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OBG 508

MEDICAL DISORDERS IN PREGNANCY

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Course code: OBG 508

Course title: Medical Disorders in Pregnancy

Course credit load: 2 Units

Series 1: Haematological Disorders in Pregnancy

- **Part 1.1: Anaemia in Pregnancy: Definitions, Causes, and Impact**
    - Sub Part 1.1.1: Definitions and classification of anaemia in pregnancy
    - Sub Part 1.1.2: Causes of anaemia in pregnancy
    - Sub Part 1.1.3: Impact of anaemia on pregnancy outcome
- **Part 1.2: Anaemia in Pregnancy: Evaluation and Management**
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- **Part 1.4: Disseminated Intravascular Coagulation in Pregnancy**
    - Sub Part 1.4.1: Pathophysiology of DIC in pregnancy
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Introduction

Picture a woman attending her booking antenatal visit, her blood results returning with a haemoglobin level lower than expected. Understanding whether this reflects the normal physiological changes of pregnancy, a straightforward iron deficiency, or something more complex, such as an inherited haemoglobinopathy, shapes the entire course of her antenatal care. This Series lays the essential foundation for the whole of this course on medical disorders in pregnancy, beginning with the blood itself, before we turn in later Series to the heart, the endocrine system, infection, and the many other medical conditions that can complicate pregnancy.

The aim of this Series is to equip you with a thorough understanding of anaemia in pregnancy, its definitions, causes, impact, evaluation, and management, together with haemoglobinopathies and disseminated intravascular coagulation.

We shall commence this Series by examining the definitions, causes, and impact of anaemia in pregnancy. Next, we will consider the evaluation and management of anaemia. Following that, our attention turns to haemoglobinopathies in pregnancy, including sickle cell disease, thalassaemia, and antenatal screening. Finally, we will conclude by examining disseminated intravascular coagulation in pregnancy.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 1.1:** list the various definitions and causes of anaemia in pregnancy,
- **SLO 1.2:** explain the impact of anaemia in pregnancy on pregnancy outcome,
- **SLO 1.3:** describe how to evaluate women with anaemia in pregnancy,
- **SLO 1.4:** list the various management options of anaemia in pregnancy,
- **SLO 1.5:** describe sickle cell disease and thalassaemia in pregnancy,
- **SLO 1.6:** describe antenatal screening and genetic counselling for haemoglobinopathies, and
- **SLO 1.7:** describe the pathophysiology, causes, and management of disseminated intravascular coagulation in pregnancy.

1.1 Anaemia in Pregnancy: Definitions, Causes, and Impact

1.1.1 Definitions and classification of anaemia in pregnancy

Anaemia in pregnancy is defined by the World Health Organization as a haemoglobin concentration below 11 grams per decilitre, though this threshold requires careful interpretation given the physiological haemodilution of pregnancy, itself reflecting a proportionally greater rise in plasma volume than red cell mass, meaning a modest fall in haemoglobin concentration during pregnancy is entirely normal and should not automatically be equated with genuine anaemia requiring active treatment.

Anaemia is further classified by severity as mild, moderate, or severe according to the specific haemoglobin threshold used by local protocol, and by underlying mechanism as due to reduced red cell production, increased red cell destruction, or blood loss, with this mechanistic classification directly guiding the specific further investigation and, ultimately, the treatment approach most appropriate for an individual woman's particular anaemia.

Fill in the blank: Anaemia in pregnancy is defined by the World Health Organization as a haemoglobin concentration below _____ grams per decilitre. Anaemia is classified by underlying mechanism as due to reduced red cell production, increased red cell destruction, or blood _____.

1.1.2 Causes of anaemia in pregnancy

Iron deficiency is by far the most common cause of anaemia in pregnancy worldwide and in Nigeria specifically, reflecting the substantially increased iron requirements of pregnancy relative to typical dietary intake, compounded in many Nigerian settings by coexisting causes of blood loss such as hookworm infestation and malaria, together placing pregnant women at genuinely elevated risk of iron deficiency anaemia if intake and supplementation are not actively and consistently addressed.

Other significant causes of anaemia in pregnancy include folate deficiency (of particular concern given its established link with neural tube defects), vitamin B12 deficiency, haemoglobinopathies such as sickle cell disease and thalassaemia (discussed in greater depth later in this Series), and, less commonly, other causes including chronic disease and haemolytic anaemia, each carrying somewhat different implications for both maternal management and, in the case of haemoglobinopathies, foetal genetic counselling.

Fill in the blank: Iron deficiency is compounded in many Nigerian settings by coexisting causes of blood loss such as _____ infestation and malaria. Folate deficiency in pregnancy is of particular concern given its established link with _____ defects.

1.1.3 Impact of anaemia on pregnancy outcome

Anaemia in pregnancy is associated with a range of adverse maternal outcomes, including increased fatigue and reduced functional capacity, an increased risk of postpartum haemorrhage-related complications given reduced physiological reserve to tolerate blood loss, increased susceptibility to infection, and, in severe cases, cardiac decompensation from the additional demand placed on an already anaemic maternal cardiovascular system.

Foetal and neonatal outcomes associated with maternal anaemia include an increased risk of low birth weight, preterm birth, and, in severe maternal anaemia specifically, intrauterine growth restriction, reflecting the reduced oxygen-carrying capacity available to support optimal placental function and foetal growth, together underscoring why anaemia in pregnancy should never be regarded as a purely maternal issue but rather as a condition with genuinely significant, direct implications for the developing foetus as well.

Fill in the blank: Anaemia in pregnancy increases the risk of postpartum haemorrhage-related complications given reduced physiological _____ to tolerate blood loss. Severe maternal anaemia is associated with an increased risk of intrauterine growth _____.

Cause	Relative Frequency	Key Features
Iron Deficiency Anaemia	Most common (≈75%)	Microcytic, hypochromic; low ferritin; responds to iron supplementation
Folate Deficiency Anaemia	Less common	Macrocytic; megaloblastic changes; associated with poor diet, multiple pregnancies
Vitamin B12 Deficiency Anaemia	Rare	Macrocytic; neurological symptoms; seen in strict vegetarians or malabsorption
Anaemia of Chronic Disease	Occasional	Normocytic, normochromic; associated with chronic infections/inflammation
Haemoglobinopathies (e.g., Sickle Cell, Thalassaemia)	Region-specific prevalence	Genetic; microcytic or normocytic; requires specialized management
Acute Blood Loss (e.g., antepartum/postpartum haemorrhage)	Important but less frequent	Sudden drop in Hb; hypovolaemia; requires urgent transfusion
Other Causes	Rare	Aplastic anaemia, bone marrow suppression, chronic renal disease

Table 1.1: Causes of anaemia in pregnancy and their key features.

Pilot questions 1.1

1. Define anaemia in pregnancy according to the World Health Organization threshold. (Linked to SLO 1.1)
2. Describe the classification of anaemia in pregnancy by underlying mechanism. (Linked to SLO 1.1)
3. List the causes of anaemia in pregnancy. (Linked to SLO 1.1)

4. Describe the maternal complications associated with anaemia in pregnancy. (Linked to SLO 1.2)
5. Describe the foetal and neonatal outcomes associated with maternal anaemia. (Linked to SLO 1.2)

1.2 Anaemia in Pregnancy: Evaluation and Management

1.2.1 Evaluation of women with anaemia in pregnancy

Evaluation of anaemia in pregnancy begins with a full blood count, including red cell indices, which provide valuable initial diagnostic clues, given that microcytic anaemia is suggestive of iron deficiency or thalassaemia, macrocytic anaemia is suggestive of folate or vitamin B12 deficiency, and normocytic anaemia may reflect early iron deficiency, chronic disease, or an acute process such as haemolysis or blood loss.

Further targeted investigation is guided by these initial findings and includes serum ferritin (the most reliable marker of iron stores), folate and vitamin B12 levels where macrocytosis is present, haemoglobin electrophoresis where a haemoglobinopathy is suspected on the basis of ethnicity, family history, or unexplained microcytic anaemia unresponsive to iron, and, where indicated, further investigation for an underlying cause of blood loss.

Fill in the blank: Microcytic anaemia is suggestive of iron deficiency or _____, while macrocytic anaemia is suggestive of folate or vitamin B12 deficiency. Serum _____ is the most reliable marker of iron stores in the evaluation of anaemia.

1.2.2 Management options for anaemia in pregnancy

Oral iron supplementation is the first-line treatment for confirmed iron deficiency anaemia in pregnancy, generally well tolerated though sometimes limited by gastrointestinal side effects including nausea and constipation, with intravenous iron considered where oral therapy is poorly tolerated, ineffective, or where a more rapid correction of anaemia is genuinely required, such as approaching term or before an anticipated significant blood loss.

Blood transfusion is reserved for severe anaemia, particularly where there is associated haemodynamic compromise, significant symptoms, or the anaemia is identified close to an anticipated delivery with insufficient time remaining for iron therapy to achieve adequate correction beforehand, with the specific threshold for transfusion genuinely individualised according to the severity of anaemia, associated symptoms, and gestational age.

Fill in the blank: Oral iron supplementation is the first-line treatment for confirmed iron deficiency anaemia, sometimes limited by _____ side effects. Blood transfusion is reserved for severe anaemia, particularly with associated haemodynamic _____.

1.2.3 Prevention of anaemia in pregnancy

Routine iron and folic acid supplementation is recommended for all pregnant women, not merely those with confirmed deficiency, reflecting the near-universal increase in iron and folate requirements imposed by pregnancy and the practical difficulty of reliably meeting these requirements through diet alone in most populations, with supplementation ideally commenced as early as possible in pregnancy.

Population-level prevention strategies relevant to Nigeria specifically include deworming programmes to address hookworm-related blood loss, effective malaria prevention including intermittent preventive treatment during pregnancy and insecticide-treated bed nets, and broader nutritional education and food fortification initiatives, together forming a genuinely comprehensive approach addressing the multiple, interconnected contributing causes of anaemia prevalent in this specific setting.

Fill in the blank: Routine iron and folic acid supplementation is recommended for all pregnant women, ideally commenced as early as _____ in pregnancy. Population-level prevention strategies in Nigeria include deworming programmes and effective _____ prevention.

