughout pregnancy until just before delivery, and then the drug will need to be restarted shortly after delivery. Note that another anticoagulant, warfarin?, is thought to be a teratogen.

Women with mitral stenosis may need a drug called a beta-blocker to slow the heart rate response to activity and anxiety.

Women who have had a heart attack may need an array of drugs such as nitrates, calcium channel blockers, or beta-blockers.

Women with mild heart disease generally go through pregnancy without any major problems. To be on the safe side, special attention should be given toward preventing and recognizing the early signs of heart failure:

- shortness of breath
- persistent wheezing, sometimes with a cough
- fatigue
- difficulty carrying out normal activities
- increased heart rate and palpitations

If you are pregnant and you have mild heart disease, you should make sure to avoid people who have respiratory infections, as these infections can lead to heart failure. Consider getting a flu shot and refrain from smoking.

If you have serious heart disease and are pregnant, you will need to carefully consider the risks and cooperate fully with your doctor's plan of care for you. If you are early into your pregnancy, you may want to consider ending the pregnancy through therapeutic abortion. If you choose to continue the pregnancy, prolonged hospitalization and bed rest will usually be required.

Labour and Delivery in Women with Heart Disease

In general, women with mild heart disease should attempt childbirth vaginally unless there is another complication that requires a caesarean section. Despite the physical effort required for vaginal birth, the outcomes are better and the risks for the mother are lower when compared with caesarean section. Pain relief during childbirth is very important, and may involve medications called intravenous analgesics or epidurals. You will be closely monitored during labour and delivery.

Likewise, pregnant women with serious heart disease should still try to deliver vaginally, if their caregiver recommends a vaginal birth. Very ill women do not tolerate major surgical procedures such as caesarean section very well. If possible, the delivery should be done in a hospital that has extensive experience with complicated cardiac disease.

Effects of maternal heart disease on the unborn baby

Babies of mothers with heart disease may inherit congenital heart problems. Congenital heart disease in the unborn baby can sometimes be diagnosed during pregnancy using a procedure called a fetal echocardiogram. Sometimes congenital heart disease can be treated with surgery shortly after birth.

Surgery

Interruption of pregnancy. Therapeutic abortion should be considered for patients with pulmonary hypertension or symptoms of NYHA class III (moderately severe) or IV (severe) heart failure or angina during the first trimester.

Delivery. Cesarean section or forceps-assisted delivery is usually not necessary, even for symptomatic patients. Vaginal delivery is usually preferred with caesarian section reserved for patients with obstetrical indications for this intervention.

A number of drugs commonly used during labor are relatively contraindicated in patients with heart disease (e.g., atropine, scopolamine, and ergot derivatives).

Early ambulation is encouraged after delivery to decrease the risk of deep venous thrombosis and pulmonary embolism.

Cardiac surgery. Cardiac surgical intervention during pregnancy carries an increased risk for both mother and fetus. Fortunately, it is rarely necessary.

Mitral valvuloplasty or replacement is the most common cardiac surgical procedure considered during pregnancy. Surgery should be performed only in women with severe disabling signs and symptoms of pulmonary congestion despite intensive medical therapy. Balloon valvuloplasty can usually be performed safely during pregnancy in patients who become markedly symptomatic.

3.6 DIABETES MELLITUS

Gestational diabetes mellitus (GDM) is defined as glucose intolerance of variable degree with onset or first recognition during pregnancy. A study by Stuebe et al found this condition to be associated with persistent metabolic dysfunction in women at 3 years after delivery, separate from other clinical risk factors.

Infants of mothers with preexisting diabetes mellitus experience double the risk of serious injury at birth, triple the likelihood of cesarean delivery, and quadruple the incidence of newborn intensive care unit (NICU) admission.

Gestational diabetes mellitus accounts for 90% of cases of diabetes mellitus in pregnancy, while preexisting type 2 diabetes accounts for 8% of such cases.

3.7 DIAGNOSIS

Type 1 diabetes

The disease is typically diagnosed during an episode of hyperglycemia, ketosis, and dehydration.

It is most commonly diagnosed in childhood or adolescence; the disease is rarely diagnosed during pregnancy.

Patients diagnosed during pregnancy most often present with unexpected coma - Early pregnancy may provoke diet and glycemic control instability in patients with occult diabetes.

Type 2 diabetes

According to the American Diabetes Association's "Standards of Medical Care in Diabetes--2010," [4, 5] the presence of any one of the following criteria supports the diagnosis of diabetes mellitus:

- Hemoglobin A1C (HbA1C) = 6.5%
- Fasting plasma glucose = >126 mg/dL (7.0 mmol/L)
- A 2-hour plasma glucose level = 200 mg/dL (11.1 mmol/L) during a 75-g OGTT

- A random plasma glucose level = 200 mg/dL (11.1 mmol/l) in a patient with classic symptoms of hyperglycemia or hyperglycemic crisis
- In the absence of unequivocal hyperglycemia, a diagnosis based on any of the first 3 criteria should be confirmed by repeat testing on a different day.

Prediabetes

Women with prediabetes identified before pregnancy should be considered at extremely high risk for developing gestational diabetes mellitus during pregnancy. As such, they should receive early (first-trimester) diabetic screening.

Postdiagnostic Testing

Once the diagnosis of diabetes is established in a pregnant woman, continued testing for glycemic control and diabetic complications is indicated for the remainder of the pregnancy.

- First-trimester laboratory studies
- HbA1C
- Blood urea nitrogen (BUN)
- Serum creatinine
- Thyroid-stimulating hormone
- Free thyroxine levels
- Spot urine protein-to-creatinine ratio
- Capillary blood sugar levels
- Second-trimester laboratory studies
- Spot urine protein-to-creatinine study in women with elevated value in first trimester
- Repeat HbA1C
- Capillary blood sugar levels
- Ultrasonography

First trimester - Ultrasonographic assessment for pregnancy dating and viability

Second trimester - Detailed anatomic ultrasonogram at 18-20 weeks and a fetal echocardiogram if the maternal glycohemoglobin value was elevated in the first trimester

Third trimester - Growth ultrasonogram to assess fetal size every 4-6 weeks from 26-36 weeks in women with overt preexisting diabetes; perform a growth ultrasonogram for fetal size at least once at 36-37 weeks for women with gestational diabetes mellitus

Electrocardiography

If maternal diabetes is longstanding or associated with known microvascular disease, obtain a baseline maternal electrocardiogram (ECG) and echocardiogram.

3.8 EFFECT OF PREGNANCY ON DIABETES

Pregnancy makes the body need more insulin to control the levels of sugar (glucose) in the body. Therefore, women with diabetes usually need more treatments to control their blood sugar when they are pregnant.

If the diabetes is not well controlled during the pregnancy this may cause harm for both you and your baby. Therefore you will need more regular check-

ups with a doctor, and to see a specialist during the pregnancy. This will help to reduce the risks and help you to stay well and have a healthy baby.

During pregnancy, the placenta supplies a growing fetus with nutrients and water. The placenta also makes a variety of hormones to maintain the pregnancy. In early pregnancy, hormones can cause increased insulin secretion and decreased glucose produced by the liver, which can lead to hypoglycemia (low blood glucose levels). In later pregnancy, some of these hormones (estrogen, cortisol, and human placental lactogen) can have a blocking effect on insulin, a condition called insulin resistance.

As the placenta grows, more of these hormones are produced, and insulin resistance becomes greater. Normally, the pancreas is able to make additional insulin to overcome insulin resistance, but when the production of insulin is not enough to overcome the effect of the placental hormones, gestational diabetes results or there may be worsening of pregestational diabetes.

Diabetes in pregnancy can have serious consequences for the mother and the growing fetus. The severity of problems often depends on the degree of the mother's diabetic disease, especially if she has vascular (blood vessel) complications and poor blood glucose control. Diabetes that occurs in pregnancy is often listed according to White's classification:

Gestational diabetes. When a mother who does not have diabetes develops a resistance to insulin because of the hormones of pregnancy.

Noninsulin dependent - Class A1, which can be controlled by changes in diet

Insulin dependent - Class A2

Pre-gestational diabetes. Women who already have insulin-dependent diabetes and become pregnant.

Class B - diabetes developed after age 20, have had the disease less than 10 years, no vascular complications.

Class C - diabetes developed between age 10 and 19 or have had the disease for 10-19 years, no vascular complications.

Class D - diabetes developed before age 10, have had the disease more than 20 years, vascular complications are present.

Class F - diabetic women with kidney disease called nephropathy.

Class R - diabetic women with retinopathy (retinal damage).

Class T - diabetic women who have undergone kidney transplant.

Class H - diabetic women with coronary artery or other heart disease.

It is very important for a mother to closely manage her diabetes during pregnancy. Generally, the poorer the control of blood glucose and the more severe the disease and complications, the greater the risks for the pregnancy.

3.9 EFFECT OF DIABETES ON PREGNANCY

Maternal Complications of Diabetes on a Pregnancy

Complications for the mother depend on the degree of insulin need, the severity of complications associated with diabetes, and control of blood glucose.

Most complications occur in women with pre-gestational diabetes and are more likely when there is poor control of blood glucose. Women may require more frequent insulin injections. They may have very low blood glucose levels, which can be life threatening if untreated, or they may have ketoacidosis, a

condition that results from high levels of blood glucose. Ketoacidosis may also be life threatening if untreated. It is not clear whether pregnancy worsens diabetic related blood vessel damage and retinal changes, or if it causes changes in kidney function.

Complications for Fetus and Baby

Infants of mothers with diabetes are at greater risk for several problems, especially if blood glucose levels are not carefully controlled, including the following:

Birth defects. Birth defects are more likely in infants of diabetic mothers, especially insulin-dependent women who may have two to six times greater the risk of major birth defects. Some birth defects are serious enough to cause fetal death. Birth defects usually originate sometime during the first trimester of pregnancy. They are more likely in women with pre-gestational diabetes, who may have changes in blood glucose during that time. Overall, major birth defects may occur in about 5 to 10 percent of infants born to insulin-dependent women. Major birth defects that may occur in infants of diabetic mothers include the following:

- Heart and connecting blood vessels
- Brain and spine abnormalities
- Urinary and kidney
- Digestive tract

Stillbirth (fetal death). Stillbirth is more likely in pregnant women with diabetes. The fetus may grow slowly in the uterus due to poor circulation or other conditions, such as high blood pressure or microvascular disease, which can complicate diabetic pregnancy. The exact reason stillbirths occur with diabetes is unknown. The risk of stillbirth increases in women with poor blood glucose control and with blood vessel changes.

Macrosomia. Macrosomia refers to a baby that is considerably larger than normal. All of the nutrients the fetus receives come directly from the mother's blood. If the maternal blood has too much glucose, the pancreas of the fetus senses the high glucose levels and produces more insulin in an attempt to use this glucose. The fetus converts the extra glucose to fat. Even when the mother has gestational diabetes, the fetus is able to produce all the insulin it needs. The combination of high blood glucose levels from the mother and high insulin levels in the fetus results in large deposits of fat that causes the fetus to grow excessively large.

Birth injury. Birth injury may occur due to the baby's large size and difficulty being born.

Hypoglycemia. Hypoglycemia is low levels of blood glucose in the baby immediately after delivery. This problem occurs if the mother's blood glucose levels have been consistently high causing the fetus to have a high level of insulin in its circulation. After delivery, the baby continues to have a high insulin level, but no longer has the high level of glucose from the mother, resulting in the newborn's blood glucose level becoming very low. The baby's blood glucose level is checked after birth, and if the level is too low, it may be necessary to give the baby glucose intravenously.

Respiratory distress (difficulty breathing). Too much insulin or too much glucose in a baby's system may delay lung maturation and cause respiratory difficulties in babies. This is more likely in babies born before 37 weeks of pregnancy.

3.10 MANAGEMENT: CARE DURING PREGNANCY, LABOUR AND PUEPERIUM

As highlighted in Section 2. Classification and Diagnosis of Diabetes, GDM is characterized by increased risk of macrosomia and birth complications, without a risk threshold (9). Treatment starts with medical nutrition therapy, exercise, and glucose monitoring aiming for the targets described previously. A total of 70 to 85% of women diagnosed with GDM under older criteria can control GDM with lifestyle modification alone; it is anticipated that this number will increase using the lower International Association of the Diabetes and Pregnancy Study Groups (IADPSG) thresholds. Treatment has been demonstrated to improve perinatal outcomes in randomized studies and in a U.S. Preventive Services Task Force review (10). Historically, insulin has been the recommended treatment for GDM in the U.S. Randomized controlled trials support the efficacy and short-term safety of glyburide (11) (pregnancy category B) and metformin (12,13) (pregnancy category B) for the treatment of GDM. However, both agents cross the placenta, and long-term safety data are not available (14). Insulin also may be used and should follow the guidelines below.

Management of Pregestational Type 1 Diabetes and Type 2 Diabetes in Pregnancy

Insulin Use in Pregnancy

Insulin is the preferred agent for management of diabetes in pregnancy because of the lack of long-term safety data for noninsulin agents. The physiology of pregnancy requires frequent titration of insulin to match changing requirements. In the first trimester, there is often a decrease in total daily dose of insulin. In the second trimester, rapidly increasing insulin resistance requires weekly or biweekly increase in insulin dose to achieve glycemic targets. In general, a small proportion of the total daily dose should be given as basal insulin and a greater proportion as prandial insulin. Due to the complexity of insulin management in pregnancy, referral to a specialized center is recommended if this resource is available. All insulins are pregnancy category B except for glargin and glulisine, which are labeled C.

Concerns Related to Type 1 Diabetes in Pregnancy

Women with type 1 diabetes have an increased risk of hypoglycemia in the first trimester. Frequent hypoglycemia can be associated with intrauterine growth restriction. In addition, rapid implementation of tight glycemic control in the setting of retinopathy is associated with worsening of retinopathy (15). Insulin resistance drops rapidly with delivery of the placenta, and women become very insulin sensitive, requiring much less insulin than in the prepartum period.

Concerns Related to Type 2 Diabetes in Pregnancy

Pregestational type 2 diabetes is often associated with obesity. Recommended weight gain during pregnancy for overweight women is 15–25 lb and for obese women is 10–20 lb. Glycemic control is often easier to achieve in type 2 diabetes than in type 1 diabetes, but hypertension and other comorbidities often render pregestational type 2 diabetes as high or higher risk than pregestational type 1 diabetes (16,17).

Postpartum Care

Lactation

All women should be supported in attempts to nurse their babies, given immediate nutritional and immunological benefits of breastfeeding for the baby; there may also be a longer-term metabolic benefit to both mother (18) and offspring (19), though data are mixed.

Gestational Diabetes Mellitus

Because GDM may represent preexisting undiagnosed type 2 diabetes, women with GDM should be screened for persistent diabetes or prediabetes at 6–12 weeks postpartum using nonpregnancy criteria and every 1–3 years thereafter depending on other risk factors. Women with a history of GDM have a greatly increased risk of conversion to type 2 diabetes over time and not solely within the 6–12 weeks' postpartum time frame (20). In the prospective Nurses' Health Study II (21), subsequent diabetes risk after a history of GDM was significantly lower in women who followed healthy eating patterns. Adjusting for BMI moderately, but not completely, attenuated this association. Interpregnancy or postpartum weight gain is associated with increased risk of adverse pregnancy outcomes in subsequent pregnancies (22) and earlier progression to type 2 diabetes. Both metformin and intensive lifestyle intervention prevent or delay progression to diabetes in women with a history of GDM. Of women with a history of GDM and impaired glucose tolerance, only 5–6 individuals need to be treated with either intervention to prevent one case of diabetes over 3 years (23).

Type 1 Diabetes

Insulin sensitivity increases in the immediate postpartum period and then returns to normal over the following 1–2 weeks, and many women will require significantly less insulin at this time than during the prepregnancy period. Breastfeeding may cause hypoglycemia, which may be ameliorated by consuming a snack (such as milk) prior to nursing. Diabetes self-management often suffers in the postpartum period.

Type 2 Diabetes

If the pregnancy has motivated the adoption of a healthier diet, building on these gains to support weight loss is recommended in the postpartum period.

Contraception

All women of childbearing age, including those who are postpartum, should have contraception options reviewed at regular intervals.

3.11 URINARY TRACT INFECTIONS

A urinary tract infection (UTI), also called bladder infection, is a bacterial inflammation in the urinary tract. Pregnant women are at increased risk for UTI's starting in week 6 through week 24.

Hormones are one reason. In pregnancy, they cause changes in the urinary tract, and that makes women more likely to get infections.

Also, your growing uterus presses on your bladder. That makes it hard for you to let out all the urine in your bladder. Leftover urine is a likely source of infection.

Causes

Several factors can lead to a UTI during pregnancy, including:

- Changes in your body. All women are at risk for UTIs (even more so than men because, for starters, our urethra is shorter, making it easier for bacteria to enter the bladder). But pregnant women may be even more prone: Changes in hormones may give bacteria an easier opportunity to travel up the urinary tract and cause an infection. Your growing uterus also puts added pressure on your bladder, making it more difficult to completely empty it of urine (which also means women carrying multiples are even more susceptible to UTIs).
- Bacteria from the bowel. UTI-causing bacteria can come from several places. A common bacterial invader, E. coli, comes from the bowel. Because the urethra is located close to the rectum, these bacteria can be transported up the urethra. Wiping from front to back (instead of back to front) every time you use the bathroom can help keep bacteria away from this area.
- Intercourse. Sex during pregnancy is perfectly healthy (unless your doctor tells you otherwise) — but there is a downside: It also has the potential to lead to a UTI, as bacteria near the vagina may be pushed into the urethra during intercourse. It may not be romantic, but it's important to urinate before and after sex to move that bacteria along.
- Group B streptococcus. This type of bacteria, commonly carried in the intestinal tract, can also cause UTIs during pregnancy. Late in your pregnancy, your doctor will test you for this infection and treat you with antibiotics if necessary.
- There are also some less avoidable risk factors. If any of these apply to you, be sure to discuss them with your doctor so you can be closely monitored for signs of an infection:
 - A history of recurring UTIs
 - Maternal diabetes
 - Sickle cell disease
 - Kidney disease
 - Previous urinary tract surgery

Diagnosis

You'll take a urine test. Your doctor will test it for bacteria and red and white blood cells. A "urine culture" may also show what kind of bacteria are in the urine.

Treatment

You'll take antibiotics for 3-7 days or as your doctor recommends. If your infection makes you feel uncomfortable, your doctor will probably start your treatment before you get your urine test results.

Your symptoms should go away in 3 days. Take all of your medication on schedule, anyway. Don't stop it early, even if your symptoms fade.

Many common antibiotics -- amoxicillin, erythromycin, and penicillin, for example -- are considered safe for pregnant women. Your doctor wouldn't prescribe others, such as tetracycline, that may lead to liver problems and affect the developing baby's teeth.

3.12 ASYMPTOMATIC BACTERIURIA

Medical Disorders Complication
Pregnancy Anemia

Asymptomatic bacteriuria (ABU) is common. The frequency varies among different populations, depending on factors such as age, sex, and underlying disorders (eg, diabetes mellitus or spinal cord injury). One study in hospitalized patients identified obesity and iron deficiency anemia as independent risk factors for ABU.

Causes

Asymptomatic bacteriuria occurs in a small number of healthy people. It affects women more often than men. The reasons for the lack of symptoms are not well understood.

You are more likely to have this problem if you:

- Have a urinary catheter in place
- Are female
- Are pregnant
- Are sexually active (in females)
- Have long-term diabetes and are female
- Are older adults
- Have recently had a surgical procedure in your urinary tract
- Symptoms
- There are no symptoms of this problem.

If you have these symptoms, you may have a urinary tract infection but you DO NOT have asymptomatic bacteriuria.

- Burning during urination
- Increased urgency to urinate
- Increased frequency of urination
- Exams and Tests
- To diagnose asymptomatic bacteriuria, a urine sample must be sent for a urine culture. Most people with no urinary tract symptoms do not need this test.

You may need a urine culture done as a screening test even without symptoms if:

- You are pregnant
- You have a surgery or procedure planned that involves bladder, prostate, or other parts of the urinary tract
- To make the diagnosis of asymptomatic bacteriuria, the culture must show a large growth of bacteria.
- In men, only one culture needs to show growth of bacteria
- In women, two different cultures must show growth of bacteria
- Treatment
- Most people who have bacteria growing in their urine, but no symptoms, do not need treatment. This is because the bacteria are not causing any harm. In fact, treating most people with this problem may make it harder to treat infections in the future.

However, for some people getting a urinary tract infection is more likely or may cause more severe problems. As a result, treatment with antibiotics may be needed if:

- You are pregnant.
- You had a kidney transplant recently.
- You are scheduled for surgery involving the prostate gland, the bladder and those with infected kidney stones.

- Young children with reflux (backward movement of urine from the bladder into ureters or kidneys).
- Without symptoms being present, even those who are older adults, have diabetes, or have a catheter in place, do not need treatment.

3.13 PYELONEPHRITIS

The urinary tract is the body's drainage system for removing wastes and extra water. The urinary tract includes two kidneys, two ureters, a bladder, and a urethra. The kidneys are two bean-shaped organs, each about the size of a fist. They are located near the middle of the back, just below the rib cage, one on each side of the spine. Every day, the two kidneys process about 200 quarts of blood to produce about 1 to 2 quarts of urine, composed of wastes and extra water. Children produce less urine than adults. The amount produced depends on their age. The urine flows from the kidneys to the bladder through tubes called the ureters. The bladder stores urine until releasing it through urination. When the bladder empties, urine flows out of the body through a tube called the urethra at the bottom of the bladder.

Pregnancy causes many temporary changes in the body, including physiological changes in the urinary tract. Increased progesterone and increased pressure on the ureters can result in an increased risk of pyelonephritis.

Pyelonephritis in pregnant women typically requires hospital admission. It can threaten the lives of both mother and baby. It can also increase the risk of premature delivery. Pregnant women are treated with beta-lactam antibiotics for at least 24 hours until their symptoms improve..

To prevent pyelonephritis in pregnant women, a urine culture should be conducted between the 12th and 16th weeks of pregnancy. A urinary infection that doesn't have symptoms can lead to the development of pyelonephritis. Detecting it early can prevent kidney infection.

3.14 MALARIA

Malaria is a disease caused by a parasite which infects a certain type of mosquito. Pregnant women are more susceptible than the general population to malaria: they are more likely to become infected, have a recurrence, develop severe complications and to die from the disease. Malaria contributes very significantly to maternal and fetal mortality. These infected mosquitoes spread malaria when they feed on humans.

- There are four types of malaria parasites which infect humans. They are:
- plasmodium falciparum
 - plasmodium vivax
 - plasmodium ovale
 - plasmodium malariae
- Plasmodium falciparum and plasmodium vivax are the most common.
Plasmodium falciparum is the most deadly.

Effect on Pregnancy

Primigravidae are at highest risk of malarial infection and serious complications. Pregnant women with one previous birth are also at higher risk.

The effect of gravida status on complication risk is negated by concurrent HIV infection.

Younger maternal age (particularly adolescence) carries a higher risk of infection and adverse effects.

Second trimester carries the highest risk of infection.

Some studies suggest the increased risk disperses quickly after delivery, others that the first two months postpartum continue to carry an increased risk of infection.

Maternal complications: In endemic/high-transmission areas for malaria, baseline immunity to malaria is decreased by pregnancy. Sufferers are more likely to experience severe anaemia. A non-immune pregnant woman (or one with low immunity from a low-transmission area) is likely to develop a severe form of the illness and complications.

Anaemia tends to occur between 16-29 weeks - due to haemolysis of parasitised cells and increased demands of pregnancy ± folate/iron deficiency. In sub-Saharan Africa 23 million pregnant women are exposed to malarial infection annually and approximately 400,000 pregnant women develop moderate or severe anaemia. Severe anaemia eliminates any physiological reserve to cope with haemorrhage, making women more likely to die in childbirth.