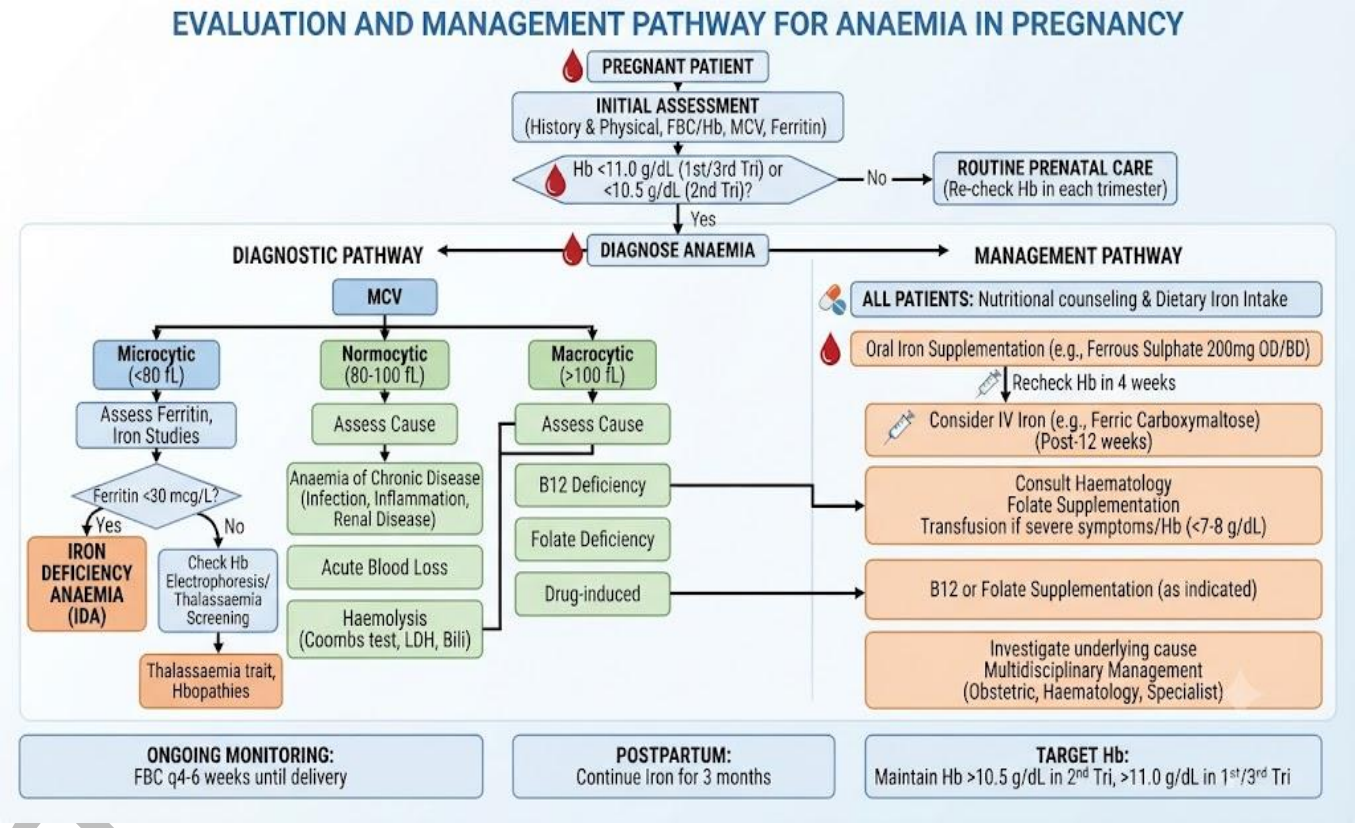

Figure 1.2: Evaluation and management pathway for anaemia in pregnancy.

Pilot questions 1.2

1. Describe the initial evaluation of anaemia in pregnancy using red cell indices. (Linked to SLO 1.3)
2. Describe the further targeted investigations used in evaluating anaemia in pregnancy. (Linked to SLO 1.3)
3. Describe the management options for iron deficiency anaemia in pregnancy. (Linked to SLO 1.4)
4. Describe the indications for blood transfusion in anaemia of pregnancy. (Linked to SLO 1.4)
5. Describe the strategies used to prevent anaemia in pregnancy. (Linked to SLO 1.4)

1.3 Haemoglobinopathies in Pregnancy

1.3.1 Sickle cell disease in pregnancy

Sickle cell disease is a significant cause of maternal and perinatal morbidity in pregnancy, particularly relevant in Nigeria given its substantial population prevalence, with pregnancy itself increasing the frequency and severity of vaso-occlusive painful crises, and carrying an increased risk of pre-eclampsia, infection, thromboembolism, and foetal growth restriction, requiring genuinely specialist, multidisciplinary antenatal care throughout pregnancy.

Management of sickle cell disease in pregnancy includes prophylactic folic acid supplementation given increased folate turnover, careful monitoring for painful crises with prompt, adequate analgesia and hydration when they occur, regular foetal growth surveillance given the recognised risk of growth restriction, and, in some cases, prophylactic or therapeutic blood transfusion, with delivery planning individualised according to disease severity and any pregnancy complications identified.

Fill in the blank: Pregnancy itself increases the frequency and severity of vaso-occlusive _____ crises in sickle cell disease. Management of sickle cell disease in pregnancy includes prophylactic folic acid supplementation given increased folate _____.

1.3.2 Thalassaemia in pregnancy

Thalassaemia trait (carrier status, generally asymptomatic outside pregnancy) typically causes mild, well-tolerated microcytic anaemia in pregnancy, often initially mistaken for iron deficiency anaemia given the similar red cell picture, though genuine iron deficiency should still be actively excluded, as it can coexist with thalassaemia trait and, if present, still requires appropriate correction alongside the underlying, unrelated thalassaemia diagnosis.

Thalassaemia major (the severe, transfusion-dependent form) is considerably less commonly encountered in pregnancy given its association with reduced fertility, but, when pregnancy does occur, requires genuinely specialist multidisciplinary management given the substantial risks of cardiac complications from iron overload, and the specific challenges of maintaining adequate transfusion support and iron chelation therapy safely throughout pregnancy.

Fill in the blank: Thalassaemia trait typically causes mild, well-tolerated _____ anaemia in pregnancy, often initially mistaken for iron deficiency. Thalassaemia major requires specialist management given the substantial risks of cardiac complications from iron _____.

1.3.3 Antenatal screening and genetic counselling for haemoglobinopathies

Antenatal screening for haemoglobinopathies, ideally performed before or in early pregnancy, identifies women who are carriers of sickle cell trait or thalassaemia trait, with partner testing then offered where the woman is identified as a carrier, given that a couple where both partners carry a relevant haemoglobinopathy trait face a significant risk of an affected pregnancy requiring specific genetic counselling.

Genetic counselling for couples at risk of an affected pregnancy should cover the specific inheritance pattern and recurrence risk, the range of clinical severity associated with the specific haemoglobinopathy in question, and the reproductive options available, including prenatal diagnosis, delivered sensitively and without any coercion, respecting the couple's own values and ultimate reproductive decision throughout this genuinely significant counselling process.

Fill in the blank: Antenatal screening for haemoglobinopathies identifies women who are _____ of sickle cell trait or thalassaemia trait. Genetic counselling should be delivered sensitively, respecting the couple's own values and ultimate reproductive _____.

Category	Details
Complications	Increased risk of maternal anaemia, pre-eclampsia, intrauterine growth restriction (IUGR), preterm labour, miscarriage, stillbirth, thromboembolism, maternal morbidity and mortality
Management	Multidisciplinary care; folic acid supplementation; avoidance of iron unless deficient; transfusion support when indicated; hydroxyurea avoided in pregnancy; close fetal surveillance with growth scans; thromboprophylaxis in high-risk cases
Screening	Antenatal screening with haemoglobin electrophoresis; genetic counselling for carriers; partner testing; prenatal diagnosis where indicated

Box 1.3: Haemoglobinopathies in pregnancy: complications, management, and screening.

Pilot questions 1.3

1. Describe the complications of sickle cell disease in pregnancy. (Linked to SLO 1.5)

2. Describe the management of sickle cell disease in pregnancy. (Linked to SLO 1.5)
3. Describe thalassaemia trait and thalassaemia major in pregnancy. (Linked to SLO 1.5)
4. Describe the process of antenatal screening for haemoglobinopathies. (Linked to SLO 1.6)
5. Describe the principles of genetic counselling for couples at risk of an affected pregnancy. (Linked to SLO 1.6)

1.4 Disseminated Intravascular Coagulation in Pregnancy

1.4.1 Pathophysiology of DIC in pregnancy

Disseminated intravascular coagulation (DIC) is a genuinely serious, acquired coagulopathy characterised by widespread, inappropriate activation of the coagulation cascade, causing consumption of clotting factors and platelets throughout the circulation, resulting in simultaneous, paradoxical bleeding (from consumed clotting factors) and microvascular thrombosis (from the widespread, inappropriate clot formation itself), a genuinely dangerous combination given its inherently contradictory clinical presentation.

Pregnancy-specific triggers of DIC include placental abruption (releasing tissue factor into the maternal circulation), amniotic fluid embolism, severe pre-eclampsia and eclampsia, sepsis, and massive obstetric haemorrhage itself, each capable of triggering the same final common pathway of widespread coagulation activation regardless of the specific underlying obstetric cause responsible for triggering the process.

Fill in the blank: DIC causes simultaneous, paradoxical bleeding and microvascular _____ given widespread, inappropriate activation of the coagulation cascade. Placental _____ releases tissue factor into the maternal circulation, a recognised trigger of DIC in pregnancy.

1.4.2 Causes and clinical features of DIC in pregnancy

The specific obstetric causes of DIC include placental abruption (the most common obstetric trigger), amniotic fluid embolism (a rare but frequently catastrophic cause), severe pre-eclampsia and HELLP syndrome, sepsis (including that associated with septic abortion or chorioamnionitis), and massive postpartum haemorrhage, with prompt recognition of the underlying obstetric trigger essential to guide appropriately targeted management alongside general DIC treatment.

Clinical features of DIC include widespread, unexpected bleeding from venepuncture sites, surgical incisions, and mucous membranes, alongside evidence of end-organ dysfunction from microvascular thrombosis, such as acute kidney injury or altered consciousness, with the

combination of unexplained bleeding in a woman with a recognised obstetric risk factor for DIC prompting immediate clinical suspicion and urgent laboratory confirmation.

Fill in the blank: The most common obstetric trigger of DIC is placental _____. Clinical features of DIC include widespread, unexpected bleeding alongside evidence of end-organ dysfunction from microvascular _____.

1.4.3 Diagnosis and management of DIC in pregnancy

Diagnosis of DIC is supported by a combination of laboratory findings, including a prolonged prothrombin time and activated partial thromboplastin time, low platelet count, low fibrinogen (though fibrinogen levels are physiologically elevated in normal pregnancy, meaning a level within the normal non-pregnant range may already represent a genuinely significant relative fall), and elevated fibrin degradation products or D-dimer, interpreted together with the clinical picture rather than any single test result in isolation.

Management of DIC combines urgent, aggressive treatment of the underlying obstetric trigger, such as delivery of the placenta in abruption or evacuation of retained tissue in sepsis, with replacement of consumed clotting factors and platelets, generally guided by a major haemorrhage protocol providing balanced blood product ratios, and close, ongoing monitoring of coagulation parameters to guide the specific, evolving components of ongoing replacement therapy required.

Fill in the blank: A fibrinogen level within the normal non-pregnant range may already represent a genuinely significant relative fall, given fibrinogen is physiologically _____ in normal pregnancy. Management of DIC combines urgent treatment of the underlying trigger with replacement of consumed clotting _____ and platelets.

Category	Details
Pregnancy-Specific Triggers	**Placental abruption, severe pre-eclampsia/eclampsia, HELLP syndrome, amniotic fluid embolism, intrauterine fetal demise (retained), septic abortion, postpartum haemorrhage**
Key Laboratory Findings	**Prolonged PT and aPTT, low fibrinogen, thrombocytopenia, elevated D-dimer and fibrin degradation products, schistocytes on blood film**

Table 1.4: Pregnancy-specific triggers and diagnostic laboratory findings of DIC.

Pilot questions 1.4

1. Describe the pathophysiology of disseminated intravascular coagulation. (Linked to SLO 1.7)
2. List the pregnancy-specific triggers of DIC. (Linked to SLO 1.7)
3. Describe the clinical features of DIC. (Linked to SLO 1.7)
4. Describe the laboratory findings used to diagnose DIC. (Linked to SLO 1.7)
5. Describe the principles of managing DIC in pregnancy. (Linked to SLO 1.7)

Series Summary

This Series has covered the definitions, causes, and impact of anaemia in pregnancy, followed by its evaluation and management. It went on to examine haemoglobinopathies in pregnancy, including sickle cell disease, thalassaemia, and antenatal screening, before concluding with disseminated intravascular coagulation in pregnancy.

You should now be able to list the definitions and causes of anaemia in pregnancy, explain its impact on pregnancy outcome, describe its evaluation and management, describe sickle cell disease and thalassaemia, describe antenatal screening and genetic counselling, and describe the pathophysiology and management of DIC in pregnancy (Linked to SLOs 1.1 to 1.7).

Glossary of Terms

- **Disseminated intravascular coagulation (DIC):** an acquired coagulopathy characterised by widespread activation of the coagulation cascade, causing simultaneous bleeding and thrombosis.
- **Ferritin:** the most reliable serum marker of iron stores, used in the evaluation of anaemia.
- **Haemoglobin electrophoresis:** a laboratory test used to identify haemoglobinopathies such as sickle cell disease and thalassaemia.
- **Iron deficiency anaemia:** anaemia resulting from insufficient iron to support haemoglobin synthesis, the most common cause of anaemia in pregnancy.
- **Macrocytic anaemia:** anaemia characterised by abnormally large red blood cells, suggestive of folate or vitamin B12 deficiency.

- **Microcytic anaemia:** anaemia characterised by abnormally small red blood cells, suggestive of iron deficiency or thalassaemia.
- **Placental abruption:** premature separation of the placenta, the most common obstetric trigger of DIC.
- **Sickle cell disease:** an inherited haemoglobinopathy causing vaso-occlusive crises, with increased severity and frequency in pregnancy.
- **Thalassaemia trait:** carrier status for thalassaemia, generally causing mild, well-tolerated microcytic anaemia.
- **Thalassaemia major:** the severe, transfusion-dependent form of thalassaemia.
- **Vaso-occlusive crisis:** an acute painful episode in sickle cell disease caused by blockage of blood vessels by sickled red cells.
- **Fibrin degradation products:** breakdown products of fibrin, elevated in disseminated intravascular coagulation.

Concept Check Questions [Series 1]

Objective questions

1. Anaemia in pregnancy is defined by the World Health Organization as a haemoglobin concentration below _____ grams per decilitre.
2. Iron deficiency is compounded in many Nigerian settings by coexisting causes of blood loss such as _____ infestation and malaria.
3. Serum _____ is the most reliable marker of iron stores in the evaluation of anaemia.
4. Pregnancy itself increases the frequency and severity of vaso-occlusive _____ crises in sickle cell disease.
5. The most common obstetric trigger of DIC is placental _____.

Short-answer questions

6. Describe the foetal and neonatal outcomes associated with maternal anaemia. (Linked to SLO 1.2)
7. Describe the indications for blood transfusion in anaemia of pregnancy. (Linked to SLO 1.4)
8. Describe the complications of sickle cell disease in pregnancy. (Linked to SLO 1.5)

9. Describe the principles of genetic counselling for couples at risk of an affected pregnancy. (Linked to SLO 1.6)
10. Describe the clinical features of DIC. (Linked to SLO 1.7)

Long-answer questions

11. List the definitions and causes of anaemia in pregnancy, and explain its impact on pregnancy outcome. (Linked to SLO 1.1, SLO 1.2)
12. Describe the evaluation and management of anaemia in pregnancy. (Linked to SLO 1.3, SLO 1.4)
13. Describe sickle cell disease and thalassaemia in pregnancy. (Linked to SLO 1.5)
14. Describe antenatal screening and genetic counselling for haemoglobinopathies. (Linked to SLO 1.6)
15. Describe the pathophysiology, causes, diagnosis, and management of DIC in pregnancy. (Linked to SLO 1.7)

Answers to Concept Check Questions [Series 1]

Objective questions

1. 11.
2. Hookworm.
3. Ferritin.
4. Painful.
5. Abruption.

Short-answer questions

6. Increased risk of low birth weight, preterm birth, and, in severe cases, intrauterine growth restriction.
7. Severe anaemia with haemodynamic compromise, significant symptoms, or insufficient time for iron therapy before delivery.

8. Increased pre-eclampsia risk, infection, thromboembolism, foetal growth restriction, and more frequent, severe painful crises.
9. Sensitive, non-coercive communication of inheritance pattern, recurrence risk, clinical severity, and reproductive options.
10. Widespread, unexpected bleeding from venepuncture sites and mucous membranes, alongside signs of end-organ dysfunction.

Long-answer questions

11. **Basic response:** Anaemia in pregnancy is defined below 11 g/dL, most commonly from iron deficiency, with maternal and foetal complications including growth restriction.

Value-added response: Anaemia should never be regarded as a purely maternal issue, given its genuinely significant implications for foetal growth and outcome.

12. **Basic response:** Evaluation uses full blood count and red cell indices to guide targeted testing, with management ranging from oral iron to transfusion depending on severity.

Value-added response: Population-level prevention in Nigeria requires addressing deworming, malaria, and nutrition alongside routine supplementation.

13. **Basic response:** Sickle cell disease increases pregnancy complications and crisis frequency, while thalassaemia trait causes mild anaemia often confused with iron deficiency.

Value-added response: Thalassaemia major requires specialist multidisciplinary management given the risks of iron overload and transfusion dependence.

14. **Basic response:** Antenatal screening identifies carriers, with partner testing and genetic counselling offered where both partners carry a relevant trait.

Value-added response: Counselling should be delivered sensitively and without coercion, respecting the couple's own values and reproductive decisions.

15. **Basic response:** DIC involves widespread coagulation activation causing simultaneous bleeding and thrombosis, triggered by abruption, embolism, or sepsis in pregnancy.

Value-added response: Management combines urgent treatment of the underlying trigger with balanced blood product replacement guided by ongoing coagulation monitoring.

Answers to Pilot Questions [Series 1]

Part 1.1

1. A haemoglobin concentration below 11 grams per decilitre.
2. Reduced red cell production, increased red cell destruction, or blood loss.
3. Iron deficiency, folate deficiency, vitamin B12 deficiency, haemoglobinopathies, and, less commonly, chronic disease or haemolysis.
4. Increased fatigue, increased postpartum haemorrhage risk, increased infection susceptibility, and, in severe cases, cardiac decompensation.
5. Increased risk of low birth weight, preterm birth, and intrauterine growth restriction with severe maternal anaemia.

Part 1.2

1. Microcytic anaemia suggests iron deficiency or thalassaemia; macrocytic suggests folate or B12 deficiency; normocytic may reflect several causes.
2. Serum ferritin, folate and B12 levels, haemoglobin electrophoresis, and investigation for an underlying cause of blood loss.
3. Oral iron first-line, with intravenous iron for poor tolerance, ineffectiveness, or need for rapid correction.
4. Severe anaemia with haemodynamic compromise, significant symptoms, or insufficient time for iron therapy before delivery.
5. Routine iron and folic acid supplementation, deworming, malaria prevention, and nutritional education and fortification.

Part 1.3

1. Increased pre-eclampsia, infection, thromboembolism, and foetal growth restriction risk, with more frequent painful crises.
2. Folic acid supplementation, prompt analgesia and hydration for crises, foetal growth surveillance, and individualised delivery planning.
3. Trait causes mild, well-tolerated microcytic anaemia; major is severe, transfusion-dependent, and rare in pregnancy given reduced fertility.

4. Identifying carriers before or in early pregnancy, with partner testing offered where the woman is a carrier.
5. Sensitive, non-coercive discussion of inheritance, severity, and reproductive options, respecting the couple's values.