An Indian study reported that pregnant women with malaria are at increased risk of hypoglycaemia, cerebral malaria, acute kidney injury, hepatic failure and hypotension.

Acute pulmonary oedema occurs much more commonly in pregnant women and may be the presenting feature. It carries a high mortality and is typically seen in the second and third trimesters.

Disseminated intravascular coagulation can occur and carries a high mortality risk.

Fetal complications: Both *P. falciparum* and *P. vivax* can cause complications that affect the fetus. Fetal mortality is estimated at 15% for *P. vivax* and around 30% for *P. falciparum*. Common problems for the fetus include:

- Spontaneous abortion.
- Premature delivery.
- Stillbirth.
- Intrauterine growth restriction.
- Low birth weight - common.
- Intrauterine fetal death.

Maternal infection can also be associated with missed abortion, preterm labour, intrauterine growth restriction and intrauterine fetal death.

Treatment in Pregnancy

It's very important to take any medicines prescribed for malaria during pregnancy, because the risk of complications from untreated malaria far outweigh those of any treatment.

For severe malaria that is caused by *P. falciparum* parasite, the drug artesunate is usually recommended. This is given via a drip (intravenously). In less severe cases of *falciparum* malaria, a combination of quinine and clindamycin is often used.

Not all malaria medicines are safe to take in pregnancy. Primaquine is not generally recommended for pregnant women because there's not enough information about its safety in pregnancy, and it has been linked to complications in the third trimester.

For some types of malaria, the drug chloroquine is often recommended as it is thought to be a safer option. It should be taken weekly until your baby is born. Quinine may still be used for the treatment of malaria, particularly in the first trimester, but only if the benefits outweigh the risks.

It's important to treat the fever of malaria in pregnancy. Paracetamol is usually recommended, a maximum of four times a day.

If you develop anaemia as a result of malaria, this is usually treated with iron and folic acid supplements. Severe malaria may need to be treated with a blood transfusion.

Some evidence suggests that in pregnancy, malaria can be particularly difficult to treat, and established treatments may not work as well. If, after treatment, your symptoms or fever return, contact your doctor immediately. You may need another blood test to confirm that the infection has gone.

Once you've recovered from an episode of malaria during pregnancy, it's important to have regular pregnancy check-ups, including blood tests to check your haemoglobin, platelet and blood sugar levels. You may need more frequent ultrasound scans to check your baby's growth.

3.15 PULMONARY TUBERCULOSIS

Tuberculosis or TB is a bacterial infection which most often affects the lungs. However, it can also affect other parts of your body, such as the bones, kidneys, uterus, spine, nervous system and brain. The wide array of opinion of Medical practitioners on tuberculosis in pregnancy simply reflects the Public Health significance of the condition. It is best described as a doubled-edged sword, one blade being the effect of tuberculosis on pregnancy and the pattern of growth of the newborn, while the other is the effect of pregnancy on the progression of tuberculosis.

Tuberculosis not only accounts for a significant proportion of the global burden of disease, it is also a significant contributor to maternal mortality, with the disease being among the three leading causes of death among women aged 15–45 years.

The exact incidence of tuberculosis in pregnancy is not readily available in many countries due to a lot of confounding factors. It is, however, expected that the incidence of tuberculosis among pregnant women would be as high as in the general population, with possibly higher incidence in developing countries.

Diagnosis

If you are pregnant and you are coughing up sputum (phlegm) for more than three weeks, your doctor will ask you to do a sputum test. This involves taking a sample of the phlegm and checking for the presence of TB. The test picks up most forms of TB. Two samples are usually needed, so you may be asked to come back for a second test.

This may be followed by a chest X-ray, skin test or a blood test. It's important to have any tests that are recommended. The impact that undetected and untreated TB will have on your baby is greater than any potential harm that an X-ray might have on your baby.

If you have no specific symptom of TB, you will be given the tuberculin skin test. Also called the Mantoux test, it identifies if you have ever been

exposed to TB. The test involves an injection in your skin. If after two to three days the area shows a large swelling it indicates the presence of the TB bacteria, but not necessarily an active infection.

Effects on Pregnancy

The effects of TB on pregnancy may be influenced by many factors, including the severity of the disease, how advanced the pregnancy has gone at the time of diagnosis, the presence of extrapulmonary spread, and HIV coinfection and the treatment instituted.

The worst prognosis is recorded in women in whom a diagnosis of advanced disease is made in the puerperium as well as those with HIV coinfection. Failure to comply with treatment also worsens the prognosis.

Other obstetric complications that have been reported in these women include a higher rate of spontaneous abortion, small for date uterus, and suboptimal weight gain in pregnancy. Others include preterm labour, low birth weight and increased neonatal mortality. Late diagnosis is an independent factor, which may increase obstetric morbidity about fourfolds, while the risk of preterm labour may be increased ninefolds.

Treatment in pregnancy

Because the infection is caused by a bacteria, the treatment for TB is a course of antibiotics. TB can be fully cured if it is detected early and if the full course of medication is taken without interruption. The course can go for between six and nine months. Occasionally the treatment might go on for longer, depending on the severity of the case. Your doctor will tell you when it is safe to stop your medication.

You may feel better within a few weeks of treatment, but the bacteria will still be alive. So it is very important to complete the full course of medication. If you don't take the drugs as exactly prescribed, there is a very strong chance of a relapse. And you could pass the infection on to your family members. You may also end up with drug-resistant forms of the disease which are more difficult to treat.

Pregnant women should start treatment as soon as TB is detected. This greatly reduces the chances of you becoming ill during pregnancy. It also reduces the chances of your baby having health problems, such as being born too early or too small.

Most TB medicines are safe for you and your baby. You may be advised to take a vitamin B6 (pyridoxine) supplement along with your TB medicine to reduce the risk of some side effects.

In addition to your antibiotics, it is important to take good care of yourself so that you strengthen your immune system:

Eat a well balanced diet.

Get plenty of fresh air.

Make sure you don't miss any antenatal visits and other doctor's appointments.

Report any side effects, such as vision changes, headaches or increased nausea to your doctor immediately.

You are thought to be contagious for up to two or three weeks after starting treatment. After that, you can no longer infect other people.

As long as you are infectious, maintain good personal hygiene. Ensure that you wash your hands regularly and cover your mouth and nose with a tissue when you cough or sneeze so that you do not spread the germs around. Make sure you dispose of your soiled tissues in a covered bin or sealed plastic bag.

It is important to stay positive. Remember, it is safer for you and your baby to be aware of the illness and get treated than to be ignorant and suffer from failing health.

3.16 JAUNDICE

Jaundice in pregnancy, whilst relatively rare, has potentially serious consequences for maternal and fetal health. It can be caused by pregnancy or occur intercurrently. Causes of jaundice specific to pregnancy include:

- Pre-eclampsia associated with HELLP syndrome (= haemolysis, elevated liver enzymes and low platelet count).
- Acute fatty liver of pregnancy.
- Hyperemesis gravidarum.
- Intrahepatic cholestasis of pregnancy.

The presenting clinical features of liver disease in pregnancy are often nonspecific and consist of jaundice, nausea, vomiting and abdominal pain. All liver diseases occurring during pregnancy can lead to increased maternal and fetal morbidity and mortality.

Causes

Jaundice is synonymous with a decline in liver function and may be a result of several reasons including:

- Primary causes are liver disorders such as alcoholic liver disease, non-alcoholic fatty liver disease, acute fatty liver, primary biliary cirrhosis and viral hepatitis.
- Liver cancer may cause jaundice.
- Overdose of paracetamol may adversely affect the functioning of the liver and hamper its ability to filter out waste, causing jaundice.
- Choledocholithiasis or the presence of stones in the common bile duct causes build up of bilirubin that leads to jaundice.
- Malaria may cause inflammation of the liver and jaundice.
- Sickle cell anemia is a genetic condition that causes the breakdown of red blood cells. It also results in a buildup of a waste product known as bilirubin.
- HELLP syndrome, a life threatening condition that usually occurs in the later stages of pregnancy or even after childbirth.
- Secondary causes like obesity, certain autoimmune diseases, and congenital malformation and high cholesterol levels may also lead to jaundice. The latter increases the risk of gallstones, which in turn disrupts the removal of bilirubin, leading to jaundice.

Diagnosis

After a physical examination, the doctor may ask you about any symptoms you have, or if you are taking any prescription drugs. Doctors usually diagnose jaundice with the help of the following steps:

- The doctor may conduct a urine test to check for urobilinogen. The breaking down of bilirubin produces urobilinogen. Higher or lower levels of this compound may help the doctor confirm jaundice.
- He may also ask you to go for a blood test to check if you are suffering from malaria or hepatitis.
- Sometimes, the doctor may recommend a liver function test to check for alcoholic liver disease, cirrhosis, hepatitis or other health conditions that could affect the liver.
- To check for internal problems, the doctor may recommend you to go for an ultrasound.
- In severe cases, the doctor may also suggest a liver biopsy to identify liver cirrhosis or liver cancer.

Treatment

Your blood test (and if needed, a CT scan) reports will help your doctor confirm jaundice and identify its cause too. Jaundice is usually an indicator to an underlying problem. Your doctor will treat the underlying cause of your jaundice, keeping your pregnancy in mind:

- Causes of jaundice like Hepatitis A, go away on its own and usually may not need treatment.
- If your jaundice is a side-effect of Malaria, your doctor will suggest the right treatment to you.
- In case jaundice during pregnancy is a result of cirrhosis, extreme hepatitis, or liver cancer it will demand serious medical attention.

3.17 ANEMIA IN PREGNANCY

Anemia occurs in up to one third of women during the 3rd trimester. The most common causes are:

- Iron deficiency
- Folate deficiency

If women have a hereditary anemia (such as sickle cell disease, hemoglobin S-C disease, and some thalassemias), the risk of problems is increased during pregnancy. If women are at increased risk of having any of these disorders because of race, ethnic background, or family history, blood tests are routinely done before delivery to check for the disorders. Chorionic villus sampling or amniocentesis may be done to check for these disorders in the fetus.

When anemia develops, the blood cannot carry as much oxygen as it normally does. At first, anemia causes no symptoms or only vague symptoms, such as fatigue, weakness, and light-headedness. Affected women may look pale. If anemia is severe, the pulse may be rapid and weak, women may faint, and blood pressure may be low. If anemia persists, the following may result:

- The fetus may not receive enough oxygen, which is needed for normal growth and development, especially of the brain.
- Pregnant women may become excessively tired and short of breath.
- The risk of preterm labor is increased.
- The bleeding that normally occurs during labor and delivery can dangerously worsen anemia in these women. Also, infections are more likely to develop after delivery.
- Anemia is usually detected when doctors do a routine complete blood count at the first examination after pregnancy is confirmed.

Symptoms

Anemia signs and symptoms vary depending on the cause of your anemia. They may include:

- Fatigue
- Weakness
- Pale or yellowish skin
- Irregular heartbeats
- Shortness of breath
- Dizziness or lightheadedness
- Chest pain
- Cold hands and feet
- Headache

At first anemia can be so mild that it goes unnoticed. But symptoms worsen as anemia worsens.

Causes of Anemia

Different types of anemia and their causes include:

- Iron deficiency anemia. This is the most common type of anemia worldwide. Iron deficiency anemia is caused by a shortage of iron in your body. Your bone marrow needs iron to make hemoglobin. Without adequate iron, your body can't produce enough hemoglobin for red blood cells.
- Without iron supplementation, this type of anemia occurs in many pregnant women. It is also caused by blood loss, such as from heavy menstrual bleeding, an ulcer, cancer and regular use of some over-the-counter pain relievers, especially aspirin.
- Vitamin deficiency anemia. In addition to iron, your body needs folate and vitamin B-12 to produce enough healthy red blood cells. A diet lacking in these and other key nutrients can cause decreased red blood cell production.
- Additionally, some people may consume enough B-12, but their bodies aren't able to process the vitamin. This can lead to vitamin deficiency anemia, also known as pernicious anemia.
- Anemia of chronic disease. Certain diseases — such as cancer, HIV/AIDS, rheumatoid arthritis, kidney disease, Crohn's disease and other chronic inflammatory diseases — can interfere with the production of red blood cells.
- Aplastic anemia. This rare, life-threatening anemia occurs when your body doesn't produce enough red blood cells. Causes of aplastic anemia include infections, certain medicines, autoimmune diseases and exposure to toxic chemicals.
- Anemias associated with bone marrow disease. A variety of diseases, such as leukemia and myelofibrosis, can cause anemia by affecting blood production in your bone marrow. The effects of these types of cancer and cancer-like disorders vary from mild to life-threatening.
- Hemolytic anemias. This group of anemias develops when red blood cells are destroyed faster than bone marrow can replace them. Certain blood diseases increase red blood cell destruction. You can inherit a hemolytic anemia, or you can develop it later in life.
- Sickle cell anemia. This inherited and sometimes serious condition is an inherited hemolytic anemia. It's caused by a defective form of

hemoglobin that forces red blood cells to assume an abnormal crescent (sickle) shape. These irregular blood cells die prematurely, resulting in a chronic shortage of red blood cells.

- Other anemias. There are several other forms of anemia, such as thalassemia and malarial anemia.

Risk Factors

These factors place you at increased risk of anemia:

- A diet lacking in certain vitamins. Having a diet that is consistently low in iron, vitamin B-12 and folate increases your risk of anemia.
- Intestinal disorders. Having an intestinal disorder that affects the absorption of nutrients in your small intestine — such as Crohn's disease and celiac disease — puts you at risk of anemia.
- Menstruation. In general, women who haven't experienced menopause have a greater risk of iron deficiency anemia than do men and postmenopausal women. That's because menstruation causes the loss of red blood cells.
- Pregnancy. If you're pregnant and aren't taking a multivitamin with folic acid, you're at an increased risk of anemia.
- Chronic conditions. If you have cancer, kidney failure or another chronic condition, you may be at risk of anemia of chronic disease. These conditions can lead to a shortage of red blood cells.
- Slow, chronic blood loss from an ulcer or other source within your body can deplete your body's store of iron, leading to iron deficiency anemia.
- Family history. If your family has a history of an inherited anemia, such as sickle cell anemia, you also may be at increased risk of the condition.
- Other factors. A history of certain infections, blood diseases and autoimmune disorders, alcoholism, exposure to toxic chemicals, and the use of some medications can affect red blood cell production and lead to anemia. Age. People over age 65 are at increased risk of anemia.

Complications

Left untreated, anemia can cause many health problems, such as:

- Severe fatigue. When anemia is severe enough, you may be so tired that you can't complete everyday tasks.
- Pregnancy complications. Pregnant women with folate deficiency anemia may be more likely to experience complications, such as premature birth.
- Heart problems. Anemia can lead to a rapid or irregular heartbeat (arrhythmia). When you're anemic your heart must pump more blood to compensate for the lack of oxygen in the blood. This can lead to an enlarged heart or heart failure.
- Death. Some inherited anemias, such as sickle cell anemia, can be serious and lead to life-threatening complications. Losing a lot of blood quickly results in acute, severe anemia and can be fatal.

When to See a Doctor

Make an appointment with your doctor if you're feeling fatigued for unexplained reasons. Some anemias, such as iron deficiency anemia or vitamin B-12 deficiency, are common.

Fatigue has many causes besides anemia, so don't assume that if you're tired you must be anemic. Some people learn that their hemoglobin is low, which indicates anemia, when they go to donate blood. If you're told that you can't donate blood because of low hemoglobin, make an appointment with your doctor.

Treatment for Anemia During Pregnancy

Anemia during pregnancy can easily be treated by adding iron or vitamin supplements to your daily routine. Typically, this is all that is needed to reverse the effects of anemia. However, in very rare cases, women with severe anemia may need a blood transfusion. Talk with your doctor about which supplements might be necessary for you.

4

Complications in Late Pregnancy

STRUCTURE

- 4.1 Introduction
- 4.2 Objective
- 4.3 Introduction Abortions
- 4.4 Ectopic pregnancy
- 4.5 Tubal pregnancy
- 4.6 Hydatidiform Mole
- 4.7 Hyperemesis Gravidarum
- 4.8 Urinary retention

LEARNING OBJECTIVES

- ❖ Understanding complication in late pregnancy.
- ❖ Know about abortions.
- ❖ Know about ectopic pregnancy.
- ❖ Know about ectopic pregnancy other than tubal pregnancy.
- ❖ Know about hydatidiform mole.
- ❖ Know about hyperemesis gravidarum
- ❖ Know about retention of urine.

4.1 INTRODUCTION

Preeclampsia, fetal growth restriction (undernourished baby) and spontaneous preterm birth are the major complications of late pregnancy. They are leading causes of illness and death in mothers and newborn babies. In the developed world, in almost half the cases either the mother and/or baby require admission to an intensive care unit. Every year, an estimated \$41 billion is spent on healthcare costs related to these pregnancy diseases.

The purpose of this review is to address two common complications of late pregnancy, abnormal vaginal bleeding and abnormally high blood pressure.

Complications Pregnancy	in	Late	The possible causes of bleeding will be discussed and a review of hypertensive disorders of pregnancy will be presented.
			<p>The initial management of significant bleeding in late pregnancy is similar no matter what the cause of the bleeding may be. An initial survey should attempt to estimate the amount of blood loss, although this may be difficult due to concealed hemorrhage. Quick attention to the presenting vital signs looking for hypotension, tachycardia, confusion, or breathlessness can alert the clinician to hemodynamic instability. In cases of hemodynamic instability immediate intravenous access, fluid resuscitation, and availability of blood products is necessary. Baseline laboratory tests include hematocrit or hemoglobin, blood type, platelet count, fibrinogen level, and coagulation studies. An assessment of the fetal condition through auscultation of fetal heart tones or continuous fetal monitoring should be done as soon as possible.</p>
			<p>The problems of childbearing in later life that were addressed in this report have long been recognised. Many women planning on becoming pregnant in later life will be well aware of some of the possible difficulties in conceiving or the risks of complications. However, the age at which a woman becomes a mother is governed by a number of complex personal, social, professional and life circumstances, which means that it cannot always be easily planned.</p>
			<p>Women should not be overly concerned by this report, but should be aware of the recommendations. These include an awareness of the risks of genetic disorders and the screening tests available, ensuring any medical conditions are managed and stable (for example, high blood pressure, diabetes or obesity) and ensuring that folic acid and vitamin supplements are taken around the time of conception. A woman's health should be as optimal as possible prior to pregnancy, which means maintaining a healthy weight and eating a balanced diet, taking regular exercise, limiting alcohol and not smoking.</p>
			<p>Many women who become pregnant in their late 30s and early 40s have perfectly healthy pregnancies and babies. All pregnant women and those planning pregnancy, regardless of age, should be fully informed, receive optimal care and support and the appropriate medical attention required to meet any needs that arise from becoming a mother.</p>
			<h4 style="text-align: center;">4.2 OBJECTIVE</h4>
			<p>It might take longer to get pregnant. You're born with a limited number of eggs. As you reach your mid- to late 30s, your eggs decrease in quantity and quality. An older woman's eggs also aren't fertilized as easily as a younger woman's eggs. If you're older than 35 and haven't been able to conceive for six months, consider asking your health care provider for advice.</p>
			<p>You're more likely to have a multiple pregnancy. The chance of having twins increases with age. The use of assisted reproductive technologies — such as in vitro fertilization — also can play a role.</p>
			<p>You're more likely to develop gestational diabetes. This type of diabetes, which occurs only during pregnancy, is more common as women get older. Tight control of blood sugar through diet and physical activity is essential. Sometimes medication is needed, too. Left untreated, gestational diabetes can cause a baby to grow significantly larger than average — which increases the risk of injuries during delivery.</p>
			<p>You're more likely to develop high blood pressure during pregnancy. Research suggests that high blood pressure that develops during pregnancy is</p>

more common in older women. Your health care provider will carefully monitor your blood pressure and your baby's growth and development. You might need to take medication or deliver your baby before your due date to avoid complications.

You're more likely to have a low birth weight baby and a premature birth. Premature babies, especially those born earliest, often have complicated medical problems.

You might need a C-section. Older mothers have a higher risk of pregnancy-related complications that might lead to a C-section delivery, such as placenta previa — a condition in which the placenta blocks the cervix.

The risk of chromosome abnormalities is higher. Babies born to older mothers have a higher risk of certain chromosome problems, such as Down syndrome.

The risk of pregnancy loss is higher. The risk of pregnancy loss — by miscarriage and stillbirth — increases as you get older, perhaps due to pre-existing medical conditions or fetal chromosomal abnormalities. Ask your health care provider about monitoring your baby's well-being during the last weeks of pregnancy.

Health risks of late pregnancy

As women get older, both mothers and babies face an increased risk of pregnancy-related complications and health problems. These are due to changes in the reproductive system and the increased likelihood of general health problems that comes with age. Problems include:

Greater difficulty in initially conceiving a child, with the personal and psychological difficulties that this can cause.

Increased risk of complications for both mother and infant during pregnancy and delivery (although the actual size of the risk may be small).

Greater risk of general maternal health problems, such as high blood pressure, which can contribute to complications.

Higher risk of miscarriage in women above the age of 35.

Higher risk of having twins or triplets, which is itself associated with higher risk of complications.

Increased chance of having a baby with a congenital abnormality, such as Down's syndrome.

Increased risk of pre-eclampsia.

Increased risk of complications during delivery, such as prolonged labour, need for assisted delivery or Caesarean section, or stillbirth.

4.3 INTRODUCTION ABORTIONS

An abortion is the deliberate medical process of ending a pregnancy. An abortion is also known as a 'termination' or 'termination of pregnancy'. 1 in 3 women will have an abortion in her life time. Abortion is when a pregnancy is ended so that it doesn't result in the birth of a child. Sometimes it is called 'termination of pregnancy'.

BPAS cares for women with an unplanned or unwanted pregnancy. We treat thousands of women who've decided that abortion is the right choice for them, and give advice and counselling to women who don't know what to do next.

There are two types of abortion treatment, 'Medical' and 'Surgical' abortion.

1. Medical abortion: The abortion pill: Some women feel that a medical abortion is a more natural process. There are two types of medical abortion:

- Abortion pill (also known as early medical abortion) up to 10 weeks
- Abortion pill from 10 weeks up to 24 weeks

2. Surgical abortion: Surgical abortion involves a quick, minor operation.

There are two types of surgical abortion:

- Vacuum aspiration up to 15 weeks
- Dilatation and evacuation between 15 and 24 weeks

Risks

Below is a description of the risks that have been associated with abortion:

Pelvic Infection: Bacteria (germs) from the vagina or cervix may enter the uterus and cause an infection. Antibiotics may clear up such an infection. In rare cases, a repeat suction, hospitalization or surgery may be needed. Infection rates are less than 1 percent for suction curettage, 1.5 percent for D&E, and 5 percent for labor induction.

Incomplete abortion: Fetal parts or other products of pregnancy may not be completely emptied from the uterus, requiring further medical procedures. Incomplete abortion may result in infection and bleeding. The reported rate of such complications is less than 1 percent after a D&E; whereas, following a labor induction procedure, the rate may be as high as 36 percent.

Blood clots in the uterus: Blood clots that cause severe cramping occur in about 1 percent of all abortions. The clots usually are removed by a repeat suction curettage.

Heavy bleeding: Some amount of bleeding is common following an abortion. Heavy bleeding (hemorrhaging) is not common and may be treated by repeat suction, medication or, rarely, surgery. Ask the doctor to explain heavy bleeding and what to do if it occurs.

Cut or torn cervix: The opening of the uterus may be torn while it is being stretched open to allow medical instruments to pass through and into the uterus. This happens in less than 1 percent of first trimester abortions.

Perforation of the uterus wall: A medical instrument may go through the wall of the uterus. The reported rate is 1 out of every 500 abortions. Depending on the severity, perforation can lead to infection, heavy bleeding or both. Surgery may be required to repair the uterine tissue, and in the most severe cases hysterectomy may be required.

Anesthesia-related complications: As with other surgical procedures, anesthesia increases the risk of complications associated with abortion. The reported risks of anesthesia-related complications is around 1 per 5,000 abortions.