Part 1.4

1. Widespread, inappropriate activation of the coagulation cascade causing consumption of clotting factors and platelets.
2. Placental abruption, amniotic fluid embolism, severe pre-eclampsia, sepsis, and massive obstetric haemorrhage.
3. Widespread unexpected bleeding and evidence of end-organ dysfunction from microvascular thrombosis.
4. Prolonged clotting times, low platelets, low fibrinogen, and elevated fibrin degradation products or D-dimer.
5. Urgent treatment of the underlying trigger combined with balanced blood product replacement and coagulation monitoring.

References and Attributions [Series 1]

Textual References

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Figures, Plates, Tables, and Boxes

- Table 1.1: Causes of anaemia in pregnancy and their key features. AI-generated using the prompt: "Create a clean reference table titled Causes of Anaemia in Pregnancy, listing causes with relative frequency and key features. Simple clinical reference table style with outside border."
- Figure 1.2: Evaluation and management pathway for anaemia in pregnancy. AI-generated using the prompt: "Create a professional medical flowchart titled Evaluation and Management Pathway for Anaemia in Pregnancy, showing diagnostic and management pathways. Clean clinical educational diagram style."
- Box 1.3: Haemoglobinopathies in pregnancy: complications, management, and screening. AI-generated using the prompt: "Create a simple single-column reference box with an outside border titled Haemoglobinopathies in Pregnancy, listing complications, management, and screening. Clinical reference box style."
- Table 1.4: Pregnancy-specific triggers and diagnostic laboratory findings of DIC. AI-generated using the prompt: "Create a clean reference table titled DIC in Pregnancy: Triggers and Diagnosis, listing pregnancy-specific triggers and key laboratory findings. Simple clinical reference table style with outside border."

Course code: OBG 508

Course title: Medical Disorders in Pregnancy

Course credit load: 2 Units

Series 2: Cardiovascular and Endocrine Conditions

- **Part 2.1: Heart Disease in Pregnancy: Classification and Impact**
  - Sub Part 2.1.1: Physiological cardiovascular changes of pregnancy
  - Sub Part 2.1.2: Classification of heart disease in pregnancy
  - Sub Part 2.1.3: Impact of heart disease on maternal and foetal outcome
- **Part 2.2: Heart Disease in Pregnancy: Evaluation and Care**
  - Sub Part 2.2.1: Evaluation of women with heart disease in pregnancy
  - Sub Part 2.2.2: Prenatal foetal diagnosis in maternal heart disease
  - Sub Part 2.2.3: Principles of patient care in pregnancy, labour, and puerperium
- **Part 2.3: Thyroid Disease and Drug Considerations in Pregnancy**
  - Sub Part 2.3.1: Thyroid physiology in pregnancy
  - Sub Part 2.3.2: Effect of thyroid disease on maternal and foetal outcome
  - Sub Part 2.3.3: Drug treatment modification and teratogenicity in pregnancy
- **Part 2.4: Diabetes Mellitus in Pregnancy**
  - Sub Part 2.4.1: Classification and pathophysiology of diabetes in pregnancy
  - Sub Part 2.4.2: Maternal and foetal effects of diabetes in pregnancy
  - Sub Part 2.4.3: Management of diabetes in pregnancy

Introduction

In the last Series, we explored haematological disorders in pregnancy. We now turn to the cardiovascular and endocrine systems, both placed under substantial physiological demand

throughout pregnancy even when entirely healthy, and genuinely challenged when disease is already present. From maternal heart disease and its implications for both mother and baby, through thyroid disease and the broader question of medication safety in pregnancy, to diabetes mellitus, this Series builds the knowledge you need to care confidently for women navigating these conditions during pregnancy.

The aim of this Series is to equip you with a thorough understanding of heart disease in pregnancy, thyroid disease, drug considerations in pregnancy, and diabetes mellitus in pregnancy.

We shall commence this Series by examining heart disease in pregnancy, its classification and impact. Next, we will consider its evaluation and the principles of patient care throughout pregnancy, labour, and the puerperium. Following that, our attention turns to thyroid disease and drug considerations in pregnancy. Finally, we will conclude by examining diabetes mellitus in pregnancy.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 2.1:** enumerate the classifications of heart disease in pregnancy,
- **SLO 2.2:** explain how heart disease affects both maternal and foetal outcome,
- **SLO 2.3:** describe how to evaluate women with heart disease in pregnancy,
- **SLO 2.4:** recognise the need for prenatal foetal diagnosis and describe the principles of patient care in pregnancy, labour, and puerperium,
- **SLO 2.5:** describe how thyroid disease can affect maternal and foetal outcome,
- **SLO 2.6:** identify the need to modify drug treatment given teratogenic risk,
- **SLO 2.7:** describe the classification, pathophysiology, and effects of diabetes mellitus in pregnancy, and
- **SLO 2.8:** describe the management of diabetes mellitus in pregnancy.

2.1 Heart Disease in Pregnancy: Classification and Impact

2.1.1 Physiological cardiovascular changes of pregnancy

Pregnancy imposes substantial physiological demands on the maternal cardiovascular system, with cardiac output rising by approximately 30 to 50 percent above non-pregnant values, driven by increases in both stroke volume and heart rate, alongside a fall in systemic vascular resistance, changes that peak around the late second to early third trimester and place genuinely significant additional strain on a heart already structurally or functionally compromised by pre-existing cardiac disease.

Labour and the immediate postpartum period impose further, acute haemodynamic stress, with each uterine contraction transiently increasing cardiac output, and the immediate postpartum period bringing a substantial autotransfusion of blood from the contracting, involuting uterus back into the maternal circulation, meaning that a woman with significant cardiac disease often faces her single greatest period of cardiovascular risk not during pregnancy itself, but during labour and the days immediately following delivery.

Fill in the blank: Cardiac output rises by approximately 30 to _____ percent above non-pregnant values during pregnancy. A woman with significant cardiac disease often faces her greatest cardiovascular risk during labour and the immediate _____ period.

2.1.2 Classification of heart disease in pregnancy

Heart disease in pregnancy is broadly classified by underlying cause as congenital (increasingly the most common category encountered in pregnancy in high-income settings, reflecting improved survival to reproductive age following childhood cardiac surgery) or acquired, with acquired disease further subdivided into rheumatic heart disease (still a genuinely significant cause in Nigeria and similar settings), cardiomyopathy (including peripartum cardiomyopathy, a condition specific to pregnancy itself), and ischaemic heart disease.

Functional classification using the New York Heart Association (NYHA) system, grading symptoms from class I (no limitation of physical activity) through class IV (symptoms present even at rest), provides a genuinely practical, widely used framework for assessing the severity of functional cardiac impairment and directly guiding the intensity of antenatal surveillance and delivery planning required for an individual woman.

Fill in the blank: Acquired heart disease in pregnancy includes rheumatic heart disease, cardiomyopathy, and _____ heart disease. The NYHA functional classification grades symptoms from class I to class _____.

2.1.3 Impact of heart disease on maternal and foetal outcome

Maternal cardiac disease remains a leading cause of indirect maternal death in many settings, with the specific risk to the woman genuinely dependent on the underlying cardiac lesion, its severity, and her functional capacity, with certain high-risk lesions, including pulmonary hypertension and severe left ventricular outflow tract obstruction, carrying a genuinely substantial risk of maternal mortality that may, in some cases, warrant specific pre-pregnancy counselling against pregnancy altogether.

Foetal outcomes associated with maternal cardiac disease include an increased risk of foetal growth restriction (reflecting reduced uteroplacental perfusion in a woman with compromised cardiac output), preterm birth, and, where the maternal cardiac lesion is congenital, an increased risk of congenital heart disease in the offspring, underscoring why specialist, multidisciplinary antenatal care genuinely matters for both mother and baby in this specific population.

Fill in the blank: Maternal cardiac disease remains a leading cause of indirect maternal _____ in many settings. Where the maternal cardiac lesion is congenital, there is an increased risk of congenital heart disease in the _____.

Class	Symptom Limitations
Class I	No limitation of physical activity. Ordinary activity does not cause undue fatigue, palpitations, or dyspnoea.
Class II	Slight limitation of physical activity. Comfortable at rest, but ordinary activity results in fatigue, palpitations, or dyspnoea.
Class III	Marked limitation of physical activity. Comfortable at rest, but less-than-ordinary activity causes symptoms.
Class IV	Unable to carry out any physical activity without discomfort. Symptoms of heart failure present even at rest.

Table 2.1: NYHA functional classification of heart disease in pregnancy.

Pilot questions 2.1

- Describe the physiological cardiovascular changes of pregnancy. (Linked to SLO 2.1)
- Explain why labour and the immediate postpartum period carry particular cardiovascular risk. (Linked to SLO 2.1)
- Describe the classification of heart disease in pregnancy by underlying cause. (Linked to SLO 2.1)
- Describe the NYHA functional classification system. (Linked to SLO 2.1)
- Describe the maternal and foetal outcomes associated with heart disease in pregnancy. (Linked to SLO 2.2)

2.2 Heart Disease in Pregnancy: Evaluation and Care

2.2.1 Evaluation of women with heart disease in pregnancy

Evaluation of a pregnant woman with known or suspected heart disease combines careful clinical history and examination, assessing functional capacity and specific symptoms such as breathlessness, palpitations, or chest pain, with echocardiography as the principal, non-invasive investigation for structural and functional cardiac assessment, and electrocardiography and, where indicated, further specialist cardiac investigation guided by the specific clinical presentation.

Ideally this evaluation begins before pregnancy through dedicated pre-pregnancy counselling, allowing genuine risk stratification and informed discussion of the specific risks of pregnancy for a woman with a particular cardiac lesion before conception occurs, though evaluation of a woman already pregnant with newly identified or previously undiagnosed cardiac disease follows the same fundamental principles, simply compressed into the timeframe of an already established pregnancy.

Fill in the blank: Echocardiography is the principal, non-invasive investigation for structural and functional cardiac _____. Ideally, evaluation of maternal cardiac disease begins before pregnancy through dedicated pre-pregnancy _____.

2.2.2 Prenatal foetal diagnosis in maternal heart disease

Foetal echocardiography should be offered to any woman with congenital heart disease herself, given the recognised increased risk of congenital heart disease in the offspring of an affected parent, allowing detailed antenatal assessment of foetal cardiac structure and, where an abnormality is identified, appropriate counselling and delivery planning at a facility equipped to manage a baby with congenital heart disease from birth.