Rh Immune Globulin Therapy: Genetic material found on the surface of red blood cells is known as the Rh Factor. If a woman and her fetus have different Rh factors, she must receive medication to prevent the development of antibodies that would endanger future pregnancies.

Future childbearing: Early abortions that are not complicated by infection do not cause infertility or make it more difficult to carry a later pregnancy to term. Complications associated with an abortion or having many abortions may make it difficult to have children.

4.4 ECTOPIC PREGNANCY

In a normal pregnancy, a fertilized egg travels through a fallopian tube to the uterus. The egg attaches in the uterus and starts to grow. But in an ectopic pregnancy camera.gif, the fertilized egg attaches (or implants) someplace other than the uterus, most often in the fallopian tube. (This is why it is sometimes called a tubal pregnancy.) In rare cases, the egg implants in an ovary, the cervix, or the belly.

There is no way to save an ectopic pregnancy. It cannot turn into a normal pregnancy. If the egg keeps growing in the fallopian tube, it can damage or burst the tube and cause heavy bleeding that could be deadly. If you have an ectopic pregnancy, you will need quick treatment to end it before it causes dangerous problems.

Pregnancy complications range in nature and severity. Fortunately, with proper treatment and advice, most can be managed. When a fertilized egg implants outside the uterus, it's an ectopic pregnancy. One in 50 pregnancies is ectopic. Because the vast majority of ectopic pregnancies occur in a fallopian tube, they're often called "tubal" pregnancies.

It's important to catch this type of pregnancy early because the growing embryo could rupture your fallopian tube and cause internal bleeding that can be fatal. Since there's no way to transplant an ectopic pregnancy into the uterus, ending the pregnancy is the only option.

Causes an Ectopic Pregnancy

Ectopic pregnancies are caused by one or more of the following:

- An infection or inflammation of the fallopian tube can cause it to become partially or entirely blocked.
- Scar tissue from a previous infection or a surgical procedure on the tube may also impede the egg's movement.
- Previous surgery in the pelvic area or on the tubes can cause adhesions.
- Abnormal growths or a birth defect can result in an abnormality in the tube's shape.

Risk Factors for Ectopic Pregnancy

Although an ectopic pregnancy can happen to any woman, having certain risk factors makes it more likely. One common risk factor is previously having any condition or surgery that affected your fallopian tubes, such as:

Surgery. Tubal ligation for sterilization, tubal ligation reversal, or surgery to correct a problem with your fallopian tubes can increase your ectopic pregnancy risk. (If you've had other pelvic or abdominal surgery, your risk may also be higher, though to a much lesser degree.)

A previous ectopic pregnancy. In a review of studies, researchers found that in women who had one ectopic pregnancy, the chance of having another ranged from 5 to 25 percent, depending on how the previous ectopic pregnancy was treated.

Pelvic inflammatory disease (PID). This bacterial infection in the uterus, ovaries, or fallopian tubes often results from untreated sexually transmitted infections (STIs), such as gonorrhea or chlamydia. PID doesn't always cause symptoms, so having had either of these STIs also increases your risk for an ectopic pregnancy, even if you don't think you have PID.

Endometriosis. In this condition, the tissue that normally lines your uterus grows elsewhere in your abdomen, such as your ovaries, intestines, or fallopian tubes. If the tissue grows on your fallopian tubes, it causes inflammation and scarring, increasing your risk of an ectopic pregnancy.

Other risks factors for an ectopic pregnancy include:

Fertility issues. Infertility is often caused by damaged tubes. If you get pregnant as a result of fertility drugs or in vitro fertilization (IVF), there's a slightly higher than average chance that the pregnancy will be ectopic.

Being age 35 or older. If you're 35 or older, you may have accumulated risk factors over time, such as pelvic infections or changes in how well your fallopian tubes work.

Smoking. Some experts theorize that smoking cigarettes may impair normal functioning of the fallopian tubes.

Having a mother who took the drug DES during pregnancy. This drug used to be prescribed to prevent miscarriage and various pregnancy complications. If your mother took it while she was pregnant with you, you may have health problems, including abnormalities of your fallopian tubes and uterus, which increase your risk of an ectopic pregnancy. (Note: DES was taken off the market in the United States in 1971 but remained available in other countries. If you were born in 1972 or earlier, or if your mother lived in another country during her pregnancy with you, ask her whether she took DES.)

Getting pregnant with an intrauterine device (IUD) in place. Although the chance of this happening is rare, you have a higher than average risk of an ectopic pregnancy if it does. An IUD works by preventing an egg from implanting in the uterus, but in very rare cases, it may implant outside it.

Of course, while using an IUD, your overall risk of ectopic pregnancy is much lower than that of the general population. (And having used an IUD in the past doesn't raise your risk of an ectopic pregnancy.)

Taking progestin-only hormonal contraceptives. Some studies suggest that this somewhat increases your chance of an ectopic pregnancy.

Treating Ectopic Pregnancy

Ectopic pregnancies aren't safe for the mother. Also, the embryo won't be able to develop to term. It's necessary to remove the embryo as soon as possible for the mother's immediate health and long-term fertility. Treatment options vary depending on the location of the ectopic pregnancy and its development.

4.5 TUBAL PREGNANCY

A pregnancy that is not in the usual place within the uterus but is located in the Fallopian tube. Tubal pregnancies are due to the inability of the fertilized egg to make its way through the Fallopian tube into the uterus.

Most tubal pregnancies occur in women 35 to 44 years of age. Tubal pregnancies are the most common type of extrauterine or ectopic pregnancy, accounting for the large majority (95%) of all extrauterine pregnancies.

Risk factors predisposing to tubal pregnancies include:

- Pelvic inflammatory disease (PID) which can damage the tube's functioning or leave it partly or completely blocked;
- Surgery on a Fallopian tube;

- Surgery in the neighborhood of the Fallopian tube which can leave adhesions (bands of tissue that bind together surfaces);
- A prior tubal pregnancy;
- A history of repeated induced abortions;
- A history of infertility problems or medications to stimulate ovulation; and
- An abnormality in the shape of the Fallopian tube, as with a congenital malformation (a birth defect).
- A major concern with a tubal pregnancy, as with any ectopic pregnancy, is internal bleeding. If there is any doubt, seek medical attention promptly.

4.6 HYDATIDIFORM MOLE

Hydatidiform mole (HM) is a rare mass or growth that forms inside the womb (uterus) at the beginning of a pregnancy. It is a type of gestational trophoblastic disease (GTD).

Causes

HM, or molar pregnancy, results from abnormal fertilization of the oocyte (egg). It results in an abnormal fetus. The placenta grows normally with little or no growth of the fetal tissue. The placental tissue forms a mass in the uterus. On ultrasound this mass often has a grape-like appearance, as it contains many small cysts.

Chance of mole formation is higher in older women. A history of mole in earlier years is also a risk factor.

Molar pregnancy can be of 2 types:

- Partial molar pregnancy. There is an abnormal placenta and some fetal development.
- Complete molar pregnancy. There is an abnormal placenta and no fetus.
- There is no way to prevent formation of these masses.

Symptoms

Symptoms of a molar pregnancy may include:

- Abnormal growth of the uterus, either bigger or smaller than usual
- Severe nausea and vomiting
- Vaginal bleeding during the first 3 months of pregnancy
- Symptoms of hyperthyroidism, including heat intolerance, loose stools, rapid heart rate, restlessness or nervousness, warm and moist skin, trembling hands, or unexplained weight loss
- Symptoms similar to preeclampsia that occur in the first trimester or early second trimester, including high blood pressure and swelling in the feet, ankles, and legs (this is almost always a sign of a hydatidiform mole, because preeclampsia is extremely rare this early in a normal pregnancy).

Tests

A pregnancy ultrasound will show a snowstorm appearance with an abnormal placenta, with or without some development of a baby.

Tests done may include:

- hCG (quantitative levels) blood test
- Abdominal or vaginal ultrasound of the pelvis
- Chest x-ray

- CT or MRI of the abdomen (imaging tests)
- Complete blood count (CBC)
- Blood clotting tests
- Kidney and liver function tests

Treatment

If your provider suspects a molar pregnancy, removal of the abnormal tissue with a dilation and curettage (D & C) will most likely be suggested. D & C may also be done using suction. This is called suction aspiration (The method uses a suction cup to remove contents from the uterus).

Sometimes a partial molar pregnancy can continue. A woman may choose to continue her pregnancy in the hope of having a successful birth and delivery. However, these are very high-risk pregnancies. Risks may include bleeding, problems with blood pressure, and premature delivery (having the baby before it is fully developed). In rare cases, the fetus is genetically normal. Women need to completely discuss the risks with their provider before continuing the pregnancy.

A hysterectomy (surgery to remove the uterus) may be an option for older women who DO NOT wish to become pregnant in the future.

After treatment, your hCG level will be followed. It is important to avoid another pregnancy and to use a reliable contraceptive for 6 to 12 months after treatment for a molar pregnancy. This time allows for accurate testing to be sure that the abnormal tissue does not grow back. Women who get pregnant too soon after a molar pregnancy are at high risk of having another molar pregnancy.

4.7 HYPEREMESIS GRAVIDARUM

Hyperemesis Gravidarum (HG) is a condition at the extreme end of the pregnancy sickness spectrum. It affects only 1% of women with pregnancy sickness and is extremely unpleasant for sufferers. Hyperemesis gravidarum is the most severe form of nausea and vomiting in pregnancy, characterized by persistent nausea and vomiting associated with ketosis and weight loss (>5% of prepregnancy weight). This condition may cause volume depletion, electrolytes and acid-base imbalances, nutritional deficiencies, and even death. Severe hyperemesis requiring hospital admission occurs in 0.3-2% of pregnancies.

Signs and Symptoms

The defining symptoms of hyperemesis gravidarum are gastrointestinal in nature and include nausea and vomiting. Other common symptoms include ptyalism (excessive salivation), fatigue, weakness, and dizziness.

Patients may also experience the following:

- Sleep disturbance
- Hyperolfaction
- Dysgeusia
- Decreased gustatory discernment
- Depression
- Anxiety
- Irritability
- Mood changes
- Decreased concentration.

Risk

Some factors that could increase your risk of getting HG are:

- having a history of HG
- being pregnant with more than one baby
- being overweight
- being a first-time mother

Trophoblastic disease can also cause HG. Trophoblastic disease occurs when there's an abnormal growth of cells inside the uterus.

Treatment

Treatment for HG depends on the severity of your symptoms. Your doctor may recommend natural nausea prevention methods such as vitamin B-6 or ginger. Try eating smaller, more frequent meals and dry foods such as crackers. You should drink plenty of fluids to stay hydrated.

Severe cases may require hospitalization. Pregnant women who are unable to keep fluids or food down due to constant nausea or vomiting will need to get them intravenously, or through an IV. Medication is necessary when vomiting is a threat to the mother or child. The most commonly used anti-nausea drugs are promethazine and meclizine. You can't take medication orally. You can receive it through an IV or as a suppository. Taking medication while pregnant can cause potential health problems for your baby, but in severe cases of HG, maternal dehydration is a more concerning problem. Talk to your doctor about the risks associated with any method of treatment.

4.8 URINARY RETENTION

Urinary retention is the inability to empty the bladder. Urinary retention can be acute or chronic. Acute urinary retention is a medical emergency. A woman may experience urinary retention if her bladder sags or moves out of the normal position (cystocele) or pulled out of position by a sagging of the lower part of the colon.

Acute urinary retention in pregnancy is rare. It has been described in all trimesters but most commonly occurs between weeks 10-16.

It is initially treated with catheterization, however definitive cause must be determined for treatment.

Symptoms

Symptoms of acute urinary retention are severe discomfort and pain, an urgent need to urinate but you simply can't, and bloated lower belly. Chronic urinary retention symptoms are mild but constant discomfort, difficulty starting a stream of urine, weak flow of urine, needing to go frequently, or feeling you still need to go after you've finished.

Pathphysiology

Interestingly, direct urethral obstruction is most commonly not the cause. Cystoscopy and ultrasonography have shown an alternative mechanism based on anatomy.

The gravid uterus is confined by the sacrum below and promontory above which cause anterior and superior displacement of the cervix. The cervix then compresses the lower bladder obstructing the urethral orifice but not the urethra itself.

Disposition

Patients should be referred to urogynecology for further evaluation. Prophylactic recommendations (thought to help although no good studies have been conducted):

- limiting fluids before sleep,
- changing from supine to prone position for a few minutes before attempting to void,
- leaning forward when initiating voiding, avoiding any Valsalva maneuver,
- using a Credé maneuver (manual pressure just over the anterior bladder) to initiate voiding,
- Patients should be educated on signs and symptoms of acute urinary retention and instructed to return if those should develop.

Complications

Complications include urinary tract infections (UTIs), bladder damage, and chronic kidney disease.

Diagnose

Tests to diagnose urinary retention include taking a urine sample, bladder scan, cystoscopy, X-ray and CT scan, blood test for prostate-specific antigen (PSA), prostate fluid sample test, and urodynamic tests to measure the bladder's ability to empty steadily and completely.

Treatment

Treatment for urinary retention includes catheterization, treating prostate enlargement, and surgery.

5

Labor

STRUCTURE

- 5.1 Introduction
- 5.2 Normal Labor & Its Management
- 5.3 Anatomy
- 5.4 Physiology of Labour
- 5.5 Stages of labor
- 5.6 True and False Labor
- 5.7 Examination of a Woman in Labour
- 5.8 History, Examination, Procedures on Admission
- 5.9 Monitoring Labour
- 5.10 Management of labor
- 5.11 Examination of Placenta and Membrances
- 5.12 Post Delivery Management
- 5.13 Normal Puerperium and Postnatal Care
- 5.14 Physiological Change in Normal Puerperium
- 5.15 Postnatal Care
- 5.16 Breech Presentation
- 5.17 Transverse Lie
- 5.18 Twin Pregnancy
- 5.19 Abnormal Progress of Labour
- 5.20 Obstructed Labour
- 5.21 Rupture uterus
- 5.22 Abnormal Puerperium

LEARNING OBJECTIVES

- ❖ Understanding about normal labor process and its management
- ❖ Know about anatomy of meternal pelvis and foetal skull.
- ❖ Know about physiology of labour.
- ❖ Know about stages of labour.
- ❖ Know about true and false labour.

- ❖ Know about examination of a woman in labour
- ❖ Know about monitoring process of labour.
- ❖ Know about management during first, second and third stage of labour.
- ❖ Know about examination of placenta and membranes.
- ❖ Know about post delivery management.
- ❖ Know about normal puerperium and postnatal care.
- ❖ Know about breech presentation, transverse lie and twins
- ❖ Know about prolonged labour, obstructed labour & ruptured uterus.
- ❖ Know about abnormal progress of labour.
- ❖ Know about abnormal puerperium.

5.1 INTRODUCTION

Labor is a physiologic process during which the fetus, membranes, umbilical cord, and placenta are expelled from the uterus. Labor consists of a series of rhythmic, involuntary, progressive contractions of the uterus that cause effacement (thinning and shortening) and dilation of the uterine cervix. The stimulus for labor is unknown, but digitally manipulating or mechanically stretching the cervix during examination enhances uterine contractile activity, most likely by stimulating release of oxytocin by the posterior pituitary gland.

Normal labor usually begins within 2 wk (before or after) the estimated delivery date. In a first pregnancy, labor usually lasts 12 to 18 h on average; subsequent labors are often shorter, averaging 6 to 8 h.

5.2 NORMAL LABOR & ITS MANAGEMENT

The World Health Organization (WHO) defines normal birth as "spontaneous in onset, low-risk at the start of labor and remaining so throughout labor and delivery. The infant is born spontaneously in the vertex position between 37 and 42 completed weeks of pregnancy. After birth, mother and infant are in good condition".

This topic will present a paradigm for intrapartum management of women who are expected to have a normal birth. Many of the options for managing these women have not been studied in clinical trials or the data from clinical trials are insufficient for making strong recommendations for a specific approach. Therefore, much of our approach is based upon our clinical experience, data from observational studies, and expert opinion.

Management of women with complicated labor and delivery is discussed in separate topic reviews (eg, malpresentation, protraction and arrest disorders, preterm labor, operative vaginal delivery, maternal medical/obstetrical disorders, hemorrhage) (refer to individual topic reviews on each subject).

5.3 ANATOMY

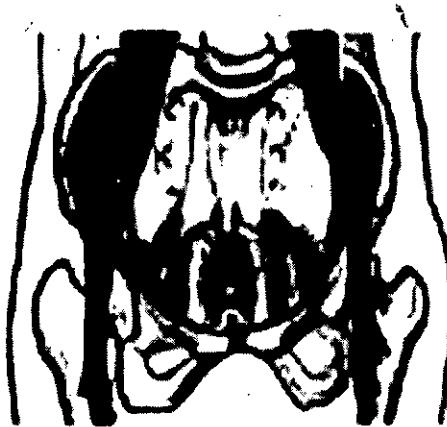
To better understand the changes your body goes through during the last trimester and labor, it is helpful to be familiar with basic anatomy. Open the activity on the right to compare your body before pregnancy to your body at 37 weeks. You'll see how your body adjusts in amazing ways to support your growing baby. Then, play the video to learn about pregnancy anatomy from inside the womb. A woman's birthing anatomy includes soft tissues and hard bones..

The soft Tissues

Labor

More important than pelvic shape is the tone and relative symmetry of a woman's uterine ligaments and muscles.

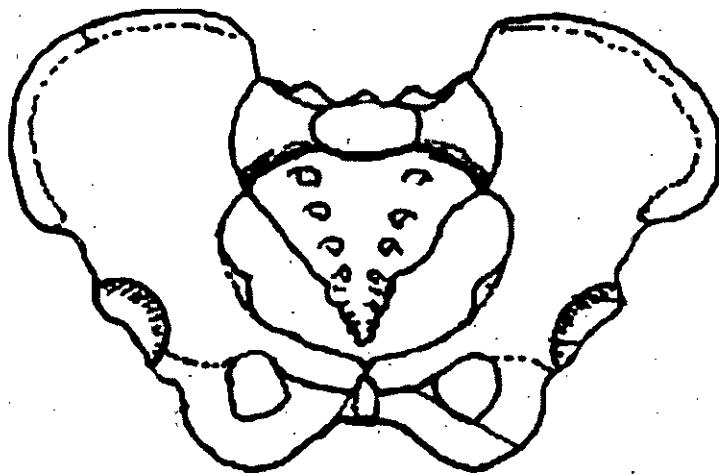
Our ability to stand depends on the psoas muscle pair. The psoas begins at T-12 vertebrae and sweeps around from the center of the sides of the spine over the pelvis to attach at the top of the thigh bone (femur). The muscle pair comes around like supporting arms, pulling up the legs so that our backs don't fall over.



As the psoas comes across the pelvis, it makes a diagonal support for our organs. The support can be thought of as a shelf. When the uterus is large, at the end of pregnancy, a tight psoas can hold up a baby from descending and engaging in the womb. Many discomforts of the abdomen can stem from psoas tightness, but there are exercises to release the psoas.

The Bones

Our bones are held together by flexible tendons. In pregnancy, these joints become even more mobile. Waddling is an example of what happens when these joints get softer. The baby passes through the mobile pelvis.



The hormone relaxin helps make the pelvis a dynamic, flexible passageway.

The bony pelvis has four joints. In the front of the pelvis is the symphysis pubis joint. Movement here really isn't that comfortable. Sometimes a pregnancy belt holds this joint stable for walking and rolling over in bed. Symmetry in the symphysis pubis (pubic bone) reduces spasm in the round ligaments and

helps the sacrum, around back, to be aligned properly. On either side of the sacrum are the SI joints (Sacroiliac joints). These are located where the dimples are. Many plastic baby dolls have SI dimples above their bum. The SI joints are a common location for aches when the pelvis is weak or crooked.

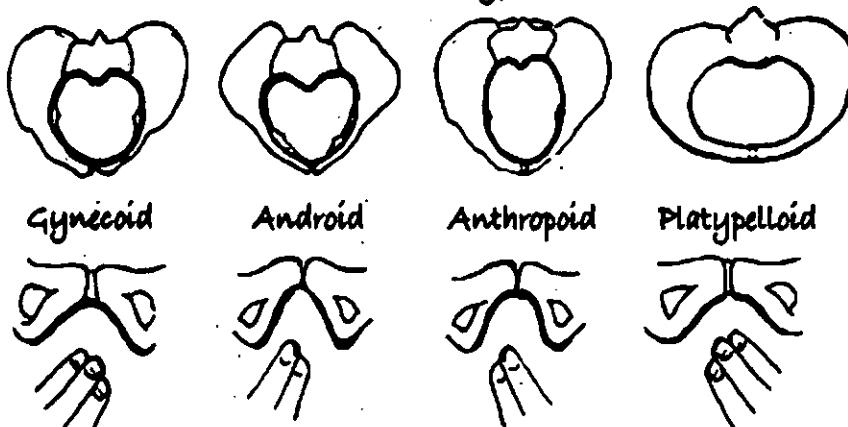
Symmetry in the SI joints will help the sacrum be lined up with the pelvic brim. Then the baby can get into a nice, head down position. A chiropractic adjustment helps get the symphysis and the SI joints aligned.

The sacrum, rather than fused, is slightly mobile and in the birth process actually moves to allow the head past. The tailbone is connected by a joint to the lower end of the sacrum. Sometimes this needs an adjustment, too, especially after birthing a baby. Ligaments connecting to the sacrum and tailbone (coccyx) will become more symmetrical and their tone will be more relaxed and less in spasm after bodywork on the pelvis.

Pelvic Types

The pelvis is a hard ring of bone, which supports and protects the pelvic organs and the contents of the abdominal cavity. The muscles of the legs, back and abdomen are attached to the pelvis, and their strength and power keep the body upright and enable it to bend and twist at the waist, and to walk and run. Four general pelvic types are taught in midwifery and obstetrical schools. Caldwell-Malloy (1933) taught that nearly half of Caucasian women have a Gynecoid pelvis (rounder at the inlet, but wider side-to-side and a little less room front-to-back) while nearly half of women of African descent are said to have an Anthropoid pelvis (oval at the inlet, roomiest front-to-back of all pelvic types). Today there is new evidence that most people share a mix of types.

Four Pelvic Types



About 1/4 of all women have been considered to have an android pelvis, with its triangular inlet and a bit smaller outlet than its own inlet. Now days, this "type" is described as a more narrow outlet and more narrow "front of the pelvis" and narrower pubic arch. See the pubic arch in the drawing above that has room for only two finger widths across and a triangular arch shape (the second option)?

Only about 5% of women are said to have a platypelloid pelvis. Fetal position of LOT is crucial for engagement.

The woman's pelvis is adapted for child bearing, and is a wider and flatter shape than the male pelvis. The pelvis is composed of pairs of bones, which are fused together so tightly that the joints are difficult to see. We will describe each of the bones in turn, and their major landmarks.

Ilium

The major portion of the pelvis is composed of two bones, each called the ilium — one on either side of the backbone (or spinal column) and curving towards the front of the body. When you place your hand on either hip, your hand rests on the iliac crest, which is the upper border of the ilium on that side. At the front of the iliac crest, you can feel the bony protuberance called the anterior superior iliac spine (a 'protuberance' is something that sticks out, like a little hill or knob).

Ischium

The ischium is the thick lower part of the pelvis, formed from two fused bones — one on either side. When a woman is in labour, the descent of the fetal head as it moves down the birth canal is estimated in relation to the ischial spines, which are inward projections of the ischium on each side. The ischial spines are smaller and rounder in shape in the woman's pelvis than in that of the man. In the Module on Labour and Delivery Care, you will learn how to feel for the ischial spines to help you estimate how far down the birth canal the baby's head has progressed.

Pubic Bones and the Symphysis Pubis

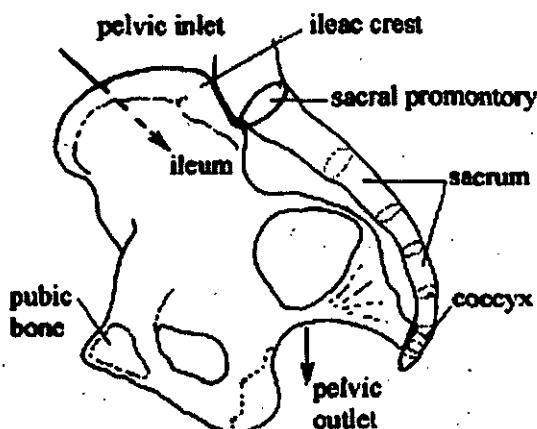
The pubic bones on either side form the front part of the pelvis. The two pubic bones meet in the middle at the pubic symphysis. (A symphysis is a very strong bony joint.) The pubic symphysis is immediately below the hair-covered pubic mound that protects the woman's external genitalia.

Sacrum

The sacrum is a tapered, wedge-shaped bone at the back of the pelvis, consisting of five fused vertebrae (the small bones that make up the spinal column or backbone). At the bottom of the sacrum is a tail-like bony projection called the coccyx. The upper border of the first vertebra in the sacrum sticks out, and points towards the front of the body; this protuberance is the sacral promontory — an important landmark for labour and delivery.

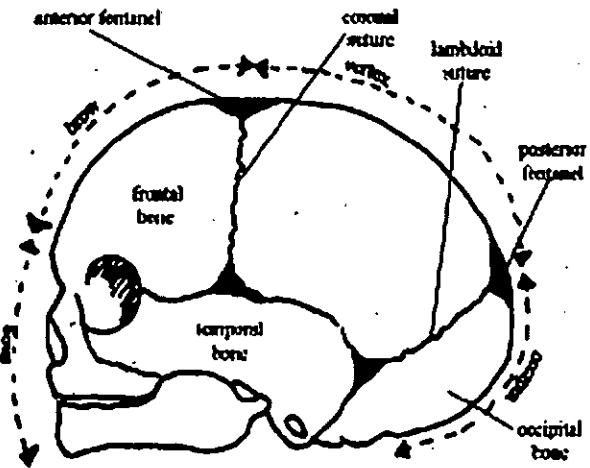
The Pelvic Canal

The roughly circular space enclosed by the pubic bones at the front, and the ischium on either side at the back, is called the pelvic canal — the bony passage through which the baby must pass. This canal has a curved shape because of the difference in size between the anterior (front) and posterior (back) borders of the space created by the pelvic bones.



The Fetal Skull

The fetal skull is the most difficult part of the baby to pass through the mother's pelvic canal, due to the hard bony nature of the skull. Understanding the anatomy of the fetal skull and its diameter will help you recognise how labour is progressing, and whether the baby's head is 'presenting' correctly as it comes down the birth canal. This will give you a better understanding of whether a normal vaginal delivery is likely, or if the mother needs referral because the descent of the baby's head is not making sufficient progress.



The fetal head is heavy in comparison to the rest of the baby's body. The vertical positions of walking, standing and sitting help the heavy head settle lower than the body during the third trimester, and sometimes in the second trimester.

The fetal skull has not yet hardened and remains somewhat flexible for fitting through the pelvis. There are plates of bone and cartilage that are nearly finished coming together at birth. That nearly finished margin is what allows molding. These margins are called sutures.

The skull plates are held together by a coating for strong fascia. This membrane also wraps down the spine to the pelvis and legs. The fascia also connects to membranes that support the brain, called the tentorium cerebelli.

Which angle the head presses past, or onto, the bony pelvic passageway determines molding. When the crown of the head enters the pelvis first molding is most efficient. When a plate, rather than the margin between, or sutures, aims into the narrow part of pelvis, molding takes a long time and does less to reduce the diameter of the baby's head. One example of this is the asynclitic baby. Second stage can take a long time and pushing can be quite strenuous when a baby is asynclitic.

The baby's shoulders can also mold a bit for the birth process. The shoulder girdle is flexible and many times the shoulders are folded towards the chest for the actual emergence. Other times one shoulder comes out just ahead of the other in another natural variation to reduce shoulder breadth.

5.4 PHYSIOLOGY OF LABOUR

The last few hours of human pregnancy are characterized by forceful and painful uterine contractions that effect cervical dilatation and cause the fetus

to descend through the birth canal. There are extensive preparations in both the uterus and cervix long before this. During the first 36 to 38 weeks of normal gestation, the myometrium is in a preparatory yet unresponsive state. Concurrently, the cervix begins an early stage of remodeling—termed softening—yet maintains structural integrity. Following this prolonged uterine quiescence, there is a transitional phase during which myometrial unresponsiveness is suspended, and the cervix undergoes ripening, effacement, and loss of structural integrity.

The physiological processes that regulate parturition and the onset of labor continue to be defined. It is clear, however, that labor onset represents the culmination of a series of biochemical changes in the uterus and cervix. These result from endocrine and paracrine signals emanating from both mother and fetus. Their relative contributions vary between species, and it is these differences that complicate elucidation of the exact factors that regulate human parturition. When parturition is abnormal, then preterm labor, dystocia, or postterm pregnancy may result. Of these, preterm labor remains the major contributor to neonatal mortality and morbidity in developed countries.

Physiology of Uterine Contractions

Uterine contractile activity plays an important role in many and varied reproductive functions including sperm and embryo transport, implantation, menstruation, gestation and parturition. Abnormal contractility might underlie common and important disorders such as infertility, implantation failure, dysmenorrhea, endometriosis, spontaneous miscarriage or preterm birth.

Characteristics of Uterine Contraction in Labor

The musculature of the pregnant uterus is arranged in three strata:

An external hood-like layer which arches over the fundus and extends into the various ligaments.

An internal layer consisting of sphincter-like fibers around the orifices of the tubes and the internal os.

Lying between the two, a dense network of muscle fibers perforated in all directions by blood vessels. The main portion of the uterine wall is formed by this middle layer which consists of an interlacing network of muscle fibers between which extend the blood vessels. As the result of such an arrangement, when the cells contract after delivery, they constrict the vessels and thus act a "living ligatures."

Phases of Parturition

The bringing forth of young—parturition—requires well-orchestrated transformations in both uterine and cervical function. As shown in Figure 21-1, parturition can be arbitrarily divided into four overlapping phases that correspond to the major physiological transitions of the myometrium and cervix during pregnancy (Casey, 1993, 1997; Challis, 2000; Word, 2007). These phases of parturition include: (1) a prelude to it, (2) the preparation for it, (3) the process itself, and (4) recovery. Importantly, the phases of parturition should not be confused with the clinical stages of labor, that is, the first, second, and third stages—which comprise the third phase of parturition.

The Mechanism of Normal Labor

The definition or clinical diagnosis of labor is a retrospective one. There is no laboratory test that gives a "labor titer" or an x-ray procedure that can

define the difference between the laboring and non-laboring patient. Realizing these limitations, the patient is diagnosed as being in labor when a combination of conditions exist. Perhaps a good working definition may be stated as follows: When in the presence of perceived uterine contractions, there is progressive cervical dilation and descent of the presenting part which leads to the eventual expulsion of the products of conception, the patient is in labor.

The "mechanism of labor" refers to the sequencing of events related to posturing and positioning that allows the baby to find the "easiest way out." For the most part the fetus is a passive respondent in the process of labor, while the mother provides the uterine forces and structural configuration of the passageway through which the passenger must travel. For a normal mechanism of labor to occur, both the fetal and maternal factors must be harmonious. An understanding of these factors is essential for the obstetrician to appropriately intervene if the mechanism deviates from the normal. The following definitions must be mastered to be able to discuss and understand the mechanism of labor:

- Attitude. This refers to the posturing of the joints and relation of fetal parts to one another. The normal fetal attitude when labor begins is with all joints in flexion.
- Lie. This refers to the longitudinal axis of the fetus in relation to the mother's longitudinal axis; i.e., transverse, oblique, or longitudinal (parallel).
- Presentation. This describes that part on the fetus lying over the inlet of the pelvis or at the cervical os.
- Point of Reference or Direction. This is an arbitrary point on the presenting part used to orient it to the maternal pelvis [usually occiput, mentum (chin) or sacrum].
- Position. This describes the relation of the point of reference to one of the eight octants of the pelvic inlet (e.g., LOT: the occiput is transverse and to the left).
- Engagement. This occurs when the biparietal diameter is at or below the inlet of the true pelvis.
- Station. This references the presenting part to the level of the ischial spines measured in plus or minus centimeters.

The single most important determinant to the mechanism of labor is probably pelvic configuration. The classic work of Caldwell and Maloy is reviewed in the text and should be understood. Their classification of the pelvis into four major types (gynecoid, android, anthropoid, and platypelloid) helps the student understand the possible difficulties that may arise in a laboring patient. A quote that should be remembered is: "No two pelvis are exactly the same, just as no two faces are the same. For each pelvis there is an optimum mechanism that may be wholly different from the so-called normal mechanism described."

An important principle is that most pelvis are not purely defined but occur in nature as mixed types. Regardless of the shape, the baby will be delivered if size and positioning remain compatible. The narrowest part of the fetus attempts to align itself with the narrowest pelvic dimension (e.g., biparietal to interspinous diameters) which means the occiput generally tends to rotate to the "most ample portion of the pelvis."

The mechanical steps the baby undergoes can be arbitrarily divided, and clinically they are usually broken down into six or eight steps for ease of

discussion. It must be understood, however, that these are arbitrary distinctions in a natural continuum.

The following six divisions of labor are easy to use:

- Flexion and Engagement. This occurs at various times before the forces of labor begin.
- Descent. This occurs as a result of active forces of labor.
- Internal Rotation. This occurs as a result of impingement of the presenting part on the bony and soft tissues of the pelvis.
- Extension. This is the mechanism by which the head normally negotiates the pelvic curve.
- External Rotation(Restitution). This is the spontaneous realignment of the head with the shoulders.
- Expulsion. This is anterior and then posterior shoulders, followed by trunk and lower extremities in rapid succession.

Abnormal mechanisms of labor do occur, and the operator must be able to recognize these early and intervene when appropriate. The above mechanisms of labor should become "second nature" to the practitioner and indeed does become such by careful observation. Those patients who have undeliverable or uncorrectable problems should be unhesitatingly delivered by the abdominal route because inappropriate operative vaginal intervention may lead to damage to both mother and fetus. Some of the undeliverable situations include persistent mentum posterior, persistent brow presentation, some types of breech presentations, and shoulder presentation.

5.5 STAGES OF LABOR

Obstetricians have divided labor into 3 stages that delineate milestones in a continuous process.

First Stage of Labor

- Begins with regular uterine contractions and ends with complete cervical dilatation at 10 cm
- Divided into a latent phase and an active phase
- The latent phase begins with mild, irregular uterine contractions that soften and shorten the cervix
- Contractions become progressively more rhythmic and stronger
- The active phase usually begins at about 3-4 cm of cervical dilation and is characterized by rapid cervical dilation and descent of the presenting fetal part

Second Stage of Labor

Begins with complete cervical dilatation and ends with the delivery of the fetus

In nulliparous women, the second stage should be considered prolonged if it exceeds 3 hours if regional anesthesia is administered or 2 hours in the absence of regional anesthesia

In multiparous women, the second stage should be considered prolonged if it exceeds 2 hours with regional anesthesia or 1 hour without it.

Third Stage of Labor

The period between the delivery of the fetus and the delivery of the placenta and fetal membranes

Delivery of the placenta often takes less than 10 minutes, but the third stage may last as long as 30 minutes

Expectant management involves spontaneous delivery of the placenta

The third stage of labor is considered prolonged after 30 minutes, and active intervention is commonly considered

Active management often involves prophylactic administration of oxytocin or other uterotronics (prostaglandins or ergot alkaloids), cord clamping/cutting, and controlled traction of the umbilical cord.

5.6 TRUE AND FALSE LABOR

You may be in real labor if you experience the following:

Effacement: The cervix becomes progressively thinner, softer, and dilated.

Persistent lower back pain, especially if it's accompanied by a crampy, premenstrual feeling.

The appearance of bloody show. If you pass the mucus plug that blocks the cervix, labor could be imminent—or it could be several days away. Still, it's a sign that things are moving along.

Breaking of the bag of waters, but only if it's accompanied by contractions.

Contractions that are stronger, last longer, and occur at regular intervals, such as every five or seven minutes apart.

To time your contractions, use a watch with a second hand, a stop watch, or a digital timer that displays seconds. You need to monitor and record the following:

Duration: How long do the contractions last? Time each contraction from the moment it begins until it ends.

Frequency: How far apart are the contractions to each other? Time from the beginning of one contraction to the beginning of the next.

Call your physician immediately if you have more than six contractions per hour and if they come with back, abdominal, or pelvic pain.

If you have regular contractions and your membranes rupture, you are most likely in regular labor. The crucial thing to remember is—if you think you are in labor, call your doctor, day or night.

There are many ways to deal with early active labor. This depends on both your desires and those of your doctor or midwife. Discuss this with your practitioner. Explain to him or her exactly what it is that you would like to do. Some women prefer to walk for as long as they can, while others prefer to lie in bed.

False Labor

As you near your due date, you may be experiencing an increase in Braxton Hicks contractions. Sometimes these can even be painful and rhythmic, leading you to believe you're in labor.

So how exactly do you know if your labor is false? Concerned about making an unnecessary trip to the hospital? Or calling your midwife and having it be a false alarm? Don't worry—it's happened to plenty of moms, and you shouldn't feel bad if it happens to you.

These guidelines will help you determine whether your labor is just practice for what's to come:

Most telling, there is not a progressive dilation of the cervix.

Labor

You aren't having any bloody show

You haven't experienced rupture of membranes.

Uterine contractions may or may not be painful and may stop with activity. Their pattern will usually be unpredictable and the contractions will not get longer, more intense, and closer together.

Contractions are likely to be felt in your lower abdomen. True labor contractions often begin in the lower back and then move to your abdomen.

Keep in mind that not all women experience false labor, and when it doubt, it's always best to call your obstetrician or midwife. Otherwise, take a warm bath or shower and be sure to drink plenty of fluids. Try and get some rest as your body prepares for the impending delivery of your new little one.

5.7 EXAMINATION OF A WOMAN IN LABOUR

Labour consists of regular uterine contractions resulting in cervical change, and normally accompanied by descent of the fetus. These changes are confirmed and monitored during labour by vaginal exam.

The exam can often be unpleasant for the woman, and also increases the risk of maternal and infant infection. As such, vaginal exam should be performed as minimally as possible, usually every two hours, unless there are potentially important changes (i.e. the woman is feeling an urge to push, or the fetal heart rate changes significantly).

Things you Need to Have

Her Antenatal Care Card (if she has been in your care previously); if she has come to you for the first time and she is already in labour, start a new health record for her

Partograph for recording the progress of labour (you will learn how to use the partograph in Study Session 4).

Sterile gloves

Fetoscope to listen to the baby's heart beat

Thermometer to take the mother's temperature

Watch or other timer to help you measure the fetal heart rate and the mother's pulse rate

Blood pressure measuring cuff with stethoscope

Swabs (3-4 balls of gauze soaked with antiseptic solution such as savlon (chlorhexidine 2-4%) to clean the perineum before doing a vaginal examination. You can prepare warm water and soap if you have no antiseptic solution.

Check Her Vital Signs

Blood pressure: normal values range between 90/60 mmHg to below 140/90 mmHg.

Maternal pulse rate: normal range is 80-100 beats/minute, but should not be greater than 110 beats/minute in a woman in labour.

Temperature: average 37oC; if it is between 37.5-38.4oC the woman has a low grade fever; if it is 38.5oC or above, she has a high grade fever.

Physical Examination in Labour

Inspection of the abdomen: In order to memorise what aspects to inspect on the abdomen of a woman in labour, you can take the initial 'S' letters of the three points to look out for: size, shape and scars.

Palpation of the abdomen: Palpation means feeling the abdomen with your hands in specific positions, or moving them in particular ways, using certain levels of pressure. Ask the mother to lie down on her back and bend her legs at the knees, with her feet flat on the bed. You need to be able to move around her: sometimes you will be palpating her abdomen while standing at her feet and looking up her body towards her head; sometimes you will be standing behind her and facing her feet; and sometimes you will stand beside her.

Measuring fetal heart rate: Use a fetoscope or stethoscope to listen to the fetal heart rate immediately after a contraction. Listening to sounds inside the abdomen is called auscultation. Count the number of fetal heartbeats for a full minute at least once every 30 minutes during the active phase first stage of labour and every 5 minutes during the second stage. If there are fetal heart rate abnormalities (less than 120 or more than 160 beats per minute, sustained for 10 minutes), suspect fetal distress and refer urgently to a health facility, unless the labour is progressing fast and the baby is about to be born.

Measuring contractions: To assess the frequency and duration of contractions, put your hand over the mother's abdomen, around the fundus. You will sense the abdomen starting to tighten and become hard. The mother may make 'pain' sounds with the contraction. Count the frequency, i.e. number of contractions in 10 minutes, and the duration.

Vaginal Examination

The functions of a vaginal examination are to:

- Determine if true labour has begun and the stage it has reached, based on measuring the dilatation of the cervix
- Assess the progress of labour in terms of the rate of increase in cervical dilatation and the descent of the fetus down the birth canal
- Identify the fetal presentation and position
- Detect any moulding of the fetal skull bones (the extent to which they overlap under pressure from the birth canal)
- Assess the size of the mother's pelvis and its adequacy for the passage of the fetus
- Check the colour of the amniotic fluid.

In this study session, we will only focus on the first of these reasons for conducting a vaginal examination: assessing the stage of labour by measuring the dilatation of the cervix. All of the other functions of vaginal examination will be covered in later study sessions.

5.8 HISTORY, EXAMINATION, PROCEDURES ON ADMISSION

Typically, pregnant women are advised to go to the hospital if they believe their membranes have ruptured or if they are experiencing contractions lasting at least 30 sec and occurring regularly at intervals of about 6 min or less. Within an hour after presentation at a hospital, whether a woman is in labor can usually be determined based on the following:

- Occurrence of regular and sustained painful uterine contractions
- Bloody show
- Membrane rupture
- Complete cervical effacement

If these criteria are not met, false labor may be tentatively diagnosed, and the pregnant woman is typically observed for a time and, if labor does not begin within several hours, is sent home.

When pregnant women are admitted, their blood pressure, heart and respiratory rates, temperature, and weight are recorded, and presence or absence of edema is noted. A urine specimen is collected for protein and glucose analysis, and blood is drawn for a CBC and blood typing. A physical examination is done. While examining the abdomen, the clinician estimates size, position, and presentation of the fetus, using Leopold maneuvers (see Figure: Leopold maneuver.). The clinician notes the presence and rate of fetal heart sounds, as well as location for auscultation. Preliminary estimates of the strength, frequency, and duration of contractions are also recorded.

A helpful mnemonic device for evaluation is the 3 Ps:

- Powers (contraction strength, frequency, and duration)
- Passage (pelvic measurements)
- Passenger (eg, fetal size, position, heart rate pattern)

History

The initial assessment of labor should include a review of the patient's prenatal care, including confirmation of the estimated date of delivery. Focused history taking should elicit the following information:

- Frequency and time of onset of contractions
- Status of the amniotic membranes (whether spontaneous rupture of the membranes has occurred, and if so, whether the amniotic fluid is clear or meconium stained)
- Fetal movements
- Presence or absence of vaginal bleeding.
- Braxton-Hicks contractions must be differentiated from true contractions. Typical features of Braxton-Hicks contractions are as follows:
 - Usually occur no more often than once or twice per hour, and often just a few times per day
 - Irregular and do not increase in frequency with increasing intensity
 - Resolve with ambulation or a change in activity
 - Contractions that lead to labor have the following characteristics:
 - May start as infrequently as every 10-15 minutes, but usually accelerate over time, increasing to contractions that occur every 2-3 minutes
 - Tend to last longer and are more intense than Braxton-Hicks contractions
 - Lead to cervical change

Physical examination

The physical examination should include documentation of the following:

- Maternal vital signs
- Fetal presentation
- Assessment of fetal well-being
- Frequency, duration, and intensity of uterine contractions
- Abdominal examination with Leopold maneuvers
- Pelvic examination with sterile gloves

Digital examination allows the clinician to determine the following aspects of the cervix:

- Degree of dilatation, which ranges from 0 cm (closed or fingertip) to 10 cm (complete or fully dilated)
- Effacement (assessment of the cervical length, which can be reported as a percentage of the normal 3- to 4-cm-long cervix or described as the actual cervical length)
- Position (ie, anterior or posterior)
- Consistency (ie, soft or firm)
- Palpation of the presenting part of the fetus allows the examiner to establish its station, by quantifying the distance of the body (-5 to +5 cm) that is presenting relative to the maternal ischial spines, where 0 station is in line with the plane of the maternal ischial spines.

5.9 MONITORING LABOUR

There are two kinds. The first is called intermittent monitoring and means regular, but not continuous, monitoring of your baby's heart rate.

If you're healthy and have had a trouble-free pregnancy, this is the recommended method. It should happen every 15 minutes during the early stages of labour, increasing to once every five minutes, or following every contraction in the later stages.

It's done using a Pinard (trumpet-shaped stethoscope) or a Doppler (a small hand-held device, which your midwife may have used during your antenatal checks). It allows you and your midwife to listen to your baby's heartbeat using ultrasound waves.

Intermittent monitoring won't restrict your ability to move around, as the midwife can listen wherever you are and whatever position you choose.

The other kind is called continuous monitoring, which involves using an electronic foetal heart-rate monitor. This prints out the results, often referred to as a CTG (cardiotocograph), and keeps track of your baby's heartbeat for the whole labour.

The sensors, which are usually held in place on your abdomen with elastic belts, and are connected to the monitor, detect your baby's heartbeat.

Occasionally a foetal scalp electrode (may be called a 'clip' or FSE) is used. This picks up your baby's heartbeat, as it's attached to his scalp through the vagina during an internal examination.

5.10 MANAGEMENT OF LABOR

First Stage of Labor

On admission to the Labor and Delivery suite, a woman having normal labor should be encouraged to assume the position that she finds most comfortable. Possibilities including the following:

- Walking
- Lying supine
- Sitting
- Resting in a left lateral decubitus position

Management includes the following:

- Periodic assessment of the frequency and strength of uterine contractions and changes in cervix and in the fetus' station and position

- Monitoring the fetal heart rate at least every 15 minutes, particularly during and immediately after uterine contractions; in most obstetric units, the fetal heart rate is assessed continuously.

Labor

Second Stage of Labor

With complete cervical dilatation, the fetal heart rate should be monitored or auscultated at least every 5 minutes and after each contraction. Prolonged duration of the second stage alone does not mandate operative delivery if progress is being made, but management options for second-stage arrest include the following:

Continuing observation/expectant management

Operative vaginal delivery by forceps or vacuum-assisted vaginal delivery, or cesarean delivery.

Third Stage

This stage starts with the birth of the baby and ends with the delivery of the placenta and membranes:

- Separation of the placenta occurs immediately after birth due to forceful uterine contractions along with retraction of the uterus, thus greatly reducing the size of the placental bed.
- It normally takes up to 5 minutes, but can take longer.
- Haemorrhaging is prevented by the contraction of uterine muscle fibres closing off the blood vessels that were supplying the placenta.
- Without active management, after 10-20 minutes, separation is shown by a gush of blood, prominence of the fundus in the abdomen and apparent lengthening of the umbilical cord.

Management: Expectant (traditional or physiological):

- Once the placenta lies in the vagina, the uterus is 'rubbed up' to produce a contraction and the uterus is pushed towards the vagina to help with expulsion of the placenta and membranes.
- These are held and twisted whilst pulling constantly so that membranes are kept intact.
- The cord is not clamped until pulsation has stopped and no uterotonic drugs are used.
- Should last <60 minutes.