Recognising the genuine need for prenatal foetal diagnosis in this specific population reflects a broader principle running throughout obstetric practice, that maternal medical conditions frequently carry direct, specific implications for the foetus that must be actively and specifically sought, rather than assuming a foetus is unaffected simply because it has not been specifically investigated for a condition genuinely relevant to its own individual risk profile.

Fill in the blank: Foetal echocardiography should be offered to any woman with congenital heart disease herself, given the increased risk of congenital heart disease in the _____. Maternal medical conditions frequently carry direct implications for the foetus that must be actively and specifically _____.

2.2.3 Principles of patient care in pregnancy, labour, and puerperium

Antenatal care for a woman with significant cardiac disease requires genuinely specialist, multidisciplinary input from cardiology and obstetric medicine alongside routine obstetric care, with the specific frequency of review and any additional monitoring individualised according to the severity of the underlying cardiac lesion, and delivery planned at an appropriately resourced facility with immediate access to cardiac and critical care support.

Labour and delivery management for significant cardiac disease includes careful attention to fluid balance (avoiding both under- and over-hydration, each carrying specific risks in a woman with compromised cardiac function), continuous cardiac monitoring where indicated, and, in some cases, a planned, assisted second stage to minimise the additional cardiovascular strain of prolonged active pushing, with the immediate postpartum period recognised as a particularly high-risk time requiring continued, vigilant monitoring.

Fill in the blank: Delivery for a woman with significant cardiac disease should be planned at an appropriately resourced facility with immediate access to cardiac and _____ care support. Labour management includes careful attention to fluid _____, avoiding both under- and over-hydration.

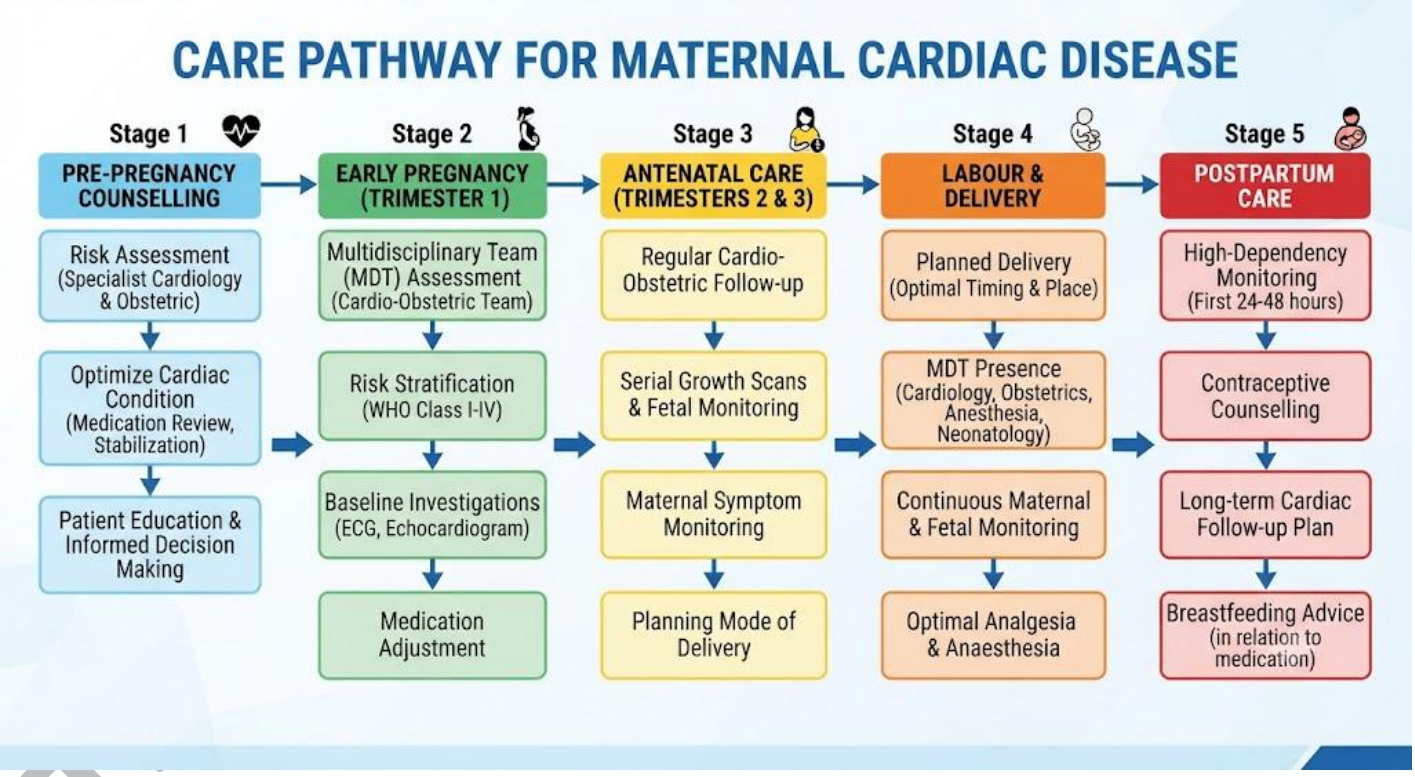

Figure 2.2: Care pathway for the pregnant woman with significant cardiac disease.

Pilot questions 2.2

1. Describe the evaluation of a pregnant woman with known or suspected heart disease. (Linked to SLO 2.3)
2. Explain the value of pre-pregnancy counselling in maternal cardiac disease. (Linked to SLO 2.3)
3. Explain the indication for foetal echocardiography in a woman with congenital heart disease. (Linked to SLO 2.4)
4. Describe the principles of antenatal care for a woman with significant cardiac disease. (Linked to SLO 2.4)
5. Describe the principles of labour and postpartum management in maternal cardiac disease. (Linked to SLO 2.4)

2.3 Thyroid Disease and Drug Considerations in Pregnancy

2.3.1 Thyroid physiology in pregnancy

Pregnancy induces significant changes in thyroid physiology, with increased thyroid-binding globulin production raising total thyroid hormone levels while free hormone levels remain relatively stable, and human chorionic gonadotropin, structurally similar to thyroid-stimulating hormone, providing a mild stimulatory effect on the thyroid gland, particularly in early pregnancy, meaning pregnancy-specific reference ranges must be used when interpreting thyroid function tests rather than standard non-pregnant ranges.

Adequate maternal thyroid hormone is essential for normal foetal neurodevelopment, particularly in early pregnancy before the foetal thyroid gland itself becomes functional, meaning maternal thyroid status genuinely matters for foetal brain development from the very earliest stages of pregnancy, well before this dependency might otherwise be intuitively expected.

Fill in the blank: Human chorionic gonadotropin provides a mild stimulatory effect on the thyroid gland, given its structural similarity to thyroid-_____ hormone. Adequate maternal thyroid hormone is essential for normal foetal _____ before the foetal thyroid becomes functional.

2.3.2 Effect of thyroid disease on maternal and foetal outcome

Hypothyroidism in pregnancy (most commonly from autoimmune thyroiditis) is associated with an increased risk of miscarriage, pre-eclampsia, preterm birth, and, if inadequately treated, impaired foetal neurodevelopment, making prompt diagnosis and adequate thyroxine replacement genuinely important throughout pregnancy, with thyroid function monitored and dose adjusted as pregnancy progresses given the increased thyroid hormone requirements pregnancy itself imposes.

Hyperthyroidism in pregnancy (most commonly from Graves' disease) is associated with an increased risk of miscarriage, pre-eclampsia, preterm birth, and, in poorly controlled disease, maternal thyroid storm, a genuine medical emergency, with treatment requiring careful selection of an antithyroid medication with a favourable safety profile in pregnancy, given that not all commonly used antithyroid medications carry an identical teratogenic risk profile.

Fill in the blank: Hypothyroidism in pregnancy is associated with an increased risk of miscarriage, pre-eclampsia, and impaired foetal _____ if inadequately treated. Poorly controlled hyperthyroidism can result in maternal thyroid _____, a genuine medical emergency.

2.3.3 Drug treatment modification and teratogenicity in pregnancy

Prescribing in pregnancy requires careful weighing of the benefit of treating the maternal condition against any potential risk to the developing foetus, recognising that untreated maternal illness itself frequently carries greater foetal risk than appropriate treatment, and that the period of greatest teratogenic vulnerability, roughly weeks three to eight of gestation during organogenesis, is of particular relevance when reviewing any medication a woman may already be taking at the time pregnancy is confirmed.

Medications requiring specific review or modification in pregnancy include certain antiepileptic drugs (some carrying substantial teratogenic risk, requiring specialist discussion of the safest available option for an individual woman), ACE inhibitors and angiotensin receptor blockers (associated with fetal renal impairment, requiring substitution with a pregnancy-safe alternative antihypertensive), warfarin (particularly teratogenic in the first trimester, generally substituted with heparin during pregnancy), and certain antithyroid medications, each requiring genuinely individualised, specialist-guided medication review at the earliest opportunity once pregnancy is confirmed or being actively planned.

Fill in the blank: The period of greatest teratogenic vulnerability is roughly weeks three to _____ of gestation, during organogenesis. Warfarin is particularly teratogenic in the first trimester and is generally substituted with _____ during pregnancy.

Drug/Class	Specific Concerns
ACE inhibitors / ARBs	Fetotoxic in 2nd/3rd trimester → renal dysgenesis, oligohydramnios, growth restriction
Warfarin	Teratogenic (nasal hypoplasia, stippled epiphyses); risk of fetal bleeding; safer alternatives: LMWH
Valproate	Neural tube defects, neurodevelopmental delay; avoid if possible
Methotrexate	Abortifacient, teratogenic (craniofacial, limb anomalies); contraindicated
Tetracyclines	Dental discoloration, bone growth inhibition

Drug/Class	Specific Concerns
Fluoroquinolones	Cartilage damage in animal studies; avoid
NSAIDs (late pregnancy)	Premature closure of ductus arteriosus, oligohydramnios
Lithium	Ebstein's anomaly (tricuspid valve defect); neonatal toxicity risk
Antiepileptics (phenytoin, carbamazepine)	Congenital malformations (cleft lip/palate, cardiac defects); folate supplementation advised
Retinoids (isotretinoin)	Highly teratogenic (craniofacial, cardiac, CNS anomalies); contraindicated

Box 2.3: Medications requiring specific review or modification in pregnancy.