Active:

- Give intramuscular (IM) synthetic oxytocin with the delivery of the anterior shoulder or as soon as the baby is born.
- The umbilical cord is clamped between 1-5 minutes after the birth and cut soon after delivery.
- After the cord has been cut and once there are signs of separation of the placenta, controlled traction on the umbilical cord (with simultaneous suprapubic pressure by the other hand - to prevent uterine inversion) will facilitate expulsion of the placenta and membranes.
- In a small proportion of cases, the placenta is not removed - repeat the attempt after 10 minutes and then remove manually.
- In all cases, the placenta and membranes are examined for completeness and any retained material removed under anaesthetic.
- Should last <30 minutes.
- Delivery of the fetus

Positioning of the mother for delivery can be any of the following :

- Supine with her knees bent (ie, dorsal lithotomy position; the usual choice)
- Lateral (Sims) position
- Partial sitting or squatting position
- On her hands and knees
- Episiotomy used to be routinely performed at this time, but current recommendations restrict its use to maternal or fetal indications

Delivery maneuvers are as follows:

- The head is held in mid position until it is delivered, followed by suctioning of the oropharynx and nares
- Check the fetus's neck for a wrapped umbilical cord, and promptly reduce it if possible
- If the cord is wrapped too tightly to be removed, the cord can be double clamped and cut
- The fetus's anterior shoulder is delivered with gentle downward traction on its head and chin
- Subsequent upward pressure in the opposite direction facilitates delivery of the posterior shoulder
- The rest of the fetus should now be easily delivered with gentle traction away from the mother
- If not done previously, the cord is clamped and cut
- The baby is vigorously stimulated and dried and then transferred to the care of the waiting attendants or placed on the mother's abdomen

Third stage of Labor

The following 3 classic signs indicate that the placenta has separated from the uterus:

- The uterus contracts and rises
- The umbilical cord suddenly lengthens
- A gush of blood occurs
- Delivery of the placenta usually happens within 5-10 minutes after delivery of the fetus, but it is considered normal up to 30 minutes after delivery of the fetus.

5.11 EXAMINATION OF PLACENTA AND MEMBRANCES

Once a baby is born the midwife or doctor will carefully check the placenta to ensure that no part of the placenta or membranes have remained inside the uterus. If any part of the placenta or membranes has been retained in the uterus, it can cause a postpartum haemorrhage and/or infection. The process of checking the placenta should take place as soon as possible after birth.

When a baby is born at full term (37 to 42 weeks) and the placenta is healthy, it will measure approximately 15 to 20 cm in diameter and will be around 2.0 to 2.5 cm thick. A placenta weighs approximately 500 to 600 grams, which is approximately one sixth of the baby's birth weight. The size and weight of the placenta can vary considerably depending on the baby's ethnicity, whether there were any pregnancy problems and how much the baby weighed.

The structure of the placenta is disc-shaped with both maternal and fetal surfaces. At term the placenta weighs approximately 500g to 600g and has a diameter of 15cm to 20cm (Johnson and Taylor, 2010). The fetal surface is made up of cotyledons, which are further divided into lobules. The outer

appearance is white and shiny in nature due to chorionic plate and the amnion covering.

Labor

The cord is usually inserted in the centre of the fetal surface with blood vessels branching outwards. The umbilical cord contains two umbilical arteries and one vein; they are surrounded by Wharton's jelly and covered by the amnion (Johnson and Taylor, 2010). The cord is twisted spirally in order to protect the vessels and it is approximately 40cm to 50cm in length.

The maternal surface is dark red in colour and is made up of 15 to 20 cotyledons, which are divided by septa. Insignificant changes can occur such as infarctions due to the depositing of fibrin, and the surface can appear gritty due to lime salt deposits (Vance, 2009).

5.12 POST DELIVERY MANAGEMENT

The delivery of the placenta and associated membranes, commonly referred to as the afterbirth, marks the final stage of childbirth. After expulsion of the newborn, the myometrium continues to contract. This movement shears the placenta from the back of the uterine wall. It is then easily delivered through the vagina. Continued uterine contractions then reduce blood loss from the site of the placenta. Delivery of the placenta marks the beginning of the postpartum period—the period of approximately 6 weeks immediately following childbirth during which the mother's body gradually returns to a non-pregnant state. If the placenta does not birth spontaneously within approximately 30 minutes, it is considered retained, and the obstetrician may attempt manual removal. If this is not successful, surgery may be required.

It is important that the obstetrician examines the expelled placenta and fetal membranes to ensure that they are intact. If fragments of the placenta remain in the uterus, they can cause postpartum hemorrhage. Uterine contractions continue for several hours after birth to return the uterus to its pre-pregnancy size in a process called involution, which also allows the mother's abdominal organs to return to their pre-pregnancy locations. Breastfeeding facilitates this process.

Although postpartum uterine contractions limit blood loss from the detachment of the placenta, the mother does experience a postpartum vaginal discharge called lochia. This is made up of uterine lining cells, erythrocytes, leukocytes, and other debris. Thick, dark, lochia rubra (red lochia) typically continues for 2–3 days, and is replaced by lochia serosa, a thinner, pinkish form that continues until about the tenth postpartum day. After this period, a scant, creamy, or watery discharge called lochia alba (white lochia) may continue for another 1–2 weeks.

Immediate Postpartum Care

The cervix and vagina are inspected for lacerations, which, if present, are repaired, as is episiotomy if done. Then if the mother and infant are recovering normally, they can begin bonding. Many mothers wish to begin breastfeeding soon after delivery, and this activity should be encouraged. Mother, infant, and father or partner should remain together in a warm, private area for an hour or more to enhance parent-infant bonding. Then, the infant may be taken to the nursery or left with the mother depending on her wishes.

For the first hour after delivery, the mother should be observed closely to make sure the uterus is contracting (detected by palpation during abdominal

examination) and to check for bleeding, BP abnormalities, and general well-being.

The time from delivery of the placenta to 4 h postpartum has been called the 4th stage of labor; most complications, especially hemorrhage, occur at this time, and frequent observation is mandatory.

5.13 NORMAL PUPERIUM AND POSTNATAL CARE

Puerperium is defined as the time from the delivery of the placenta through the first few weeks after the delivery. This period is usually considered to be 6 weeks in duration. By 6 weeks after delivery, most of the changes of pregnancy, labor, and delivery have resolved and the body has reverted to the nonpregnant state. The puerperium covers the six-week period following birth, during which time the various changes that occurred during pregnancy revert to the non-pregnant state. Physiological changes during this time include:

The cardiovascular system reverts to normal during the first two weeks. The extra load on the heart from the extra volume of blood disappears by the second week.

The vaginal wall is initially swollen, bluish and pouting but rapidly regains its tone, although remaining fragile for 1-2 weeks. Perineal oedema may persist for some days.

After delivery of the placenta, the uterus is the size of a 20-week pregnancy; however, it reduces in size on abdominal examination by one finger-breadth each day, such that on the 12th day it cannot be palpated. By the end of the puerperium it is only slightly larger than pre-pregnancy.

For the first 3-4 days, lochia comprises mainly blood and remnants of trophoblastic tissue. During days 3-12 the colour is reddish-brown but then changes to yellow. Occasionally, lochia may become red again for a few days, due to thrombi from the ends of vessels.

5.14 PHYSIOLOGICAL CHANGE IN NORMAL PUPERIUM

The postpartum period involves your moving through many changes, both emotionally and physically, while learning how to deal with all the changes needed with becoming a new mother. The postpartum period also involves you and your partner learning how to care for your newborn and learning how to function as a changed family unit. An overview of the relevant anatomy and physiology in the postpartum period follows.

Change in Genital Tract

Uterus

The full term uterus has grown at least ten times bigger than it was before pregnancy. On its own it weighs approximately 1kg (not including the baby, placenta, amniotic fluid, etc), whereas its pre-pregnant weight was only 50-100 gm. Immediately after the baby is born, the uterus can be palpated at or near the woman's umbilicus (belly button), as it contracts to expel the placenta and fetal membranes. It normally shrinks to its non-pregnant size during the first six weeks after delivery, but most of the reduction in size and weight occurs in the first two weeks. At around this time, the uterus should have shrunk enough to be located in the woman's pelvis, below her umbilicus.

The inner lining of the uterus (the endometrium) rapidly heals after the birth, so that by the seventh day, it is restored throughout the uterus, except at the placental site. The inside of the uterus, where the placenta was attached, undergoes a series of changes which reduce the number of blood capillaries entering that site. The capillaries that remain 'leak' blood plasma for a time, which results in a normal vaginal discharge called lochia. This discharge often continues for several weeks after the birth. In the first week, the lochia is bloody and brownish red, but it gradually changes over time to a more watery consistency. Over a period of two to three weeks, the discharge continues to decrease in amount and the colour changes to pale yellow (straw coloured). The period of time the lochia continues varies, with an average duration of around five weeks, with a waxing and waning amount of flow and colour. Each woman has her own pattern, with the various phases of the lochia lasting for different lengths of time.

Cervix

The cervix also begins to rapidly revert to a nonpregnant state, but it never returns to the nulliparous state. By the end of the first week, the external os closes such that a finger cannot be easily introduced.

Vagina

The vagina also regresses but it does not completely return to its prepregnant size. Resolution of the increased vascularity and edema occurs by 3 weeks, and the rugae of the vagina begin to reappear in women who are not breastfeeding. At this time, the vaginal epithelium appears atrophic on smear. This is restored by weeks 6-10; however, it is further delayed in breastfeeding mothers because of persistently decreased estrogen levels.

Perineum

The perineum has been stretched and traumatized, and sometimes torn or cut, during the process of labor and delivery. The swollen and engorged vulva rapidly resolves within 1-2 weeks. Most of the muscle tone is regained by 6 weeks, with more improvement over the following few months. The muscle tone may or may not return to normal, depending on the extent of injury to muscle, nerve, and connecting tissues.

Abdominal Wall

The abdominal wall remains soft and poorly toned for many weeks. The return to a prepregnant state depends greatly on maternal exercise.

Ovaries

The resumption of normal function by the ovaries is highly variable and is greatly influenced by breastfeeding the infant. The woman who exclusively breastfeeds her baby has a longer period of amenorrhoea (absence of monthly bleeding) and delayed first ovulation after the birth, compared with the mother who chooses to bottle-feed. A woman who does not breastfeed may ovulate as early as four weeks after delivery, and most have a menstrual period by twelve weeks; the average time to the first menstruation for a woman who is not breastfeeding is seven to nine weeks after the birth.

Changes in Breast and Lactation

The changes to the breasts that prepare the body for breastfeeding occur throughout pregnancy. Lactogenesis, which is the development of the ability

to secrete milk, occurs as early as 16 weeks gestation. The placenta supplies high levels of circulating progesterone which activates mature alveolar cells in the breast to secrete small amounts of milk. After delivery of the placenta, there is a rapid decline in progesterone which triggers the onset of milk production and subsequent swelling, or engorgement, of breasts in the postpartum period. The colostrum is the liquid that is initially released by the breasts during the first 2-4 days after delivery. High in protein content and antibody rich, this liquid is protective for the newborn. The colostrum, which the baby receives in the first few days postpartum, is already present in the breasts, and suckling by the newborn triggers its release. The process, which begins as an endocrine process, switches to an autocrine process; the removal of milk from the breast stimulates more milk production. Over the first 7 days, the milk matures and contains all necessary nutrients in the neonatal period. The milk continues to change throughout the period of breastfeeding to meet the changing nutritional demands of the baby.

Lactation is the process of continued secretion of copious milk. Lactation requires regular removal of milk (ie breast emptying) which triggers prolactin release from the anterior pituitary gland. It also requires nipple stimulation (ie suckling) which triggers oxytocin from the posterior pituitary gland. Oxytocin release after tactile stimulation of the nipple-areolar complex causes myoepithelial cells of the breasts to contract, which forces milk into the alveolar lumens and then into the ducts, prior to moving out through the nipple. If the mother is not breastfeeding, the absence of milk removal leads to elevated intramammary pressure as the milk accumulates within the alveolar lumen. Alveolar distention restricts blood flow to the alveoli and interferes with milk production. Additionally, the increase in pressure triggers an inhibitor of lactation (FIL) which decreases prolactin levels and triggers mammary involution within 2-3 weeks.

Change in Other Systems

During the pregnancy, the woman's body contains more body fluids than in the non-pregnant state. Some of this additional water is held in her tissues, some in her increased volume of blood, and some in the uterus. This excess water is rapidly eliminated after the birth. The amniotic fluid drains away through the vagina. From the second day after the delivery, the urine volume will increase up to three litres per day for a few days, but within one week it returns to the normal pattern of urination. The bladder increases its capacity during the period in which excess body fluids are being eliminated, filling with between 1,000 to 1,500 ml of urine without discomfort. If urine is retained for long periods in the bladder, because the urethra is obstructed by swollen or bruised tissues after the birth, it increases the risk of urinary tract infections developing.

5.15 POSTNATAL CARE

Prenatal care helps decrease risks during pregnancy and increases the chance of a safe and healthy delivery. Regular prenatal visits can help your doctor monitor your pregnancy and identify any problems or complications before they become serious.

Babies born to mothers who lack prenatal care have triple the chance of being born at a low birth weight. Newborns with low birth weight are five times more likely to die than those whose mothers received prenatal care.

Prenatal care ideally starts at least three months before you begin trying to conceive. Some healthy habits to follow during this period include:

- quitting smoking and drinking alcohol
- taking folic acid supplements daily (400 to 800 micrograms)
- talking to your doctor about your medical conditions, dietary supplements, and any over-the-counter or prescription drugs that you take
- avoiding all contact with toxic substances and chemicals at home or work that could be harmful

Postnatal Check Up

It's been a long road since that first prenatal appointment. This postnatal check-up is about making sure you're feeling well and recovering as expected after your pregnancy and birth experience. It's also an opportunity to introduce your baby to your GP. Most importantly, this is a chance to discuss any questions or concerns you may have.

Some women can be surprised at how quick the postpartum check-up is and that there isn't always a physical examination or detailed questions asked. You can help to make sure this check is useful for you by thinking about what you would like to talk about beforehand. As life in the early weeks can be busy and tiring, it may help to write down your questions to take along so you don't forget what you want to ask.

There are no UK wide guidelines on what should happen at this 6 week check-up and how long they are will also vary between surgeries. It's also true that the check itself might be handled differently by individual GPs or midwives. In general, the following areas should be covered:

- Your general wellbeing - how have the first few weeks been for you? Are you coping OK? Do you feel you need extra support?
- Your perineum - does it feel OK? Did you have any stitches and, if so, does it feel as if it has healed? You may be offered an examination to see if your stitches have healed and that all the muscles used during labour and delivery are returning to normal.
- If you had a caesarean, has the scar healed well?
- Your blood pressure will be checked.
- Your lochia (the discharge you have after birth) - is it still there or not and how heavy is it? When might you start your period?
- Changes to your body post-birth. You may be weighed and you can get weight loss advice if you want it.
- Feeding - if you're breastfeeding, how's it going? Do you need any support? Do you have any symptoms you're not sure about?
- Your bladder and bowels - are you comfortable and feeling back to normal?
- Contraception should always be discussed at this check so find out what your options are. You can also discuss any concerns or questions you might have about sex.

Management of Normal Puerperium

Immediately following delivery, the patient should be closely observed. She may be given a drink of her choice or something to eat, if she is hungry.

Principles

- To give all out attention in to restore the health status of the mother.
- To prevent infection.
- To take care of the breasts, including promotion of lactation and nursing of the child.
- To motivate the mother for contraception.

General management

Rest and Ambulance: It is indeed difficult to categories an uniform period of rest. After a good resting period, the patient becomes fresh and can breast feed the baby or moves out of bed to go to the toilet. Early ambulation is encouraged.

Hospital Stay : Early discharge from the hospital is an almost universal procedure. If adequate supervision by trained health visitors is provided, there is no harm in early discharge.

Diet: The patient should be on normal diet of her choice. If the patient is lactating, high calories, adequate protein, fat, plenty of fluids, minerals and vitamins are to be given.

Care of the Bladder: The patient is encouraged to pass urine following delivery as soon as convenient. If the patient fails to pass urine, catheterisation should be done. Catheterisation is also indicated in case of incomplete emptying of bladder.

Care of the Bowel: The problem of constipation is much less because of early ambulation and liberalisation of the dietary intake. A diet containing sufficient roughage and fluids is enough to move the bowel.

If necessary, mild laxative such as Igol (isopgol husk) two teaspoons may be given at bed time.

Sleep: The patient is in need of rest, both physical and mental. So she should be protected against worries and undue fatigue. Sleep is ensured providing adequate physical and emotional support.

Care of the Vulva and Episiotomy: Shortly after delivery, the vulva and buttocks are washed with soapwater down over the anus and a sterile pad is applied. The patient should look after personal cleanliness of the vulval region. The perineal wound should be dressed with spirit and antiseptic power after each act micturition and defaecation or at least twice a day.

Care of the breast: The nipple should be washed with sterile water before each feeding. It should be cleaned and kept dry after the feeding is over. Nipple soreness is avoided by frequent short feeding rather than the prolonged feeding, keeping the nipple clean and dry.

Maternal-infant bonding: It starts from first few moments after birth. This is manifested by holding, kissing, cuddling and gazing at the infant. The baby should be kept in her bed or in a cot besides her bed.

This is not only establishes the mother-child relationship but the mother is conversant with the art of baby care so that she can take full care of the baby while at home.

Asepsis and antiseptic: Asepsis must be maintained specially during the first week of puerperium. Liberal use of local antiseptics, aseptic measures during perineal wound dressing, use of clean bed linen and clothing are positive steps.

Immunization: Administration of anti-D-gamma globulin to unimmunized Rh-negative mother bearing Rh-positive baby. The booster dose of tetanus

toxoid should be given at the time of discharge, if it is not given during pregnancy.

Instructions: return if: Fever >37 °c Excessive vaginal bleeding – soaking a pad an hour (possible retained placenta) Lower extremity pain and/or swelling (suspicious for DVT) Shortness of breath (suspicious for pulmonary embolism) Chest pain (can occur with pulmonary embolism)

Important Considerations of Postnatal Care

Adequate rest and sleep:

- Watch for the signs and symptoms of infection and excess bleeding.
- Diet: A balanced diet containing sufficient protein (90 gm) minerals and vitamins should be given. Additional fluid intake is encouraged. Fresh fruits and vegetables should be included in the main meals.
- Antibiotics and analgesics are given to combat infection and to relieve pain and discomfort.
- Perinatal care with aseptic precautions to prevent puerperal infections
- Micturition: Difficulty with urination is quite common during the first few days due to trauma. It must be ensured that the bladder emptied completely.
- Constipation: It is common during puerperium as there is a tendency of the bowels to be sluggish. A diet rich in fibre will overcome the problem.
- Postnatal exercise: The importances of post-natal exercises are stressed to the mother and are also taught to her to regain the muscle tone, which are stretched during pregnancy and labour.
- Continuance of supplementary iron therapy.
- Advise for a gradual return to day-day activities.
- Advise on breast-feeding and care of newborn including immunisation.
- Family planning advice and guidance.
- To have a postnatal check up after 6 weeks.

Treatment of Minor Ailments

Most of ailments experienced during pregnancy are usually temporary and caused by hormonal changes and the extra strain your body is under.

Bloating

This is because you are retaining fluid, which is a common complaint that is aggravated by prolonged standing. You should drink 2 litres of fluid daily and should limit your intake of tea, coffee and cola as the caffeine content of these drinks will affect the vitamins in your food, particularly vitamin C. Some women also feel better when they eat less salt and monosodium glutamate.

Constipation

Constipation is normal during pregnancy. The consumption of iron-containing prenatal vitamins, hormonal changes and the pressure of the uterus on the rectum can aggravate constipation. You should ensure that you have adequate amounts of fibre in your diet and drink plenty of water. Click here to see list of medicines that can be used during pregnancy.

Faintness

This arises from low blood pressure. Avoid long periods of standing, getting up too quickly and overheating, especially in the bath.

Incontinence

This can be due to the extra weight and pressure of your baby pressing on your bladder and pelvic floor, especially when you laugh, sneeze or run. Regular pelvic floor exercises during and after pregnancy will help.

Leg Aches and Cramps

The extra weight which you carry during the pregnancy can cause your legs to ache. Leg cramps are also common in the last months of pregnancy. Simple stretching and exercises may help in alleviating these aches and cramps.

Thrush

This is a yeast infection of the vagina and can be treated with a cream or pessary. Gular exercises will help in improving the circulation and ease the symptoms.

Vaginal Secretions

Vaginal discharge during pregnancy is normal. The discharge is usually clear and white, and should not smell unpleasant. If the discharge is coloured or smells strange, or you feel itchy or sore, you will need to consult a doctor as you may be having vaginal infection.

Varicose Veins

Varicose veins are distended veins around your calves, back, legs or thighs. The veins in the legs are most commonly affected. If you have varicose veins, you should avoid standing for prolonged periods and sitting with your legs crossed. Avoid putting on too much weight as this increases the pressure. You should also sit with your legs up, as this will help to ease the discomfort. Re

Morning Sickness

This is especially common in the early months of pregnancy and can occur at any time of the day. It usually disappears by 14 weeks.

The American College of Obstetricians and Gynecologists offers these suggestions to help soothe morning sickness:

- Make sure you get enough rest.
- Stay away from odors that upset your stomach.
- Instead of eating three large meals each day, eat five to six smaller meals throughout the day.
- Before getting out of bed, eat a few crackers to calm your stomach.
- Snack on protein-rich foods, such as yogurt.
- Skip foods that are greasy or high in fat.

Backache

Pregnancy strains your back and posture. To avoid or reduce backache, avoid lifting heavy weights, wearing high-heeled shoes or standing for too long. The following are some tips which may help to alleviate backaches:

- Support your back with a cushion. Kneeling on all fours and rocking from side to side.
- Sleep on your side with a pillow between your legs.
- Sit with your back straight and well-supported.
- Use hot or cold pack on the sore part of your back.
- Have someone to massage your back. If you are engaging a professional massage therapist, do inform him/her that you are pregnant.

These are dilated veins in your anus and can be very painful, itchy and uncomfortable, usually occurring from the third month onwards. Piles may bleed a little and may make going to the toilet uncomfortable and painful. Constipation and straining on the toilet can aggravate the condition, so try to keep your stools soft and regular. Having a diet high in fibre, such as wholemeal bread, fruits and vegetables, and drink plenty of water will help to prevent constipation; which in turn can help to ease or prevent piles.

Sleeplessness and Tiredness

It is common to feel tired and exhausted during your pregnancy. This could be due to anxiety, heartburn, and your baby pressing on your bladder or sheer bulk, making it difficult to get a good night's sleep. A hot milky drink and a warm shower may help you relax and try to get as much rest as possible. Avoid caffeinated drinks as caffeine can make it harder to go to sleep.

Stretchmarks / Striae

These are raised, red lines on your breasts, abdomen, thighs or bottoms and are usually permanent. Stretch marks happen whenever the skin is stretched and affect up to around 80% of the pregnant women. The likelihood of getting stretch marks increases if your weight gain is more than average during your pregnancy. Certain creams or cocoa butter may help lighten the marks. Over time, the skin will shrink and the stretch marks will fade into white-coloured scars.

Swollen Ankles, Feet and Fingers

During pregnancy, you may experience swelling of the ankles, feet and fingers as you are retaining more fluid than usual. To avoid and ease the swollen ankles, refrain from standing for prolonged periods, try to wear comfortable shoes and put your feet up as much as you can. Swelling of the ankles and feet often occurs at the end of the day, after a day of walking and standing. This gradual swelling is not harmful to you or your baby. However, if you experience sudden swelling of the face, feet and fingers, do contact your doctor immediately.

Heartburn / Indigestion

This is a painful, burning sensation in the chest caused by the regurgitation of stomach acid into the throat. The symptoms of indigestion, including heartburn, are common during pregnancy and are caused by hormonal changes and the growing womb pressing on the stomach. To reduce indigestion and heartburn, you should eat small frequent meals, avoid spicy and greasy foods and refrain from drinking large amounts of liquid before bedtime. Alcohol, coffee and chocolate may aggravate the problem. You should try to sit as upright as possible and avoid lying flat after a meal. Propping yourself up with pillows at night may help to ease the symptoms. If the symptoms are not relieved with diet and lifestyle changes, the doctor may prescribe medications to help to ease the symptoms. Click here to see list of medicines that can be used during pregnancy.

Postnatal Exercises

Regular exercise has numerous health benefits, all of which apply equally to the new mother as at any other stage of life. These benefits include assistance with weight loss, increased aerobic fitness, social interaction and psychological wellbeing. Exercise after giving birth can also hasten recovery, and assist with muscle strength and toning. Gentle exercise (such as walking) can generally be

started as soon as comfortable after giving birth. Start when you feel up to it. Some women will feel able to start exercising early. Talk with your doctor about when is a good time for you to restart an exercise program.

Six weeks after giving birth, most of the changes that occur during pregnancy will have returned to normal. If you had a caesarean birth, a difficult birth, or complications, it may take a little longer to feel ready to start exercising. If you did not exercise during pregnancy, start with easy exercises and slowly build up to harder ones.

Keep in mind your lower back and core abdominal muscles are weaker than they used to be. Your ligaments and joints are also more supple and pliable, so it is easier to injure yourself by stretching or twisting too much. Avoid any high-impact exercises or sports that require rapid direction changes.

Types of Postnatal Exercises

Recommended postnatal exercise includes:

- Brisk walking
- Swimming
- Aqua aerobics
- Yoga
- Pilates
- Low impact aerobic workouts
- Light weight training
- Cycling.
- See your doctor or midwife for further recommendations and cautions.

The Benefits of Postnatal Exercise

Exercising after you have your baby can improve your physical and mental wellbeing. It can:

- Help restore muscle strength and firm up your body
- Make you less tired because it raises your energy level and improves your sense of wellbeing
- Promote weight loss
- Improve your cardiovascular fitness and restore muscle strength
- Condition your abdominal muscles
- Improve your mood, relieve stress and help prevent postpartum depression.

5.16 BREECH PRESENTATION

Breech presentation is defined as a fetus in a longitudinal lie with the buttocks or feet closest to the cervix. This occurs in 3-4% of all deliveries. The percentage of breech deliveries decreases with advancing gestational age from 22-25% of births prior to 28 weeks' gestation to 7-15% of births at 32 weeks' gestation to 3-4% of births at term.

Predisposing factors for breech presentation include prematurity, uterine malformations or fibroids, polyhydramnios, placenta previa, fetal abnormalities (eg, CNS malformations, neck masses, aneuploidy), and multiple gestations. Fetal abnormalities are observed in 17% of preterm breech deliveries and in 9% of term breech deliveries.

Perinatal mortality is increased 2- to 4-fold with breech presentation, regardless of the mode of delivery. Deaths are most often associated with malformations, prematurity, and intrauterine fetal demise.

In breech presentation, the lie is longitudinal and the podalic pole presents at the pelvic brim. The presenting diameter is bitrochanteric (10 cm) and the denominator is sacrum.

Different Types

Complete breech: Here, the buttocks are pointing downward with the legs folded at the knees and feet near the buttocks.

Frank breech: In this position, the baby's buttocks are aimed at the birth canal with its legs sticking straight up in front of his or her body and the feet near the head.

Footling breech: In this position, one or both of the baby's feet point downward and will deliver before the rest of the body.

Diagnosed

A few weeks prior to the due date, the health care provider will place her hands on the mother's lower abdomen to locate the baby's head, back, and buttocks. If it appears that the baby might be in a breech position, they can use ultrasound to confirm the position.

Special x-rays can also be used to determine the baby's position and the size of the pelvis to determine if a vaginal delivery of a breech baby can be safely attempted.

Medical Techniques

External Version: External version is a non-surgical technique to move the baby in the uterus. In this procedure, a medication is given to help relax the uterus. There might also be the use of an ultrasound to determine the position of the baby, the location of the placenta and the amount of amniotic fluid in the uterus.

Gentle pushing on the lower abdomen can turn the baby into the head-down position. Throughout the external version the baby's heartbeat will be closely monitored so that if a problem develops, the health care provider will immediately stop the procedure. External version has a high success rate. However, this procedure becomes more difficult as the due date gets closer.

Chiropractic Care: The late Larry Webster, D.C., of the International Chiropractic Pediatric Association, developed a technique that enabled chiropractors to reduce stress on the pregnant woman's pelvis leading to the relaxation of the uterus and surrounding ligaments.

A more relaxed uterus makes it easier for a breech baby to turn naturally. His technique is known as the Webster Breech Technique. The July/August issue of the Journal of Manipulative and Physiological Therapeutics reported an 82% success rate for the Webster Technique. Further, the results of the study suggest that it is preferable to perform the Webster Technique in the 8th month of pregnancy.

Natural Techniques

The following risk-free techniques, often suggested by physical therapist Penny Simkin, can be tried at home for free:

The Breech Tilt: Using large, firm pillows, raise the hips 12? or 30cm off the floor for 10-15 minutes, three times a day. It is best to do this on an empty stomach when your baby is active. In this technique, try to concentrate on the baby without tensing your body, especially in the abdominal area.

Using Music: We know that babies can hear sounds outside the womb. Consequently, many women have used music or taped recordings of their voice to try to get their baby to move towards the sound. Placing headphones on the lower part of your abdomen and playing either music or sounds of your voice can encourage babies to move towards the sounds and out of a breech position.

Some homeopathic remedies have also been found to be successful in correcting breech positions. If interested, you can contact your local holistic practitioner about the possibility of using of Moxibustion or Pulsatilla to correct a breech position.

Machanism of normal breech delivery

According to American Pregnancy Association and the American College of OB-GYNs, the following conditions are considered necessary in order to attempt a vaginal breech birth:

- The baby is full-term (at least 37 weeks gestation), although in practice preterm babies sometimes come very quickly and are born uneventfully in the breech presentation before a cesarean can be done.
- The baby is frank or complete breech presentation.
- The baby does not show signs of distress while its heart rate is closely monitored.
- The process of labor is smooth and steady with the cervix widening as the baby descends.
- The health care provider estimates that the baby is not too big or the mother's pelvis too narrow for the baby to pass safely through the birth canal. Generally most of these babies will be between 2,500g and 4000g, or approximately 5.5-8.8lbs.
- Anesthesia is available and a cesarean delivery possible on short notice.
- May be more likely to be successful or have less complications in women who have had at least one vaginal birth already.

Risks of Vaginal Breech Birth

Though one study found that, when strict criteria are met, a cesarean vaginal birth is a safe option, another large study showed that elective cesarean section in breech births has a lower risk to baby (0.6% versus 1.6%) and a slightly increased risk to the mother than planned vaginal delivery. Keep in mind that the overall risk, or absolute risk, to the baby in either scenario is very low.

Trauma to Head

The main risk of vaginal breech birth is that the baby's head, the largest part of its body, helps to stretch the cervix, birth canal and vagina for safe passage. With breech birth, the butt is usually leading the way down the birth canal and may be smaller, which could result in the baby's head becoming stuck. Additionally, with breech birth, there isn't the same level of moulding that occurs with a head down birth. This is particularly relevant for a premature baby with a more fragile build. (Keep in mind that cesarean birth does not mold the head either.) Sometimes forceps are used to guide the baby's head out of the birth canal. Although the idea of forceps sounds scary, skilled providers that have lots of experience with forceps can safely deliver babies this way as an alternative to a cesarean birth.

Cord Prolapse

Labor

Cord prolapse is another potential issue with breech birth, particularly in the footling or complete breech. Because the feet are not tightly applied to the cervix and are smaller than the baby's bottom, which creates more empty space in the pelvis, the umbilical cord may drop in front of the baby's feet or bottom and become compressed either against the cervix or inside the vagina. It is possible for the cord to actually emerge from the vagina in serious cases. Compression of the umbilical cord can dramatically interfere with baby's supply of oxygen and blood. Cord prolapse happens in a frank breech presentation at a rate of 0.5% (the same risk as a normal head down presentation). The risk increases to 5% in a complete breech position and 15% for footling breech. Keep in mind that the greatest risk for cord prolapse is when the water breaks, so keeping the bag of water intact as long as possible and allowing it to break on its own, free of medical intervention, is an important step in preventing this emergency from occurring. The only "treatment" for a cord prolapse is to deliver the baby as quickly as possible by cesarean.

Genetic Issues

Finally, and independent to the way the baby is birthed, breech babies have higher rates of genetic issues or abnormalities. This may be the main reason why they aren't flipping to the head down position in the first place. As a result, statistically breech babies will show greater risks when born vaginally.

Management During Pregnancy and Labour

First Stage

The management protocol is similar to that mentioned in normal labour. The following are the important considerations. Spontaneous onset labour increases the chance of successful vaginal delivery.

- Vaginal examination is indicated
 - At the onset of labour for pelvic assessment
 - Soon after rupture of the membranes to exclude cord prolapsed
- An intravenous line is sited with Ringer's solution, oral intake is avoided, blood is sent for group and cross matching
- Adequate analgesia is given, epidural is preferred
- Fetal status and progress of labour are monitored
- Oxytocin infusion may be used for augmentation of labour.

Indication of Caesarean Section

- Cases seen for the first time in labour with presence of complications.
- Arrest in the progress of labour
- Fetal distress
- Cord presentation or prolapsed

Second Stage

There are three methods of vaginal breech delivery:

- Spontaneous [10%]: Expulsion of the fetus occurs with very little assistance.
- Assisted breech : The delivery of the fetus is by assistance from the beginning to the end. This method should be employed in all cases.
- Breech extraction: When the entire body of the fetus is extracted by the obstetrician. It is rarely done these days as it produces trauma to the fetus and the mother.

Assisted Breech Devlivery

Breech delivery should be conducted by a skilled obstetrician. The following are to be kept ready before hand, in addition to those required for conduction of normal labour;

- Anaesthetist
 - An assistant to push down the fundus during contraction
 - Instruments and suture materials for episiotomy
 - A pair of obstetric forceps for aftercoming head, if required
 - Appliances for revival of the baby, if asphyxiated.

Principles in Conduction

- Never to rush
- Never pull from below, but push from above
- Always keep the fetus with back anteriorly.

Steps

The patient is brought to the table when the anterior buttock and fetal anus are visible. She is placed in lithotomy position when the posterior buttock distends the perineum.

Antiseptic cleaning is done, bladder is emptied with an 'in and out' catheter.

Episiotomy: It should be done in all cases of primigravidae and selected multiparae. Its advantages are;

- To straighten the birth canal which specially facilitates the delivery of breech with extended legs where lateral flexion is inadequate.
- To facilitate intravaginal manipulation and for forceps delivery.
- To minimize compression of the after coming head.

The patient is encouraged to bear down as the expulsive forces from above ensure flexion of the fetal head and safe descent. The 'no touch of the fetus' policy is adopted until the buttocks are delivered along with the legs in flexed breech and the trunk slips upto the umbilicus.

Soon after the trunk upto the umbilicus is born the baby is wrapped with a sterile towel to prevent slipping when held by the hands and to facilitate manipulation, if required.

Delivery of the Arms

The assistant is to place a hand over the fundus and keep a steady pressure during uterine contractions to prevent extension of the arms. Soon, the anterior scapula is visible, the position of the arm should be noted. The arms are delivered one after the other only when one axilla is visible, by simply hooking down each elbow with a finger. The baby should be held by the feet over the sterile towel while the arms are delivered.

Delivery of the After – Coming Head

This is the most crucial stage of the delivery. The time between the delivery of umbilicus and delivery of mouth should preferably be 5 to 10 minutes. There are various methods of delivery for after – coming head. The following are the common methods employed;

Burns – Marshall method

- The baby is allowed to hang by its own weight.
- The assistant is asked to give suprapubic pressure with flat of hand in a downward and backward direction, the pressure is to be exerted

- more towards the sinciput. The aim is to promote flexion of the head so that favourable diameter is presented to the pelvic cavity.
- When the nape of the neck is visible under the pubic arch, the baby is grasped by the ankle with a finger in between the two.
 - Maintaining a steady traction and forming a wide circle, the trunk is swung in upward and forward direction
 - With the left hand to guard the perineum, slipping the perineum off successively the face and brow.
 - When the mouth is cleared off the vulva, there should be no hurry.
 - Mucous of the mouth and pharynx is cleared by mucus sucker. The trunk is depressed to deliver rest of the head.
 - Forceps delivery can be used as a routine.
 - Malar flexion and shoulder traction { modified Mauriceau – Smellie – Veit technique}
 - The baby is placed on the supinated left forearm with the limbs hanging on either sides.
 - The middle and the index fingers of the left hand are placed over the malar bones on either sides . this maintains the flexion of the head.
 - The ring and little fingers of the pronated right arm are placed on the child's right shoulder, the index finger is placed on the left shoulder and the middle finger is placed on the suboccipital region.
 - Traction is now given in downward and backward direction till the nape of the neck is visible under the pubic arch.
 - The assistant gives suprapubic pressure during the period to maintain flexion.
 - Thereafter, the fetus is carried in upward and forward direction towards the mother's abdomen releasing the face, brow, and lastly, the trunk is depressed to release the occiput and vertex.

Third Stage

The third stage is usually uneventful. The placenta is usually expelled out soon after the delivery of the head.

The prophylactic ergometrine is to be given, it should be administered intravenously with the crowing of the head.

5.17 TRANSVERSE LIE

Transverse lie means that your baby is lying sideways across your tummy, rather than in a head-down position. It's a common position for your baby to take in early pregnancy. Most babies will get themselves into a head-down position by the end of the final trimester, if not before. In the final weeks of pregnancy, babies often settle down in a head down position. However, in rare cases, the baby can be seen lying sideways or in a transverse position, known as malpresentation.

Although this is common in early pregnancy when the babies are more mobile, most babies turn into the head down position by the last trimester. When this does not happen, the malpresentation called transverse lie results. According to studies, this presentation is rare and is found in only 1 in 400 cases.

Diagnosis

Abdominal examination— In transverse position, the presenting part of the fetus is typically the shoulder. During abdominal examination, the head or the buttocks cannot be felt at the bottom of the uterus and the head is usually felt in the side.

Vaginal examination— A shoulder may be felt during a vaginal examination. An arm of the fetus may even slip forward and the hand or elbow may be felt during pelvic examination.

Confirmation - An ultrasound scan of the uterus confirms the transverse lie position.

Complications Management

Transverse presentation can cause serious complications during delivery. Some of the consequences are listed below:

- Obstructed labor
- Umbilical cord or hand prolapse
- Postpartum hemorrhage
- Birth trauma
- Rupture of the uterus

Delivering a Transverse Baby

It is almost impossible to deliver a transverse baby vaginally. So if a baby is still lying sideways at term or when labor begins, a C-section (caesarean) may be the safest option for delivering the baby.

If a transverse position is confirmed near term, the woman may be advised to be admitted to the hospital, as there is a minor risk of the umbilical cord slipping out of the uterus once water breaks.

This should be treated as a medical emergency and attended to immediately, as the cord may come out of the uterus before the baby and then the baby will need to be delivered quickly.

In some cases of transverse lie and shoulder presentation, the baby can be turned manually into the head down position using a process called external cephalic version.

In this process, a skilled medical professional applies pressure on the maternal belly and guides the head of the fetus into the correct position, all the while monitoring the fetal presentation on an ultrasound monitor. Although this procedure is largely painless, it can cause some discomfort to the mother.

This process should be tried only if there is no risk of membrane rupture. Although the fetus can be readily rotated to a head first presentation, it may easily turn back to the transverse position.

If external cephalic version is successful, the chance of a normal, vaginal birth is very high. If external cephalic version is not recommended due to some reason or if the procedure is unsuccessful, delivery needs to be performed via caesarean section.

If a woman goes into labor while the baby is in a transverse position, it can impact the shoulder of the fetus adversely. This is because, in such cases, the fetus in a folded position is under pressure to move down the birth canal.

An immediate C-section should be carried out in such cases, even if the fetus is not alive, as this can cause rupture of the uterus.

5.18 TWIN PREGNANCY

The following are the most common symptoms of multiple pregnancy. However, each woman may experience symptoms differently. Symptoms of multiple pregnancy may include:

- Uterus is larger than expected for the dates in pregnancy
- Increased morning sickness
- Increased appetite
- Excessive weight gain, especially in early pregnancy
- Fetal movements felt in different parts of the stomach at the same time.

Labor

Diagnosed

Many women suspect they are pregnant with more than 1 baby. Diagnosis of multiple fetuses may be made early in pregnancy. This is especially true if fertility treatments were used. In addition to a complete medical history and physical examination, diagnosis may be made by:

Pregnancy blood testing. Levels of human chorionic gonadotropin (hCG) may be quite high with multiple pregnancy.

Alpha-fetoprotein. Levels of a protein released by the fetal liver and found in the mother's blood may be high when more than 1 fetus is making the protein.

Ultrasound. A diagnostic imaging method that uses high-frequency sound waves to create images of blood vessels, tissues, and organs. Ultrasounds can be done with a vaginal transducer, especially in early pregnancy. Or with an abdominal transducer in later pregnancy.

Complication

Being pregnant with more than 1 baby is exciting and is often a happy event for many couples. However, multiple pregnancy has increased risks for complications. The most common complications include the following:

Preterm labor and birth. Over 60% of twins and nearly all higher-order multiples are premature (born before 37 weeks). The higher the number of fetuses in the pregnancy, the greater the risk for early birth. Premature babies are born before their bodies and organ systems have completely matured. These babies are often small, with low birthweights (less than 2,500 grams or 5.5 pounds), and they may need help breathing, eating, fighting infection, and staying warm. Very premature babies, those born before 28 weeks, are especially vulnerable. Many of their organs may not be ready for life outside the mother's uterus and may be too immature to function well. Many multiple birth babies will need care in a neonatal intensive care unit (NICU).

Gestational hypertension. Women with multiple fetuses are more than twice as likely to develop high blood pressure of pregnancy. This condition often develops earlier and is more severe than pregnancy with one baby. It can also increase the chance of placental abruption (early detachment of the placenta).

Anemia. Anemia is more than twice as common in multiple pregnancies as in a single birth.

Birth defects. Multiple birth babies have about twice the risk of congenital (present at birth) abnormalities including neural tube defects (like spina bifida), gastrointestinal, and heart abnormalities.

Miscarriage. A phenomenon called the vanishing twin syndrome in which more than 1 fetus is diagnosed, but vanishes (or is miscarried), usually in the first trimester, is more likely in multiple pregnancies. This may or may not be accompanied by bleeding. The risk of pregnancy loss is increased in later trimesters as well.

Twin-to-twin transfusion syndrome. Twin-to-twin transfusion syndrome (TTTS) is a condition of the placenta that develops only with identical twins

that share a placenta. Blood vessels connect within the placenta and divert blood from one fetus to the other. It happens in about 15% of twins with a shared placenta.

Abnormal amounts of amniotic fluid. Amniotic fluid abnormalities are more common in multiple pregnancies, especially for twins that share a placenta.

Cord entanglement. Cord entanglement for the twins that share amniotic sac. In these cases, monitoring of the fetuses often in the third trimester may be necessary.

Cesarean delivery. Abnormal fetal positions increase the chances of cesarean birth.

Postpartum hemorrhage. The large placental area and over-distended uterus place a mother at risk for bleeding after delivery in many multiple pregnancies.

9.19 ABNORMAL PROGRESS OF LABOUR

Abnormal labor may be referred to as dysfunctional labor, which simply means difficult labor or childbirth. When labor slows down, it's called protraction of labor. When labor stops altogether, it's called arrest of labor.

A few examples of abnormal labor patterns may help you understand how the condition is diagnosed:

An example of an "arrest of dilation" is when the cervix is 6 centimeters dilated during the first and second examinations, which your doctor performs one to two hours apart. This means that the cervix hasn't dilated at all over the course of two hours, indicating labor has stopped.

In an "arrest of descent", the head of the fetus is in the same place in the birth canal during the first and second examinations, which your doctor performs one hour apart. This signifies that the baby hasn't moved farther down the birth canal within the last hour. Arrest of descent is a diagnosis made in the second stage, after the cervix is completely dilated.

To determine whether abnormal labor can be corrected to allow for vaginal delivery, your doctor may decide to promote labor by administering oxytocin (Pitocin). This is a type of medication that stimulates uterine contractions to enhance labor. Your doctor can give you oxytocin through a vein using a medication pump, to initiate and maintain regular contractions of the uterus. These contractions help push your baby out of the uterus and help dilate your cervix. The dose necessary to cause sufficient contractions varies considerably from one woman to another.

The diagnosis of abnormal labor (dystocia) has four major etiologic categories:

- (1) the "passage," or pelvic architecture;
- (2) the "passenger," or fetal size, presentation, and position;
- (3) the "powers," or uterine action and cervical resistance; and
- (4) the "patient" and "provider."

Diagnosis of Abnormal Progress of Labour

One practical system for diagnosing labor abnormalities is to classify them as either protracted or arrested labor. Protraction and arrest can occur anytime during labor. The thresholds are defined according to the phase or stage of labor when they occur.

Active phase — As discussed above, Friedman considered the minimum rate of acceptable cervical dilation during the active phase of labor to be 1.2 cm/hour for nulliparous patients and 1.5 cm/hour for multiparous patients. A slower rate of cervical dilation was diagnostic of protracted labor. A difficulty with this system is the inability to accurately define when a patient enters active labor.

The following table serves as a better guide for determining whether labor progress is within the normal range or protracted. It is based on Zhang's studies showing that rates of dilation in the first stage slower than those shown in the table are suggestive of a protraction disorder. These studies demonstrated that labor may take more than six hours to progress from 4 to 5 cm and more than three hours to progress from 5 to 6 cm, regardless of parity. Labor accelerates much faster after 6 cm, and is significantly faster in multiparas compared to nulliparas at this dilation.

An arrest disorder has traditionally been defined as a cervix that ceases to dilate after reaching =4 cm dilation despite adequate uterine contractions (greater than or equal to 200 Montevideo units for two or more hours). Zhang's studies suggest that it is more reasonable to wait until cervical dilation ceases after reaching 5 to 6 cm dilation before establishing the diagnosis.

Second stage — In the second stage of labor, protracted labor has traditionally been defined as a second stage longer than two hours in nulliparas (three hours when regional analgesia is used), and longer than one hour in multiparas (two hours when regional analgesia is used).

Zhang's studies suggest that many women will have successful vaginal deliveries with second stages longer than these times, thus intervention is not necessarily indicated as long as labor appears to be progressing and the fetal heart rate pattern is reassuring. In this system, a protracted second stage in nulliparous women is defined as over 3.5 hours with epidural anesthesia and over 2.5 to 3 hours without epidural anesthesia; in multiparous women, these times would be about 2 hours and 1 hour, respectively.

An arrest of descent can be diagnosed after one hour if there is no descent, despite good maternal pushing efforts.

Precipitous labor — Of note, labor can be abnormally fast, as well as slow. The term precipitate or precipitous labor has been defined as a labor that lasts no more than three hours from onset of contractions to delivery.

Partogram — Management of labor includes several components: a disciplined approach to the diagnosis of labor, assessment of maternal and fetal well-being, and careful monitoring of labor progress. Once active labor is diagnosed, serial cervical examinations are performed to determine whether progression is adequate. The results can be noted on a partogram, which is a graphical representation that clearly shows the patient's labor in comparison to the expected lower limit of "normal progress." The following figure is a partogram for the slowest 95th percentile in labor progress based on dilation at the time of admission. Deviation from this curve is diagnostic of a protraction or arrest disorder.