Pilot questions 2.3

1. Describe the changes in thyroid physiology that occur during pregnancy. (Linked to SLO 2.5)
2. Explain the importance of maternal thyroid hormone for foetal neurodevelopment. (Linked to SLO 2.5)
3. Describe the effects of hypothyroidism and hyperthyroidism on pregnancy outcome. (Linked to SLO 2.5)
4. Explain why the period of organogenesis is of particular relevance when reviewing medication in pregnancy. (Linked to SLO 2.6)
5. List medications requiring specific review or modification in pregnancy. (Linked to SLO 2.6)

2.4 Diabetes Mellitus in Pregnancy

2.4.1 Classification and pathophysiology of diabetes in pregnancy

Diabetes in pregnancy is classified as pre-existing (type 1 or type 2 diabetes diagnosed before pregnancy) or gestational (first identified during pregnancy, typically around 24 to 28 weeks), with gestational diabetes reflecting a relative insulin resistance induced by placental hormones, most notably human placental lactogen, that a genetically or metabolically predisposed woman's own insulin production cannot fully compensate for as pregnancy advances.

Risk factors for gestational diabetes include obesity, previous gestational diabetes, a family history of diabetes, previous macrosomic infant, and certain ethnic backgrounds with recognised higher prevalence, with screening, generally by oral glucose tolerance test, either offered universally or targeted specifically to women with one or more identified risk factors, depending on local protocol and available resources.

Fill in the blank: Gestational diabetes reflects relative insulin resistance induced by placental hormones, most notably human placental _____. Screening for gestational diabetes is generally performed by oral glucose _____ test.

2.4.2 Maternal and foetal effects of diabetes in pregnancy

Maternal complications of diabetes in pregnancy include an increased risk of pre-eclampsia, polyhydramnios, and, particularly with poorly controlled pre-existing diabetes, an increased risk of diabetic retinopathy and nephropathy progression, alongside an increased likelihood of instrumental or caesarean delivery, reflecting the broader, genuinely significant maternal impact of this condition beyond glycaemic control alone.

Foetal and neonatal complications include macrosomia (from foetal hyperinsulinaemia in response to maternal hyperglycaemia, itself increasing the risk of shoulder dystocia and birth trauma), and, in pre-existing diabetes particularly, congenital anomaly if glycaemic control is poor around the time of conception and early organogenesis, alongside neonatal hypoglycaemia immediately after birth as the neonate's own hyperinsulinaemic state persists briefly after the maternal glucose supply is abruptly removed.

Fill in the blank: Foetal macrosomia results from foetal hyperinsulinaemia in response to maternal _____. Poor glycaemic control around conception in pre-existing diabetes increases the risk of congenital _____.

2.4.3 Management of diabetes in pregnancy

Management of diabetes in pregnancy centres on achieving and maintaining tight glycaemic control throughout pregnancy, initially through dietary modification and structured exercise, escalating to insulin therapy, or, in gestational diabetes specifically, sometimes oral hypoglycaemic agents, where target glucose levels are not achieved through lifestyle measures alone, with regular, structured monitoring of blood glucose essential to guide ongoing treatment adjustment.

Antenatal surveillance in diabetic pregnancy includes increased ultrasound assessment of foetal growth, given the recognised risk of macrosomia, alongside careful planning of the timing and mode of delivery, reflecting the recognised increase in both maternal and foetal risk associated with poorly controlled diabetes throughout pregnancy, and the genuinely important role of a coordinated, multidisciplinary team combining obstetric, diabetic, and, where needed, neonatal expertise throughout the pregnancy and around the time of delivery.

Fill in the blank: Management of diabetes in pregnancy centres on achieving and maintaining tight glycaemic _____ throughout pregnancy. Antenatal surveillance in diabetic pregnancy includes increased ultrasound assessment of foetal _____.

Category	Details
Maternal Complications	Severe haemorrhage, multi-organ failure, shock, renal failure, hepatic dysfunction, maternal mortality
Foetal Complications	Intrauterine hypoxia, growth restriction, stillbirth, neonatal death
Pregnancy-Specific Triggers	Placental abruption, severe pre-eclampsia/HELLP syndrome, amniotic fluid embolism, intrauterine fetal demise, septic abortion, postpartum haemorrhage
Key Laboratory Findings	Prolonged PT/aPTT, low fibrinogen, thrombocytopenia, elevated D-dimer/fibrin degradation products, schistocytes on blood film

Table 2.4: Maternal and foetal complications of diabetes in pregnancy.

Pilot questions 2.4

1. Describe the classification of diabetes in pregnancy. (Linked to SLO 2.7)
2. Describe the pathophysiology of gestational diabetes. (Linked to SLO 2.7)
3. List the risk factors for gestational diabetes. (Linked to SLO 2.7)
4. Describe the maternal and foetal complications of diabetes in pregnancy. (Linked to SLO 2.7)
5. Describe the management of diabetes in pregnancy. (Linked to SLO 2.8)

Series Summary

This Series has covered heart disease in pregnancy, its classification and impact, followed by its evaluation and the principles of patient care throughout pregnancy, labour, and the puerperium. It went on to examine thyroid disease and drug considerations in pregnancy, before concluding with diabetes mellitus in pregnancy.

You should now be able to enumerate the classifications of heart disease in pregnancy, explain its impact on maternal and foetal outcome, describe its evaluation and care, describe thyroid disease effects, identify the need to modify drug treatment, and describe the classification, effects, and management of diabetes in pregnancy (Linked to SLOs 2.1 to 2.8).

Glossary of Terms

1. **Foetal echocardiography:** detailed ultrasound assessment of foetal cardiac structure, offered to women at increased risk of foetal congenital heart disease.
2. **Gestational diabetes:** diabetes first identified during pregnancy, typically around 24 to 28 weeks of gestation.
3. **Human placental lactogen:** a placental hormone contributing to insulin resistance in pregnancy, relevant to gestational diabetes.
4. **Macrosomia:** a fetus or newborn significantly larger than average for gestational age, associated with maternal diabetes.
5. **NYHA classification:** the New York Heart Association functional classification of cardiac symptom severity, from class I to class IV.
6. **Organogenesis:** the period of embryonic development, roughly weeks three to eight of gestation, during which structural malformation risk is highest.
7. **Peripartum cardiomyopathy:** a form of heart failure specific to pregnancy, developing in the peripartum period.
8. **Pre-pregnancy counselling:** counselling delivered before conception, allowing risk stratification and informed decision-making for women with pre-existing conditions.
9. **Teratogenic:** capable of causing structural or functional abnormality in a developing foetus.
10. **Thyroid storm:** a life-threatening exacerbation of hyperthyroidism, a genuine medical emergency.
11. **Autotransfusion:** the physiological return of blood from the contracting uterus into the maternal circulation after delivery.
12. **Oral glucose tolerance test:** the standard screening and diagnostic test for gestational diabetes.

Concept Check Questions [Series 2]

Objective questions

- Cardiac output rises by approximately 30 to _____ percent above non-pregnant values during pregnancy.
- The NYHA functional classification grades symptoms from class I to class _____.
- Human chorionic gonadotropin provides a mild stimulatory effect on the thyroid gland, given its structural similarity to thyroid-_____ hormone.
- The period of greatest teratogenic vulnerability is roughly weeks three to _____ of gestation.
- Gestational diabetes reflects relative insulin resistance induced by placental hormones, most notably human placental _____.

Short-answer questions

1. Explain why labour and the immediate postpartum period carry particular cardiovascular risk. (Linked to SLO 2.1)
2. Explain the indication for foetal echocardiography in a woman with congenital heart disease. (Linked to SLO 2.4)
3. Describe the effects of hypothyroidism and hyperthyroidism on pregnancy outcome. (Linked to SLO 2.5)
4. List medications requiring specific review or modification in pregnancy. (Linked to SLO 2.6)
5. List the risk factors for gestational diabetes. (Linked to SLO 2.7)

Long-answer questions

6. Describe the classification of heart disease in pregnancy and its impact on maternal and foetal outcome. (Linked to SLO 2.1, SLO 2.2)
7. Describe the evaluation and principles of care for a woman with heart disease in pregnancy. (Linked to SLO 2.3, SLO 2.4)

8. Describe the effect of thyroid disease on maternal and foetal outcome. (Linked to SLO 2.5)
9. Describe the need to modify drug treatment in pregnancy given teratogenic risk. (Linked to SLO 2.6)
10. Describe the classification, effects, and management of diabetes mellitus in pregnancy. (Linked to SLO 2.7, SLO 2.8)

Answers to Concept Check Questions [Series 2]

Objective questions

11. 50.
12. IV.
13. Stimulating.
14. Eight.
15. Lactogen.

Short-answer questions

16. Each contraction transiently increases cardiac output, and postpartum autotransfusion further increases circulating volume.
17. Congenital heart disease in a parent carries an increased risk of congenital heart disease in the offspring.
18. Both are associated with miscarriage, pre-eclampsia, and preterm birth, with hypothyroidism also risking impaired foetal neurodevelopment.
19. Certain antiepileptics, ACE inhibitors and ARBs, warfarin, and certain antithyroid medications.
20. Obesity, previous gestational diabetes, family history of diabetes, previous macrosomic infant, and certain ethnic backgrounds.

Long-answer questions

21. **Basic response:** Heart disease in pregnancy is classified as congenital or acquired, with NYHA class guiding severity, and carries risk to both mother and foetus.

Value-added response: High-risk lesions such as pulmonary hypertension may warrant specific pre-pregnancy counselling against pregnancy altogether.

22. **Basic response:** Evaluation combines history, examination, and echocardiography, with specialist multidisciplinary care and foetal echocardiography where indicated.

Value-added response: Labour and the immediate postpartum period represent the highest-risk time, requiring careful fluid balance and continued monitoring.

23. **Basic response:** Both hypothyroidism and hyperthyroidism increase the risk of miscarriage, pre-eclampsia, and preterm birth if inadequately treated in pregnancy.

Value-added response: Adequate maternal thyroid hormone is essential for foetal neurodevelopment even before the foetal thyroid gland becomes functional.

24. **Basic response:** Prescribing in pregnancy requires balancing maternal benefit against foetal risk, with specific medications such as warfarin and ACE inhibitors requiring substitution.