Management

Medical Care: A prolonged latent phase is not indicative of dystocia in itself because this diagnosis cannot be made in the latent phase. Gabbe stated the following:

- For those in the latent phase, the treatment of choice is rest or sleep for several hours. During this interval uterine activity, fetal status and cervical effacement must be evaluated to determine if progress to the active phase has occurred. Approximately 85% of patients so treated will progress to the active phase. Approximately 10% will cease to have contractions, and the diagnosis of false labor may be made. For the approximately 5% of patients in whom therapeutic rest fails and in patients for whom expeditious delivery is indicated, oxytocin infusion may be used.
- If the abnormal labor results from functional dystocia or an abnormal uterine contractility pattern and oxytocin implementation has not improved the outcome, a beta-blocker may be used.
- listing inclusion and exclusion criteria for beta-blocker use.
- Low-dose administration of IV propranolol in abnormal labor augmented with oxytocin reduced the need for cesarean delivery, particularly among patients with inadequate uterine contractility.
- There have been anecdotal reports stating that simply repositioning the patient frequently may relieve a seemingly obstructed labor.
- Although not studied rigorously, there appears to be little harm in this maneuver.
- In theory, it may unseat an asynclitic or malrotated presenting part and allow it to engage in the pelvis more effectively.

Surgical Care

Amniotomy often is used and is an accepted practice once the patient has reached the active phase of labor. However, this practice is not recommended in the latent phase of labor because it may only serve to increase the risk of intrauterine infection or cord prolapse.

If one of the arrest or protraction disorders is identified and fails to respond to conservative measures or there is nonreassurance of the fetal heart pattern, expedient delivery is justified; this includes operative vaginal delivery or cesarean section as indicated.

Diet

Most institutions have standing orders that patients in labor remain NPO, or nothing by mouth, as a precaution should the need for an emergent cesarean section occur.

Some institutions permit ice chips, and other institutions permit a clear liquid diet.

If patients have been carefully selected as low risk for labor obstruction, a regular diet may be ordered.

Pregnant women have delayed gastric emptying, and aspiration is a very serious concern in the event of an anesthetic induction.

Activity

For patients in labor, remaining active and mobile while in the latent and early active phase is best.

However, once rupture of membranes has occurred or signs of fetal nonreassurance exist, then bed rest and continuous fetal monitoring is appropriate.

Some physicians allow ambulation throughout labor as long as the fetal head is well applied (minimizing risk of cord prolapse) and evidence of fetal well-being exists (monitoring for 20 min/h without signs of fetal compromise).

Labor

5.20 OBSTRUCTED LABOUR

Obstructed labour is the failure of the fetus to descend through the birth canal, because there is an impossible barrier (obstruction) preventing its descent despite strong uterine contractions. The obstruction usually occurs at the pelvic brim, but occasionally it may occur in the pelvic cavity or at the outlet of the pelvis. When labour is prolonged because of failure to progress, there is a high risk that the descent of the fetus will become obstructed. There is no single definition of prolonged labour, because what counts as 'too long' varies with the stage of labour.

Obstructed labor is an important cause of maternal death in communities in which childhood under nutrition and early marriage is common resulting in small pelvis, and in which there is no easy access to functioning health facilities with the capability of carrying out operative deliveries. Obstructed labor also causes significant maternal morbidity mainly due to infection and hemorrhage and in the long term leads to obstetric fistulae, skeletal and neurologic complications. Fetal death from asphyxia is also common.

Causes of Obstructed Labour

As indicated above, obstructed labour is generally a second stage phenomenon, in women whose labour is prolonged. Why labour becomes prolonged or obstructed may be due to one of the 'Ps' (as midwives and obstetricians call them): 'powers', 'passenger' and 'passage'.

Powers: Inadequate power, due to poor or uncoordinated uterine contractions, is a major cause of prolonged labour. Either the uterine contractions are not strong enough to efface and dilate the cervix in the first stage of labour, or the muscular effort of the uterus is insufficient to push the baby down the birth canal during the second stage.

Passenger: The fetus is the 'passenger' travelling down the birth canal. Prolonged labour may occur if the fetal head is too large to pass through the mother's pelvis, or the fetal presentation is abnormal.

Passage: The birth canal is the passage, so labour may be prolonged if the mother's pelvis is too small for the baby to pass through or the pelvis has an abnormal shape, or if there is a tumour or other physical obstruction in the pelvis.

Diagnosis

The presenting part does not enter the pelvic brim despite good contractions.

The nurse should exclude reasons such as a full bladder, loaded rectum, or excessive liquor volume as factors contributing to the failure in descent.

As the presenting part is unable to descend, cervical dilatation is affected and dilatation is slow.

Late signs of obstructed labour

These arise in a badly managed or neglected labour and the diagnosis of obstructed labour should be made before these signs are seen.

On examination the mother is dehydrated, ketotic and in constant pain.

Clinical signs also include pyrexia and rapid pulse rate.

Urinary output is poor and haematuria may be present.

Evidence of fetal distress may be observed and where the nurse has noted a maternal tachycardia the tow rates should be compared.

Profound bradycardia or fetal demise may be overlooked as the tow rates are misinterpreted.

Management of Obstructed Labour

Prevention of obstructed labour in the first instance, And Assessment of the risk within the antenatal period begins with noting any history of prolonged labour or difficult births.

Antenatal assessments include abdominal examination which should alert the nurse to any Malpresentation or signs of Cephalopelvic disproportion.

An intravenous infusion must be commenced, to correct dehydration.

Blood is taken for cross-matching in case a transfusion is needed.

The mother will require treatment with antibiotics, to overcome any infection that may be present.

If obstructed labour is recognized in the first stage of labour, as when the head is extended to brow presentation, delivery should be caesarean section.

Also, if the obstruction cannot be overcome by rotation and assisted birth, caesarean section should be performed as soon as possible.

Following the birth of the baby and prior to repair of the uterus and abdomen, the surgeon will check carefully for any indication that the uterus has ruptured.

Complications of Obstructed Labour

Maternal

Trauma to the bladder may occur as a result of pressure from the fetal head during labour or as a result of trauma during delivery.

Vesicovaginal fistula (VVF): is still a common cause of morbidity in women in developing countries.

Prolonged compression of the tissues causes necrosis of the bladder and vaginal walls and result in urinary incontinence.

Intrauterine infection may follow prolonged rupture of membranes.

Fetal

Intrauterine asphyxia may result in a fresh stillbirth or, if the baby is born alive, permanent brain damage.

Ascending infection can cause neonatal pneumonia which may also develop as a consequence of meconium aspiration.

5.21 RUPTURE UTERUS

Uterine rupture during pregnancy is a rare event and frequently results in life-threatening maternal and fetal compromise. It can either occur in women with (1) a native, unscarred uterus or (2) a uterus with a surgical scar from previous surgery.

Uterine rupture occurs when a full-thickness disruption of the uterine wall that also involves the overlying visceral peritoneum (uterine serosa) is present. By definition, it is associated with the following:

- Clinically significant uterine bleeding
- Fetal distress
- Protrusion or expulsion of the fetus and/or placenta into the abdominal cavity
- Need for prompt cesarean delivery
- Uterine repair or hysterectomy

In contrast to frank uterine rupture, uterine scar dehiscence involves the disruption and separation of a preexisting uterine scar. Uterine scar dehiscence is a more common event than uterine rupture and seldom results in major maternal or fetal complications.

Importantly, when the defect in the uterine wall is limited to a scar dehiscence, it does not disrupt the overlying visceral peritoneum and it does not result in clinically significant bleeding from the edges of the pre-existing uterine scar. In addition, in cases of uterine dehiscence (as opposed to uterine rupture), the fetus, placenta, and umbilical cord remain contained within the uterine cavity. If cesarean delivery is needed, it is for other obstetrical indications and not for fetal distress attributable to the uterine disruption.

Symptoms

A variety of symptoms are associated with uterine ruptures. Some possible symptoms include:

- excessive vaginal bleeding
- sudden pain between contractions
- contractions that become slower or less intense
- abnormal abdominal pain or soreness
- recession of the baby's head into the birth canal
- bulging under the pubic bone
- sudden pain at the site of a previous uterine scar
- loss of uterine muscle tone
- rapid heart rate, low blood pressure, and shock in the mother
- abnormal heart rate in the baby
- failure of labor to progress naturally.

Diagnosis

Uterine rupture happens suddenly and can be difficult to diagnose because the symptoms are often nonspecific. If doctors suspect uterine rupture, they'll look for signs of a baby's distress, such as a slow heart rate. Doctors can only make an official diagnosis during surgery.

Management

If a uterine rupture causes major blood loss, surgeons may need to remove a woman's uterus to control her bleeding. After this procedure, a woman can no longer become pregnant. Women with excessive blood loss receive blood transfusions.

Also, surgery is usually required to pull the baby from the mother's body. Doctors will improve the baby's chances of survival by administering critical care, such as oxygen.

5.22 ABNORMAL PUEPERIUM

Postpartum Haemorrhage

Study Sessions 3 and 11 of the Labour and Delivery Care Module explained that a life-threatening postpartum haemorrhage (PPH) involves losing at least 500 ml of blood from the uterus or vagina. The most critical period to develop a PPH is during the third and fourth stages of labour.

Puerperal Sepsis and Fever

Puerperal sepsis refers to any widespread bacterial infection of the reproductive tract in a woman following childbirth. Some women are more vulnerable to puerperal sepsis, for example those who are anaemic and/or malnourished. Fever (raised body temperature) in a mother during the postnatal period is a general danger sign. She suddenly feels chills with shivering, followed by feeling hot and sweating.

Urinary Tract Infections

Another common cause of pain and fever in the puerperium is a urinary tract infection (UTI). A woman with a UTI complains of urine coming too frequently, a burning sensation when she passes urine, and the urge to urinate very often. When you gently press on her abdomen overlying the pelvis she will have pain. This woman needs referral for treatment with antibiotics.

Endometritis

Endometritis is an infectious process involving the inner wall of the uterus (the endometrium). It is commonly caused by bacteria ascending from the vagina, or bacteria transferred to the reproductive tract from the rectum and anus.

Puerperal Mastitis

Mastitis is painful inflammation of the breast due to bacterial infection (Figure 3.5). The bacteria most often causing mastitis, or a more serious breast abscess, are called *Staphylococcus aureus*. The main source of these bacteria is the suckling baby. Mastitis is more likely to develop during lactation than when the breast is not producing milk. Commonly, it results from milk remaining in the breast for long periods (incomplete emptying), because the baby is not suckling well, or from cracked nipples.

Wound Infection

Wound infections in the puerperium usually affect torn tissues in the perineum, infection of an episiotomy (an incision made to widen the vaginal opening to let the baby pass through), or a surgical wound in the abdomen after a caesarean birth conducted at a health facility.

Deep vein Thrombosis (DVT)

Deep vein thrombosis (DVT) — a blood clot, almost always in one of the deep veins in the legs — is a rare complication during the puerperium. However, when it occurs it can be rapidly fatal if the clot breaks away from the vein in the leg and travels to the heart, lungs or brain, blocking vital blood vessels.

Labor

Psychiatric Disorders in the Postnatal Period

Psychiatric disorders are relatively common after childbirth and may include postpartum 'blues', postpartum depression (PPD), and postpartum psychosis.

Guidance Note on Prevention and Management of Postpartum Haemorrhage

Background

High maternal mortality is largely associated with preventable causes that require Emergency Obstetric Care (EmOC), such as Postpartum Hemorrhage (PPH), high blood pressure (pre-eclampsia/eclampsia), sepsis, unsafe abortion, and obstructed labor. As per the WHO, PPH affects approximately 6 percent of all women who give birth; it is associated not only with nearly one quarter of all maternal deaths globally but is also the leading cause of maternal mortality in most low-income countries. If MMR goals are to be achieved, maternal deaths related to PPH must be significantly reduced.

In India, PPH, which is exacerbated by widespread anemia among pregnant women, accounts for 38 percent of maternal deaths (RGI-SRS 2001-2003). The speed with which death from PPH occurs presents a major challenge in settings with poor communications and referral systems and shortages of necessary drugs and equipment.

Postpartum Haemorrhage (PPH) is commonly defined as a blood loss of 500 ml or more within 24 hours after birth, or a small blood loss that makes the woman hemodynamically unstable is also termed as PPH. Massive/severe PPH is defined as a blood loss of 1000 ml or more within the same timeframe. Uterine atony is the most common cause of PPH, but genital tract trauma (i.e. vaginal or cervical lacerations), uterine rupture, retained placental tissue, or maternal coagulation disorders may also result in PPH. Although the majority of women who experience PPH complications have no identifiable clinical or historical risk factors, grand multiparity and multiple gestation are associated with an increased risk of bleeding after birth. PPH may be aggravated by pre-existing anaemia and, in such instances, the loss of a smaller volume of blood may still result in adverse clinical sequelae.

A key factor in India that contributes to maternal death is the continued preference for home deliveries, which are often attended only by family members or unskilled birth attendants. For both socio-cultural and economic

reasons compounded by poor quality of care at health facilities, women prefer to deliver at home. Therefore, when complications occur, women often do not make it to hospitals for reasons including that complications are not recognized as problems, women lack decision-making power and transportation is not available. If they eventually make it to the health facility, they may experience delays in getting the care needed to save their lives because skilled health care providers do not have the appropriate skill mix, and equipment and supplies for provision of emergency obstetric care are lacking. Therefore, integrated interventions that inform women and the surrounding community on birth preparedness and possible risks, and train providers in high-quality antenatal services ensuring timely detection and management or referral of high-risk obstetrical, are essential for getting women the care they need in emergency situations.

PPH Prevention and Management at Community and Facility Level

Communities are not aware about the importance of Birth Preparedness & Complication Readiness plan (BPCR). If clients & decision makers are properly oriented & counselled about the danger signs of pregnancy by the ANM & ASHA, the communities can be well equipped to handle the emergencies & delays at the village level.

Early detection of high risk pregnancies such as severe anemia are missed or not detected during ANC. Early identification of anaemic women and adequate treatment & follow up of severely anaemic pregnant women is therefore a critical intervention which helps to prevent /reduce a significant proportion of PPH maternal mortality. Effective screening programs for Iron Deficiency Anemia (IDA) in prenatal and postnatal programs have been hampered by the lack of simple, safe, accurate, and low-cost hemoglobin testing tools. The majority of women who suffer from anemia live in low-resource areas where accurate diagnostics are unavailable. In such settings, anemia often goes undetected and untreated.

Estimation of Blood Loss: In practice, blood loss after delivery is seldom measured. At present there is no standard method available for the measurement of blood loss following childbirth, with the objective of ensuring timely diagnosis of PPH and improving health outcomes.

- As a general preventive approach, the existing GoI guideline strongly recommend the use of oxytocin for active management of the third stage of labour (along with other two steps:- CCT & Uterine massage), because it reduces PPH by more than 60%. However, service providers do not perform the three AMTS (Active Management of the Third Stage of Labour) steps correctly. This can be due to: inadequate HR, logistical/ supply chain issues, training issues, lack of on the job training & supportive supervision, and poor tracking AMTS (quality, coverage) particularly when indicators were not integrated into supervisory tools or national information systems.
- Service providers are unable to diagnose and differentiate between an atonic and traumatic PPH & their mode of treatment.
- Management of shock and resuscitation protocols remain the missing link in current strategy and needs to be emphasized as a central component in the comprehensive strategy.
- Shortages of blood storage unit within the maternity ward of high case load facility and tertiary care centers like Medical College Hospital.
- All the service providers needs to be trained or oriented as per the revised GoI and WHO recommendations:
 - Oxytocin remains the uterotonic of choice, if oxytocin is not available, oral misoprostol should be given
 - Service providers are not aware or ignorant to screen all pregnant women for hypertension when opting for ergot derivatives for the prevention of PPH as these drugs have clear contraindications in women with hypertensive disorders.
 - Service providers are not aware about the recent WHO recommendation about the Control Cord Traction (CCT) with or without presence of SBA. In settings where SBA are unavailable, CCT is not recommended.

PPH management protocols in collaboration with FOGSI and other development partners

It is generally assumed that by preventing and treating PPH, most PPH-associated deaths could be avoided. The prevention and treatment of PPH are therefore vital steps towards improving the health care of women during childbirth and the reducing maternal mortality and morbidities. Though the most of the protocols for the Prevention of PPH are in place as per the GoI guidelines. However, during the discussions with the Federation of Obstetric and Gynaecological Societies of India (FOGSI) and other Experts, few important suggestions emerge for the prevention and management of PPH at Community & Facility level in addition to what is already there in existing guidelines.

Besides, all the Development partners/ International NGOs are working vertically in the states with their own technical innovation & approaches without any coherence & coordination with the GoI. Such non-scalable pilot PPH interventions are difficult to scale at national level in a cost effective way, though these projects have their best practices or success stories from their project areas. However, due to lack of scalable technical interventions to address the PPH & its local evidences, GoI has decided to have the holistic & comprehensive PPH model, which can be implemented, throughout the country. Through this comprehensive model, GoI will expand access to innovative technologies and approaches, including BPCR, community based distribution of misoprostol and proven, but under-used practices such as AMTSI etc.

To finalize the revised PPH guideline based on some of the issues mentioned above, GoI & FOGSI along with key development partners have decided to develop Comprehensive PPH strategy model to provide a roadmap for policy makers, health officials, service providers (Public & Private), front line workers to address the full spectrum of clinical and psychosocial causes of PPH morbidity and mortality.

The discussion during various consultations with the Experts provided the opportunity to follow a woman with PPH through the health system, highlighting how effective programs must think beyond traditional prevention approaches and establish ways to facilitate quality treatment of PPH as quickly as possible as part of BEmOC. Universal prophylaxis programs alone are

insufficient, as 6-16% of women who receive prophylaxis may still go on to have PPH. The need for a broader focus on the continuum of care in a health system was emphasized, beginning with prevention and first-line treatment measures, advancing to temporizing measures and ending with emergency services. To this end, different program approaches to PPH management were presented, all with an eye towards task-sharing PPH management down to where women deliver.

The deliberation of different PPH management strategies, including the advantages and disadvantages of each, underscored the complexity of moving from established science to the practicalities of programming. A one-size-fits-all approach for programs is not sufficient; rather, program strategies will differ by specific contexts. Subsequent consultation with the Experts provided the opportunity to closely examine different hypothetical settings and to discuss optimal technologies, strategies and health system components needed to provide comprehensive PPH care to women. There is not one road ahead, but multiple pathways to ensure more comprehensive services of high quality to reduce PPH-related mortality.

The Maternal Health Division of the MoHFW has made endeavours to develop a number of guidelines & tools to help program managers & service providers in delivering quality care to women during pregnancy & childbirth, such as Skilled Birth Attendant (SBA), BEmOC, EmOC, MNH tool kit, Quality Assurance & Skill Labs guidelines. Recently, MoHFW has developed new Operational Guideline for prevention of PPH through Community based distribution of Misoprostol.

This new initiative of revising existing PPH prevention and management protocols with intention of enhancing access to appropriate medications/ technical innovations and to be trained in relevant clinical & surgical procedures. But beyond this, GoI needs to have evidence-based operational guidelines on the safety, quality, and usefulness of various technical innovations to reduce PPH related maternal mortality. This revised guidance note from GoI, will provide the foundation for the strategic policy and programme development needed to ensure realistic and sustainable implementation of appropriate technical interventions.

**Framework: Community & Clinical Interventions
for PPH Management**

Community	Clinical
Prevention	
Community awareness-BCC & IEC	Focus ANC
Birth preparedness & complication readiness plan (BPCR)	Line listing & Treatment of Anemia
Promotion of skilled attendant at birth	Use of Partograph- to reduce prolonged labor
Detection & treatment of Anemia	Limiting episiotomy at normal birth
Misoprostol at Community level	AMTSL
	Routine inspection of placenta for completeness
	Routine immediate postpartum care & monitoring
Management	
Facility or place of birth	Active triage of emergency cases
Skilled provider	Resuscitation
Early detection of danger signs	Rapid assessment & diagnosis
Designated decision maker(s)	Emergency protocol for PPH management
Communication	Basic emergency Obstetric care
Emergency transportation	<ul style="list-style-type: none"> • IV fluid resuscitation • Manual removal of Placenta
Emergency funds	<ul style="list-style-type: none"> • Parental Oxytocics & antibiotics
Blood donors	<ul style="list-style-type: none"> • Comprehensive EmOC: • Blood transfusion • Surgery

Prevention of PPH in community

Every pregnant woman faces the risk of sudden, unpredictable complications that can be life-threatening to herself or to her infant. Hence they need timely access to skilled care during pregnancy, childbirth, and the postpartum period. Most of the maternal deaths are linked with three types of delays which can result in an increase in maternal morbidity and mortality. These delays have many causes, including logistical and financial concerns, unsupportive policies, gaps in services, inadequate community and family awareness and knowledge about maternal and newborn health issues. Birth Preparedness and Complication Readiness (BPCR) is a strategy to promote the timely use of skilled maternal and neonatal care, especially during childbirth, based on the theory that preparing for childbirth and being ready for complications reduces delays in obtaining this care.

At present there is no standard protocol available for the community management of PPH. The Standards for Maternal and Neonatal Care by World Health Organization advocates that all pregnant women should have a written plan for birth and for dealing with unexpected adverse events, such as complications or emergencies that may occur during pregnancy, childbirth or the immediate postnatal period. A BPCR plan includes identification of the following elements:-

Birth Preparedness				
Attending antenatal care at least four times during pregnancy	Recognizing signs of complications	The desired place of birth; the preferred birth attendant	The location of the closest appropriate care facility	Transport to a health facility for the birth

Complication Readiness			
Funds/savings for birth-related and emergency expenses	A birth companion & support in looking after the home and children while the woman is away	Transport in the case of an obstetric emergency	Identification of compatible blood donors in case of emergency

The ultimate goal of community interventions is to decrease maternal mortality and morbidity by addressing the delays that occur at the community level. For achieving this, BPCR is used as the technical framework for share responsibility. At the household level, ASHA/ANM sensitizes the key decision makers and pregnant women for right decision at right time and timely referral through pre-identified transport for helping women access the services available as and when required. Secondly, at the community level, ASHA/ANM also promote and facilitate community involvement for collective action and shared responsibility through the community mobilization process. Through this process, community leaders and influential, non-governmental organizations, local government officials, health providers are encouraged to contribute to mobilization and establishment of community mechanisms for emergency funds and transportation.

As the ANMs may not be available to attend to the woman at the time of home delivery in a significant number of cases due to various factors, due consideration was given to the fact that ASHA are available in the community who could give Misoprostol to women in late pregnancy, to prevent PPH. This was supported by the available body of global evidence on the effectiveness, feasibility and safety of advance distribution of Misoprostol to pregnant women for prevention of PPH. The overarching objective of introducing community-based distribution of Misoprostol to pregnant women by ANMs and ASHAs is to increase the accessibility of this life saving commodity by bringing it to the doorstep of pregnant women who are likely to deliver at their homes. In the light of the rationale as explained above, the MoHFW, GoI has taken a policy decision to permit ASHAs to undertake advance distribution of Misoprostol to pregnant women who are likely to deliver at home, for prevention of PPH. (For more information, please refer to GoI- Operational Guidelines and Reference Manual for Advance Distribution of Misoprostol to Prevent PPH during Home Births-Nov 2013).

Prevention of PPH in Community

At the household level, ASHA/ANM sensitizes the key decision makers and pregnant women for right decision at right time and timely referral through pre-identified transport for helping women access the services available as and when required.

- Q Community awareness-BCC & IEC
- Q Birth preparedness & complication readiness plan
- Q Identification of Facility or place of birth and Promotion of skilled attendant at birth
- Q Detection & Treatment of Anemia
- Q Availability of Misoprostol at Community level
- Q Early detection of danger signs
- Emergency transportation

Community Based Distribution of Misoprostol for Prevention for PPH

- Prevention of PPH in cases where, for some reason, the woman is unable to access the health facility at the time of delivery and home delivery is imminent; the ANM or any other skilled birth attendant should conduct this delivery.
- In the exceptional scenario where a pregnant woman is not likely to access a health facility for delivery and the ANM is also unlikely to attend to her during delivery at home, advance distribution of Misoprostol for prevention of PPH should be considered.
- In home deliveries where ANMs cannot attend to the women, ASHAs have been allowed to undertake advance distribution of Misoprostol to pregnant women in the 8th month of pregnancy, for self-administration just after childbirth, for prevention of PPH.
- The woman has to take 1 tablet of Misoprostol (600 micrograms) by mouth with water within one minute or soon after the delivery of the baby and before the placenta comes out.
- Even after taking the tablets, if the woman has bleeding which soaks more than one average size pad in five minutes, feels weak or faint, is sweating or looks pale, or expels clotted blood, she should be transferred immediately to the hospital/FRU.

Diagnosis of PPH

For a vaginal birth, hemorrhage is considered a blood loss of > 500 ml. The diagnosis of PPH begins with recognition of excessive bleeding and methodical examination to determine its cause. As hemorrhage is a significant cause of maternal mortality, methods to accurately measure blood loss and PPH are needed. The challenge of determining the quantity of blood lost during childbirth continues to confound service providers & practitioners.

In clinical practice, the amount of blood lost during childbirth is typically visually estimated by the birth attendant. Even with repetitive studies identifying the limitations and inaccuracies of visual estimation, it is the most common method of estimating blood loss, possibly due to path dependency of service providers. It has been proved that the visual estimation of blood loss really has no place in research methods specifically evaluating blood loss. The magnitude of underestimation increases as the amount of blood loss increases. Studies have shown that visual assessment of estimated blood loss can underestimate postpartum blood loss by 33%–50% compared with the “gold standard,” photo-spectrometry. There are several quantitative methods to estimate blood loss; however, most are impractical in the delivery room as most of them require special equipment, for example photo-spectrometry which is the gold standard with 10% error rate.

Delay in the diagnosis and treatment of postpartum hemorrhage may place the woman at an increased risk of adverse outcome. In India, simple technologies for more accurate visual estimation of blood loss, such as the blood collection drape, collecting blood from the delivery table into a calibrated jug or pail, using cholera beds for measuring blood loss, and a standard absorptive cloth (adapting the Kanga Method) have been devised for early and more accurate estimation of blood loss. Using these measures mean dangerous blood loss is promptly identified, reducing life-threatening delays in treatment (including fluid replacement and uterotonic administration to prevent shock), referral, and/or transport of women who are bleeding to a higher-level facility for care.

In Indian settings majority of the pregnant women are anemic. Even small amount of blood loss can lead to PPH. Several related studies that looked at measurement of blood loss following childbirth, with the objective of ensuring timely diagnosis of PPH and improving health outcomes, were assessed. No study was found that directly addressed the question.

Recommendations for diagnosis of PPH: After childbirth, blood loss and other clinical parameters should be closely monitored. At present, there is insufficient evidence to recommend quantification of blood loss over clinical estimation.

Facility Management of PPH

1. Prevention of PPH: AMTS^L

Preventing postpartum hemorrhage can reduce the number of women who die or suffer each year because of excessive bleeding related to pregnancy. It is possible to prevent a majority of the postpartum hemorrhages that occur. Some conditions may predispose a woman to hemorrhage, but 90% of women have no risk factors. Therefore, all women need access to a skilled birth attendant (SBA), who can manage labor and childbirth to minimize risk. This includes use of active management of the third stage of labor (AMTS^L), which is associated with a nearly 60% reduction in PPH occurrence. Based on modelling (LiST), it is projected that universal use of AMTS^L will prevent 27% of deaths from PPH¹.

All the below mention recommended activities for the prevention of PPH should take place within a comprehensive package of interventions to prevent and manage PPH, along the household-to-hospital continuum of care.

- AMTS^L is still a best practice, with the use of uterotronics now the most critical element.
- All the three steps AMTS^L should only be done by SBA/trained staff. Expert group recommended to have a step by step approach at different stages, e.g steps which need to be taken for prevention, steps when PPH is identified, Oxytocin to be given after birth etc. This will also help during training of service providers. In settings where SBA are unavailable, Control Cord Traction (CCT) is not recommended.
- All women giving birth should be offered uterotronics during the third stage of labour for PPH prevention.
- Oxytocin remains the uterotonic of choice for AMTS^L. Oxytocin (10 IU, IM) is the preferred uterotonic based on studies on the safety and effectiveness of uterotronics. It also is the recommended uterotonic drug for PPH prevention during caesarean sections.

¹Lives Saved Tool (LiST), JHU Bloomberg School of Public Health, 2010

- If oxytocin is not available, misoprostol should be given. Because uterotronics are so important for PPH prevention, another uterotonic such as oral misoprostol (600 mcg) should be provided if oxytocin is not available.
- If a skilled attendant is not present, and oxytocin is not available (such as at unattended home birth), ASHA should administer 600 mcg of oral misoprostol. Women delivering without a skilled attendant also need uterotonic for PPH prevention, so oral misoprostol should be given by a community health worker who is present.
- Late cord clamping (performed after 1 to 3 minutes after birth) is still recommended for all births to reduce newborn anaemia while beginning essential newborn care at the same time.
- Caution should be exercised when opting for ergot derivatives (Methergine) for the prevention of PPH as these drugs have clear contraindications in women with hypertensive disorders. Thus, it is probably safer to avoid the use of ergot derivatives in unscreened populations.
- IV canula must be used during referral of high risk cases especially for severe anemic pregnant women.

In summary

Established guidelines

- All women giving birth should receive uterotronics during the third stage of labour for the prevention of PPH
- Oxytocin is recommended as the uterotonic drug of choice.
- CCT once uterus is contracted & cord is cut
- Uterine massage to keep uterus contracted

Developing country guidelines

- AMTSL should only be done by SBA/trained staff.
- Oxytocin remains the uterotonic of choice for AMTSL
- In settings where oxytocin is unavailable, oral misoprostol (600 µg) is recommended.
Oral misoprostol should be given by a community health worker who is present.
- CCT is contra-indicated in settings where skilled birth attendants are not available.

2. Treatment of PPH at Facility Level

The opportunity to follow a woman with PPH through the health system, highlighting how effective programs/ interventions must think beyond traditional prevention approaches and establish ways to facilitate quality treatment of PPH as quickly as possible as part of basic emergency obstetric care. The need for a broader focus on the continuum of care in a health system was emphasized, beginning with prevention and first-line treatment measures, advancing to temporizing measures and ending with emergency services. To this end, different program approaches to PPH management were presented, all with an eye towards task-sharing PPH management down to where women deliver. However, major thrust by the Experts given on the following interventions:

- ④ Intramuscular oxytocin* alone still is the recommended uterotonic drug for the treatment of PPH. IV oxytocin is the drug of choice over other drugs (ergometrine, and prostaglandins), including for women have already received it for PPH prevention.
- ④ If bleeding is not controlled after use of oxytocin, it is recommended to switch over to the next uterotonic IV methergine, fixed dose or sublingual misoprostol 800 mcg.
- ④ Discussion was also held as to whether misoprostol can be given as the second line of treatment. To this, the expert group felt that in India, since oxytocin is available in all labour rooms, we should only give oxytocin.
- ④ The use of isotonic crystalloids is recommended in preference to the use of colloids for the intravenous fluid resuscitation of women with PPH.
- ④ The use of tranexamic acid is recommended for the treatment of PPH if oxytocin and other uterotonic fall to stop the bleeding or the bleeding may be partly due to trauma.

*Always store the oxytocin with appropriate temperature management and save misoprostol from moisture. Depending on the manufacturer and regulatory agency specification, all oxytocin products must be stored in either controlled room temperature (25°C or lower) or refrigerated storage (2°C to 8°C) to ensure quality. (PATH 2011)

- Q The use of intrauterine balloon tamponade is recommended for the treatment of PPH due to uterine atony. It can be used for women who do not respond to uterotronics or if uterotronics are not available. This procedure potentially can avoid surgery and is appropriate while awaiting transfer to a higher-level facility. Regarding mechanical treatment through various balloon tamponade, group mentioned that Bakri is expensive, condom catheters can be tried. Since this is a life-saving technique, it can be used only after proper training. These can be kept in advanced skill labs for training of health providers. This approach can be tried at PHC level having presence of Medical Officer. Group suggested to refer to some evidence to understand which cadre of health service provider has been able to use the balloon technique.
- Q Use of bimanual uterine compression & external aortic compression for the treatment of PPH due to uterine atony after vaginal birth.
- Q The use of uterine packing is not recommended for the treatment of PPH due to uterine atony after vaginal birth.
- Q The use of uterine artery embolization is recommended as a treatment for PPH due to uterine atony, if other measures have failed.
- Q If bleeding does not stop in spite of treatment (using uterotronics and other available interventions), the use of surgical interventions (Modified B-Lynch) is recommended.
- Q All high case load tertiary care facilities should have blood storage unit in the Maternity wing catering to requirement of Obstetrics OT & Labour room. This is besides the blood bank of that tertiary facility.
- Q All district hospitals must be competent to manage severe & moderate anemia.
- Q All tertiary care facilities and district hospitals must have OBGY specialist and their support medical staff trained in life saving skills for management of shock, septicaemia etc

In summary

Existing guideline

- Q Use of other alternative Uterotonics not mentioned
- Q Fluid resuscitation with Ringer Lactate/Normal Saline (RL/NS)
- Q In existing as well as revised guidelines the following treatment has been mentioned: Bimanual uterine compression, external aortic compression & Intrauterine balloon tamponade

Revised recommendations

- Q If bleeding is not controlled after use of oxytocin, it is recommended to switch over to the next uterotonic IV methergine, fixed dose or sublingual misoprostol 800 mcg.
- Q Early fluid resuscitation with isotonic crystalloids is essential for the management of shock.
- Q The use of tranexamic acid is recommended for the treatment of PPH if oxytocin and other uterotronics fail to stop the bleeding or the bleeding may be partly due to trauma.
- Q The use of intrauterine balloon tamponade can be tried at PHC level having presence of Medical Officer.
- Q IV canula must be used during referral of high risk cases
- Q If there is persistent bleeding and the relevant resources are available, uterine artery embolization is recommended
- Q If bleeding does not stop in spite of treatment (using uterotronics and other available interventions), the use of surgical interventions (Modified B Lynch) is recommended
- Q Surgical interventions are more applicable to Gynaecologists and Surgeons at EmOC centres

Referral Transportation: Quick initial Assessment and Referral

Improving access for women with obstetric complications can only be effective where there is a functional referral system, equipment and medical supplies including emergency drugs. The use of formal protocols for referral of women to a higher level of care is recommended for health facilities.

- ① Make initial assessment, start basic treatment and stabilize the patient
- ② Call/Shout for help
- ③ Assess circulation, airway, breathing (CAB)
- ④ Obtain an IV line & start fluid replacement preferably with crystalloid fluid
- ⑤ Monitor, pulse, BP & respiration
- ⑥ Catheterize bladder & monitor urine output
- ⑦ Assess need for blood transfusion
- ⑧ Start IV Oxytocin infusion & consider:
 - Uterine massage
 - Bimanual uterine compression
 - External aortic compression
 - Balloon or condom tamponade
- ⑨ Transfer with ongoing IV uterotonic infusion.
- ⑩ Be ready at all times to transfer to a higher level facility if the patient is not responding to the treatment or a treatment cannot be administered at home/ facility. Ensure client will get assured services at higher referral centres

Transporting a woman who is bleeding

- ❑ Elevate legs to improve blood supply to vital organs
- ❑ Keep the woman warm
- ❑ Send a skilled provider with the woman to ensure an open airway, to deliver first aid if the woman goes into shock
- ❑ Continue uterine massage during transport
- ❑ Provide bimanual uterine compression (external if possible and internal if necessary)

Recommendations for an Effective Advanced Referral System

- ❑ An adequately resourced referral Center (meaning trained staff, equipment's, supplies etc)
- ❑ Communications and feedback systems
- ❑ Assured Referral Transport
- ❑ Agreed setting-specific protocols for the identification of complications
- ❑ Personnel trained in their use
- ❑ Teamwork between referral levels
- ❑ Unified records system

6

Infertility

STRUCTURE

- 6.1 Introduction
 - 6.2 Diagnosing Infertility
 - 6.3 Causes of Infertility
 - 6.4 Risk Factors of Infertility
 - 6.5 Management Infertility
-

LEARNING OBJECTIVES

- ❖ Understanding about infertility
 - ❖ Know about diagnosis of infertility.
 - ❖ Know about causes of infertility
 - ❖ Know about risk factors of infertility
 - ❖ Know about fertility treatments for men
 - ❖ Know about fertility treatments for women
-

6.1 INTRODUCTION

Infertility refers to an inability to conceive after having regular unprotected sex. Infertility can also refer to the biological inability of an individual to contribute to conception, or to a female who cannot carry a pregnancy to full term. In many countries infertility refers to a couple that has failed to conceive after 12 months of regular sexual intercourse without the use of contraception.

In general, infertility is defined as not being able to get pregnant (conceive) after one year (or longer) of unprotected sex. Because fertility in women is known to decline steadily with age, some providers evaluate and treat women aged 35 years or older after 6 months of unprotected sex. Women with infertility should consider making an appointment with a reproductive endocrinologist—a doctor who specializes in managing infertility. Reproductive endocrinologists may also be able to help women with recurrent pregnancy loss, defined as having two or more spontaneous miscarriages.

Studies indicate that slightly over half of all cases of infertility are a result of female conditions, while the rest are caused by either sperm disorders or unidentified factors.

Many cases of apparent infertility are treatable. Infertility may have a single cause in one of the partners, or it could be the result of a combination of factors.

6.2 DIAGNOSING INFERTILITY

Most people will visit their GP (general practitioner, primary care physician) if there is no pregnancy after 12 months of trying. For anybody who is concerned about fertility, especially if they are older (women over 35), it might be a good idea to see a doctor earlier. As fertility testing can sometimes take a long time, and female fertility starts to drop when a woman is in her thirties, seeing the doctor earlier on if you are over 35 makes sense.

A GP can give the patient advice and carry out some preliminary assessments. As it takes two to make a baby it is better for both the male and female to see the doctor together.

Before undergoing testing for fertility it is important that the couple be committed. The doctor will need to know what the patients' sexual habits are, and may make recommendations regarding them. Tests and trials might extend over a long period. Even after thorough testing, no specific cause is ever found for 30% of infertility cases.

In some countries where universal healthcare cover does not exist, evaluation and eventual treatment may be expensive.

Infertility Tests for Men

General physical exam - the doctor will ask the man about his medical history, medications, and sexual habits. The physician will also carry out an examination of his genitals. The testicles will be checked for lumps or deformities, while the shape and structure of the penis will be examined for any abnormalities.

Semen analysis - the doctor may ask for some specimens of semen. They will be analyzed in a laboratory for sperm concentration, motility, color, quality, infections and whether any blood is present. As sperm counts can fluctuate, the man may have to produce more samples.

Blood test - the lab will test for several things, including the man's level of testosterone and other male hormones.

Ultrasound test - the doctor will determine whether there is any ejaculatory duct obstruction, retrograde ejaculation, or other abnormality.

Chlamydia test - if the man is found to have Chlamydia, which can affect fertility, he will be prescribed antibiotics to treat it.

Infertility Tests for Women

General physical exam - the doctor will ask the woman about her medical history, medications, menstruation cycle, and sexual habits. She will also undergo a gynecological examination.

Blood test - several things will be checked, for example, whether hormone levels are correct and whether the woman is ovulating (progesterone test).

Hysterosalpingography - fluid is injected into the woman's uterus which shows up in X-ray pictures. X-rays are taken to determine whether the fluid travels properly out of the uterus and into the fallopian tubes. If the doctor identifies any problems, such as a blockage, surgery may need to be performed.

A Surgeon Performs a Laparoscopy

Laparoscopy - a thin, flexible tube with a camera at the end (laparoscope) is inserted into the abdomen and pelvis to look at the fallopian tubes, uterus and ovaries.

- A small incision is made below the belly button and a needle is inserted into the abdominal cavity; carbon dioxide is injected to create a space for the laparoscope. The doctor will be able to detect endometriosis, scarring, blockages, and some irregularities of the uterus and fallopian tubes.

Ovarian reserve testing - this is done to find out how effective the eggs are after ovulation.

Genetic testing - this is to find out whether a genetic abnormality is interfering with the woman's fertility.

Pelvic ultrasound - high frequency sound waves create an image of an organ in the body, which in this case is the woman's uterus, fallopian tubes, and ovaries.

Chlamydia test - if the woman is found to have Chlamydia, which can affect fertility, she will be prescribed antibiotics to treat it.

Thyroid function test - according to the National Health Service (UK) between 1.3% and 5.1% of infertile women have an abnormal thyroid.

6.3 CAUSES OF INFERTILITY

Causes of Infertility in Men

Infertility in men can be caused by different factors and is typically evaluated by a semen analysis. A specialist will evaluate the number of sperm (concentration), motility (movement), and morphology (shape). A slightly abnormal semen analysis does not mean that a man is necessarily infertile. Instead, a semen analysis helps determine if and how male factors are contributing to infertility.

Conditions that can contribute to abnormal semen analyses include:

- Varicoceles, a condition in which the veins on a man's testicles are large and cause them to overheat. The heat may affect the number or shape of the sperm.
- Medical conditions or exposures such as diabetes, cystic fibrosis, trauma, infection, testicular failure, or treatment with chemotherapy or radiation.
- Unhealthy habits such as heavy alcohol use, testosterone supplementation, smoking, anabolic steroid use, and illicit drug use.

- Environmental toxins including exposure to pesticides and lead.
- Continue Reading

Causes of Infertility in Women

Women need functioning ovaries, fallopian tubes, and a uterus to get pregnant. Conditions affecting any one of these organs can contribute to female infertility. Some of these conditions are listed below and can be evaluated using a number of different tests.

Ovarian function (presence or absence of ovulation and effects of ovarian "age")

Ovulation. Regular predictable periods that occur every 24–32 days likely reflect ovulation. Ovulation can be predicted by using an ovulation predictor kit and can be confirmed by a blood test to see the woman's progesterone level. A woman's menstrual cycle is, on average, 28 days long. Day 1 is defined as the first day of "full flow."

A woman with irregular periods is likely not ovulating. This may be because of several conditions and warrants an evaluation by a doctor. Potential causes of anovulation include the following:

Polycystic ovary syndrome (PCOS). PCOS is a hormone imbalance problem that can interfere with normal ovulation. PCOS is the most common cause of female infertility.

Functional hypothalamic amenorrhea (FHA). FHA relates to excessive physical or emotional stress that results in amenorrhea (absent periods).

Diminished ovarian reserve (DOR). This occurs when the ability of the ovary to produce eggs is reduced because of congenital, medical, surgical, or unexplained causes. Ovarian reserves naturally decline with age.

Premature ovarian insufficiency (POI). POI occurs when a woman's ovaries fail before she is 40 years of age. It is similar to premature (early) menopause.

Menopause. Menopause is an age-appropriate decline in ovarian function that usually occurs around age 50. It is often associated with hot-flashes and irregular periods.

Ovarian function. Several tests exist to evaluate a woman's ovarian function.

No single test is a perfect predictor of fertility.

The most commonly used markers of ovarian function include follicle stimulating hormone (FSH) value on day 3–5 of the menstrual cycle, anti-mullerian hormone value (AMH), and antral follicle count (AFC) using a transvaginal ultrasound. Continue Reading.

6.4 RISK FACTORS OF INFERTILITY

In medicine, a risk factor is something that raises the risk of developing a condition, disease or symptom. For example, obese people are more likely to develop diabetes type 2 compared to people of normal weight; therefore, obesity is a risk factor for diabetes type 2.

Age - a woman's fertility starts to drop after she is about 32 years old, and continues doing so. A 50-year-old man is usually less fertile than a man in his 20s (male fertility progressively drops after the age of 40).

A Young Woman Smoking

Smoking Significantly Increases Your Risk of Infertility

Smoking - smoking significantly increases the risk of infertility in both men and women. Smoking may also undermine the effects of fertility treatment. Even when a woman gets pregnant, if she smokes she has a greater risk of miscarriage.

Alcohol consumption - a woman's pregnancy can be seriously affected by any amount of alcohol consumption. Alcohol abuse may lower male fertility. Moderate alcohol consumption has not been shown to lower fertility in most men, but is thought to lower fertility in men who already have a low sperm count.

Being obese or overweight - in industrialized countries overweight/obesity and a sedentary lifestyle are often found to be the principal causes of female infertility. An overweight man has a higher risk of having abnormal sperm.

Eating disorders - women who become seriously underweight as a result of an eating disorder may have fertility problems.

Being vegan - if you are a strict vegan you must make sure your intake of iron, folic acid, zinc and vitamin B-12 are adequate, otherwise your fertility may become affected.

Over-exercising - a woman who exercises for more than seven hours each week may have ovulation problems.

Not exercising - leading a sedentary lifestyle is sometimes linked to lower fertility in both men and women.

Sexually transmitted infections (STIs) - chlamydia can damage the fallopian tubes, as well as making the man's scrotum become inflamed. Some other STIs may also cause infertility.

Exposure to some chemicals - some pesticides, herbicides, metals (lead) and solvents have been linked to fertility problems in both men and women.

Mental stress - studies indicate that female ovulation and sperm production may be affected by mental stress. If at least one partner is stressed it is possible that the frequency of sexual intercourse is less, resulting in a lower chance of conception.

6.5 MANAGEMENT INFERTILITY

- Infertility can be treated with medicine, surgery, intra-uterine insemination, or assisted reproductive technology. Many times these treatments are combined. Doctors recommend specific treatments for infertility based on -

- The factors contributing to the infertility.
- The duration of the infertility.
- The age of the female.

- The couple's treatment preference after counseling about success rates, risks, and benefits of each treatment option.

Fertility Treatments for Men

Erectile dysfunction or premature ejaculation - medication and/or behavioral approaches can help men with general sexual problems, resulting in possibly improved fertility.

Varicocele - if there is a varicose vein in the scrotum, it can be surgically removed.

Blockage of the ejaculatory duct - sperm can be extracted directly from the testicles and injected into an egg in the laboratory.

Retrograde ejaculation - sperm can be taken directly from the bladder and injected into an egg in the laboratory.

Surgery for epididymal blockage - if the epididymis is blocked it can be surgically repaired. The epididymis is a coil-like structure in the testicles which helps store and transport sperm. If the epididymis is blocked sperm may not be ejaculated properly.

Fertility Treatments for Women

Ovulation disorders - if the woman has an ovulation disorder she will probably be prescribed fertility drugs which regulate or induce ovulation. These include:

- Clomifene (Clomid, Serophene) - this medication helps encourage ovulation in females who do not ovulate regularly, or who do not ovulate at all, because of polycystic ovary syndrome (PCOS) or some other disorder. It makes the pituitary gland release more FSH (follicle-stimulating hormone) and LH (luteinizing hormone).
- Metformin (Glucophage) - women who have not responded to Clomifene may have to take this medication. It is especially effective for women with PCOS, especially when linked to insulin resistance.
- Human menopausal gonadotropin, or hMG, (Repronex) - this medication contains both FSH and LH. It is an injection and is used for patients who don't ovulate on their own because of a fault in their pituitary gland.
- Follicle-stimulating hormone (Gonal-F, Bravelle) - this is a hormone produced by the pituitary gland that controls estrogen production by the ovaries. It stimulates the ovaries to mature egg follicles.
- Human chorionic gonadotropin (Ovidrel, Pregnyl) - this medication is used together with clomiphene, hMG and FSH. It stimulates the follicle to ovulate.
- Gn-RH (gonadotropin-releasing hormone) analogs - for women who ovulate prematurely, before the lead follicle is mature enough during hMG treatment. This medication delivers a constant supply of Gn-RH to the pituitary gland, which alters the production of hormone, allowing the doctor to induce follicle growth with FSH.

Infertility

- Bromocriptine (Parlodel) - this drug inhibits prolactin production. Prolactin stimulates milk production in breast feeding mothers. If non-pregnant, non-breast feeding women have high levels of prolactin they may have irregular ovulation cycles and have fertility problems.



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