Value-added response: Untreated maternal illness itself frequently carries greater foetal risk than appropriate treatment, an important counselling principle.

25. **Basic response:** Diabetes in pregnancy is classified as pre-existing or gestational, with complications including macrosomia and congenital anomaly, managed by tight glycaemic control.

Value-added response: Coordinated multidisciplinary care combining obstetric, diabetic, and neonatal expertise is genuinely important throughout diabetic pregnancy.

Answers to Pilot Questions [Series 2]

Part 2.1

1. Cardiac output rises 30 to 50 percent through increased stroke volume and heart rate, with a fall in systemic vascular resistance.

2. Contractions transiently increase cardiac output, and postpartum autotransfusion further increases circulating volume.
3. Congenital (increasingly common) and acquired, including rheumatic heart disease, cardiomyopathy, and ischaemic heart disease.
4. A functional classification from class I (no limitation) to class IV (symptoms at rest), guiding surveillance intensity.
5. Increased foetal growth restriction and preterm birth risk, and, with congenital lesions, increased risk of congenital heart disease in offspring.

Part 2.2

6. History and examination assessing functional capacity and symptoms, with echocardiography as the principal investigation.
7. Pre-pregnancy counselling allows risk stratification and informed discussion of pregnancy-specific risks before conception.
8. Congenital heart disease in a parent carries an increased risk of congenital heart disease in the offspring.
9. Specialist multidisciplinary input, individualised review frequency, and delivery at an appropriately resourced facility.
10. Careful fluid balance, continuous monitoring where indicated, and vigilant postpartum monitoring given the high-risk period.

Part 2.3

11. Increased thyroid-binding globulin raises total hormone levels, and hCG provides mild thyroid stimulation, requiring pregnancy-specific reference ranges.
12. Maternal thyroid hormone supports foetal neurodevelopment before the foetal thyroid gland becomes functional.
13. Both increase miscarriage, pre-eclampsia, and preterm birth risk; hypothyroidism also risks impaired neurodevelopment if untreated.
14. It is the period of highest risk for structural malformation from medication exposure.

15. Certain antiepileptics, ACE inhibitors and ARBs, warfarin, and certain antithyroid medications.

Part 2.4

1. Pre-existing (type 1 or 2, diagnosed before pregnancy) or gestational (first identified during pregnancy).
2. Placental hormones, particularly human placental lactogen, induce insulin resistance that predisposed women cannot fully compensate for.
3. Obesity, previous gestational diabetes, family history, previous macrosomic infant, and certain ethnic backgrounds.
4. Pre-eclampsia, polyhydramnios, macrosomia, congenital anomaly, and neonatal hypoglycaemia.
5. Dietary modification and exercise initially, escalating to insulin or oral agents, with increased foetal growth surveillance.

References and Attributions [Series 2]

Textual References

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2. European Society of Cardiology (2018). ESC Guidelines for the Management of Cardiovascular Diseases During Pregnancy. European Heart Journal, 39(34), 3165 to 3241.
3. American Thyroid Association (2017). Guidelines of the American Thyroid Association for the Diagnosis and Management of Thyroid Disease During Pregnancy and the Postpartum. Thyroid, 27(3), 315 to 389.
4. National Institute for Health and Care Excellence (2020). Diabetes in Pregnancy: NICE Guideline NG3. NICE.

Figures, Plates, Tables, and Boxes

1. Table 2.1: NYHA functional classification of heart disease in pregnancy. AI-generated using the prompt: "Create a clean reference table titled NYHA Functional Classification, listing classes I through IV with defining symptom limitations. Simple clinical reference table style with outside border."
2. Figure 2.2: Care pathway for the pregnant woman with significant cardiac disease. AI-generated using the prompt: "Create a professional medical flowchart titled Care Pathway for Maternal Cardiac Disease, showing sequential stages from pre-pregnancy counselling through postpartum care. Clean clinical educational diagram style."
3. Box 2.3: Medications requiring specific review or modification in pregnancy. AI-generated using the prompt: "Create a simple single-column reference box with an outside border titled Medications Requiring Review in Pregnancy, listing key drugs and specific concerns. Clinical reference box style."
4. Table 2.4: Maternal and foetal complications of diabetes in pregnancy. AI-generated using the prompt: "Create a clean reference table titled Complications of Diabetes in Pregnancy, listing maternal and foetal complications with mechanisms. Simple clinical reference table style with outside border."

Course code: OBG 508

Course title: Medical Disorders in Pregnancy

Course credit load: 2 Units

Series 3: Infectious and Immunological Challenges

- **Part 3.1: HIV in Pregnancy: Pathophysiology and Transmission**
  - Sub Part 3.1.1: Causative agent and pathophysiology of HIV
  - Sub Part 3.1.2: Mother-to-child transmission of HIV
  - Sub Part 3.1.3: Risk factors for mother-to-child transmission
- **Part 3.2: HIV in Pregnancy: Treatment and Prevention of Transmission**
  - Sub Part 3.2.1: Antiretroviral drug therapy for HIV in pregnancy
  - Sub Part 3.2.2: Prevention of mother-to-child transmission (PMTCT)
  - Sub Part 3.2.3: Breastfeeding issues in infected mothers
- **Part 3.3: Monitoring and Care of Infants of HIV-Infected Mothers**
  - Sub Part 3.3.1: Monitoring babies of infected mothers
  - Sub Part 3.3.2: Infant HIV testing and diagnosis
  - Sub Part 3.3.3: Postnatal care and follow-up
- **Part 3.4: Malaria and Viral Infections in Pregnancy**
  - Sub Part 3.4.1: Malaria in pregnancy
  - Sub Part 3.4.2: Common viral infections in pregnancy
  - Sub Part 3.4.3: Prevention and management principles for infectious disease in pregnancy

Introduction

In the last Series, we explored cardiovascular and endocrine conditions in pregnancy. We now turn to infectious and immunological challenges, beginning with HIV, one of the most transformative success stories in modern obstetric medicine, where dramatic reductions in mother-to-child transmission have been achieved through consistent, evidence-based care. We then turn to malaria and other viral infections, each carrying its own specific implications for the pregnancy and the developing foetus.

The aim of this Series is to equip you with a thorough understanding of HIV in pregnancy, including its transmission, treatment, and prevention, the monitoring of infants of infected mothers, and malaria and other viral infections in pregnancy.

We shall commence this Series by examining HIV in pregnancy, its pathophysiology and mother-to-child transmission. Next, we will consider antiretroviral treatment, prevention of mother-to-child transmission, and breastfeeding issues. Following that, our attention turns to monitoring and care of infants of HIV-infected mothers. Finally, we will conclude by examining malaria and other viral infections in pregnancy.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 3.1:** define the causative agent of HIV,
- **SLO 3.2:** describe the transmission of HIV from mother to child during pregnancy, labour, and after delivery,
- **SLO 3.3:** enumerate drug therapy for HIV infection,
- **SLO 3.4:** describe the methods of prevention of mother-to-child transmission of HIV,
- **SLO 3.5:** discuss breastfeeding issues in infected mothers,
- **SLO 3.6:** illustrate how to monitor babies of infected mothers,
- **SLO 3.7:** describe malaria in pregnancy, and
- **SLO 3.8:** describe common viral infections in pregnancy.

3.1 HIV in Pregnancy: Pathophysiology and Transmission

3.1.1 Causative agent and pathophysiology of HIV

Human immunodeficiency virus (HIV) is a retrovirus, most commonly HIV-1, that infects and progressively depletes CD4-positive T-lymphocytes, cells genuinely central to normal cellular immune function, with progressive immune deficiency over time, if untreated, resulting in acquired immunodeficiency syndrome (AIDS), characterised by susceptibility to a range of opportunistic infections and malignancies that a normally functioning immune system would ordinarily control.

Modern antiretroviral therapy suppresses viral replication, allowing CD4 cell counts to recover and effectively preventing progression to AIDS in the great majority of women who access and consistently adhere to treatment, meaning HIV infection, while still requiring lifelong management, is now genuinely compatible with a normal, healthy pregnancy and a long, healthy life more broadly when appropriately and consistently treated.

Fill in the blank: HIV is a retrovirus that infects and progressively depletes CD4-positive _____. Modern antiretroviral therapy suppresses viral _____, allowing CD4 cell counts to recover.

3.1.2 Mother-to-child transmission of HIV

Mother-to-child transmission of HIV can occur during pregnancy (through placental transfer, particularly in the presence of placental inflammation or damage), during labour and delivery (through contact with maternal blood and genital secretions, representing the period of highest transmission risk in the absence of intervention), and during breastfeeding (through transmission in breast milk), meaning transmission risk genuinely exists across the entire perinatal period, not at any single isolated moment.

Without any intervention mother-to-child transmission risk is substantial, historically estimated at approximately 15 to 45 percent depending on breastfeeding practice and duration, whereas with comprehensive, effective prevention of mother-to-child transmission measures consistently applied throughout pregnancy, labour, and breastfeeding, this risk can be reduced to below 2 percent, representing one of the most genuinely dramatic, evidence-based success stories in the whole of modern obstetric and public health practice.

Fill in the blank: Mother-to-child transmission of HIV can occur during pregnancy, labour and delivery, and _____. Without intervention, transmission risk is historically estimated at approximately 15 to _____ percent.

3.1.3 Risk factors for mother-to-child transmission

The single most important determinant of mother-to-child transmission risk is maternal viral load, with a higher maternal viral load at the time of delivery associated with substantially increased transmission risk, and an undetectable viral load, achieved through consistent antiretroviral therapy adherence, associated with a genuinely very low transmission risk, reinforcing why achieving and maintaining viral suppression throughout pregnancy represents the single most important intervention available.

Additional recognised risk factors for mother-to-child transmission include prolonged rupture of membranes before delivery, invasive obstetric procedures such as amniocentesis or instrumental delivery (increasing maternal blood and foetal contact), preterm delivery, and, for breastfeeding transmission specifically, mixed feeding (combining breastfeeding with other foods or fluids), which carries a higher transmission risk than either exclusive breastfeeding or exclusive formula feeding alone.

Fill in the blank: The single most important determinant of mother-to-child transmission risk is maternal _____ load. Mixed feeding carries a higher transmission risk than either exclusive breastfeeding or exclusive _____ feeding alone.

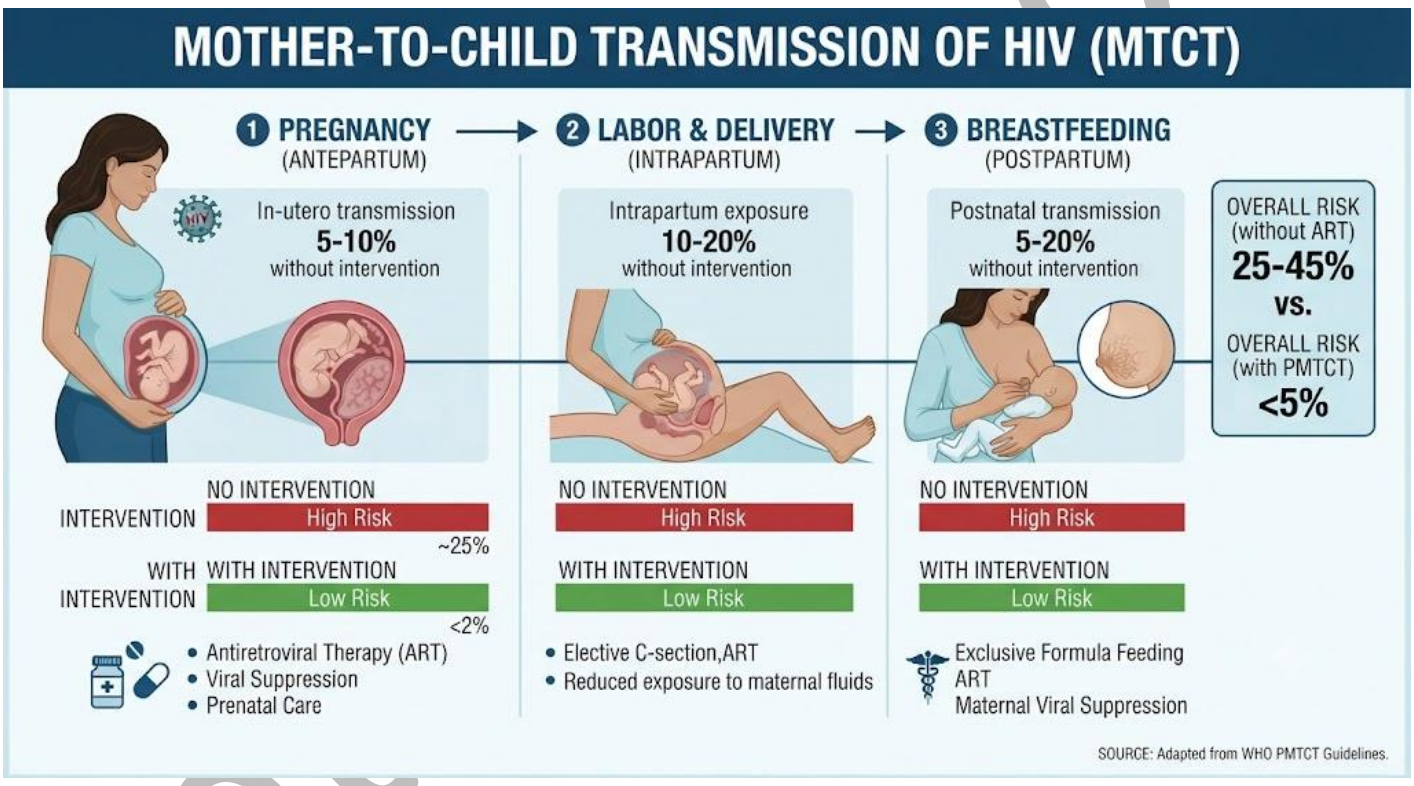

Figure 3.1: Periods and risk of mother-to-child HIV transmission, with and without intervention.

Pilot questions 3.1

- Define the causative agent of HIV and describe its pathophysiology. (Linked to SLO 3.1)
- Describe the three periods during which mother-to-child transmission of HIV can occur. (Linked to SLO 3.2)
- Compare transmission risk with and without intervention. (Linked to SLO 3.2)
- Explain why maternal viral load is the single most important determinant of transmission risk. (Linked to SLO 3.2)

- List the additional risk factors for mother-to-child transmission of HIV. (Linked to SLO 3.2)

3.2 HIV in Pregnancy: Treatment and Prevention of Transmission

3.2.1 Antiretroviral drug therapy for HIV in pregnancy

Combination antiretroviral therapy (typically three drugs from at least two different classes, most commonly two nucleoside reverse transcriptase inhibitors combined with either an integrase inhibitor or a protease inhibitor) is recommended for every pregnant woman living with HIV, regardless of her CD4 count, both for her own long-term health and to achieve viral suppression genuinely essential for preventing mother-to-child transmission.

Antiretroviral therapy should ideally be commenced as early as possible in pregnancy, or continued without interruption if the woman was already established on effective treatment before conception, given that achieving viral suppression well before delivery is directly associated with the lowest transmission risk, with specific drug selection guided by known safety and efficacy data in pregnancy, avoiding certain agents with less well-established or less favourable safety profiles in this specific population.

Fill in the blank: Combination antiretroviral therapy is recommended for every pregnant woman living with HIV, regardless of her CD4 _____. Antiretroviral therapy should ideally be commenced as early as possible in pregnancy to achieve viral _____ before delivery.

3.2.2 Prevention of mother-to-child transmission (PMTCT)

Comprehensive prevention of mother-to-child transmission combines maternal antiretroviral therapy throughout pregnancy with careful intrapartum management, including avoiding unnecessary invasive procedures and prolonged rupture of membranes, and, where the maternal viral load remains detectable close to delivery despite treatment, consideration of elective caesarean section to reduce intrapartum transmission risk, alongside infant post-exposure antiretroviral prophylaxis commenced immediately after birth.

Mode of delivery for a woman with a well-suppressed, undetectable viral load on effective treatment can generally be based on standard obstetric indications, as vaginal delivery does not meaningfully increase transmission risk in this specific circumstance, reflecting the genuinely central importance of viral suppression, rather than mode of delivery in isolation, in determining overall transmission risk.

Fill in the blank: Where maternal viral load remains detectable close to delivery, elective _____ section may be considered to reduce intrapartum transmission risk. Infant post-exposure antiretroviral prophylaxis should be commenced immediately after _____.

3.2.3 Breastfeeding issues in infected mothers

Breastfeeding recommendations for women living with HIV vary according to setting and available resources: in resource-limited settings, exclusive breastfeeding for the first six months, combined with maternal antiretroviral therapy throughout the breastfeeding period, is generally recommended given the substantial risks of formula feeding, including diarrhoeal disease and malnutrition, that often outweigh the residual, now genuinely very low HIV transmission risk when the mother is on effective, adherent treatment.

In resource-rich settings where safe, affordable formula feeding is genuinely accessible, avoidance of breastfeeding entirely may be recommended instead, reflecting a different balance of risks in that specific context, illustrating why breastfeeding counselling for a woman living with HIV must always be genuinely individualised according to her specific setting, resources, and, ultimately, her own informed preference, rather than a single, universally applied recommendation regardless of context.

Fill in the blank: In resource-limited settings, exclusive breastfeeding combined with maternal antiretroviral therapy is generally recommended given the risks of _____ feeding. Breastfeeding counselling must always be genuinely individualised according to setting, resources, and the woman's own informed _____.

Category	Details
Maternal	Routine antenatal HIV testing; antiretroviral therapy (ART) during pregnancy; monitoring maternal viral load; counselling and adherence support
Intrapartum	ART during labour; minimize invasive procedures (avoid artificial rupture of membranes, fetal scalp electrodes); consider elective caesarean section if high viral load
Infant	Neonatal ART prophylaxis; early infant diagnosis (PCR testing); immunizations; routine paediatric follow-up
Feeding	Exclusive breastfeeding with maternal ART if safe and feasible; avoid mixed feeding; formula feeding only if affordable, feasible, acceptable, sustainable, and safe (AFASS criteria)

Box 3.2: Components of comprehensive prevention of mother-to-child transmission of HIV.

Pilot questions 3.2

1. Describe the antiretroviral therapy recommended for pregnant women living with HIV. (Linked to SLO 3.3)
2. Explain why antiretroviral therapy should be commenced as early as possible in pregnancy. (Linked to SLO 3.3)

3. Describe the components of comprehensive prevention of mother-to-child transmission. (Linked to SLO 3.4)
4. Describe the mode of delivery considerations for a woman with well-suppressed HIV. (Linked to SLO 3.4)
5. Discuss breastfeeding recommendations for women living with HIV in different settings. (Linked to SLO 3.5)

3.3 Monitoring and Care of Infants of HIV-Infected Mothers

3.3.1 Monitoring babies of infected mothers

Infants born to mothers living with HIV require structured, sustained monitoring throughout the postnatal period, including growth and development assessment, monitoring for any signs suggestive of HIV infection or opportunistic infection, and specific attention to adherence with the infant's own antiretroviral prophylaxis regimen, generally continued for a defined period following birth according to the specific level of maternal transmission risk identified.

Co-trimoxazole prophylaxis is generally commenced in the exposed infant from around four to six weeks of age, continued until HIV infection has been definitively excluded and, where breastfeeding continues, for a defined period beyond the cessation of breastfeeding, providing important additional protection against opportunistic infection, particularly Pneumocystis pneumonia, during this genuinely vulnerable early period before infection status is fully confirmed.

Fill in the blank: Co-trimoxazole prophylaxis is generally commenced in the HIV-exposed infant from around four to _____ weeks of age. Co-trimoxazole provides important protection against opportunistic infection, particularly Pneumocystis _____.

3.3.2 Infant HIV testing and diagnosis

Standard antibody-based HIV testing cannot reliably diagnose HIV infection in an infant born to a mother living with HIV, as maternal antibodies cross the placenta and persist in the infant's circulation for up to 18 months, meaning a positive antibody test in a young infant reflects maternal antibody exposure rather than necessarily indicating genuine infant infection.

Virological testing (typically HIV DNA or RNA polymerase chain reaction testing, directly detecting the virus itself rather than maternal antibody) is therefore required for definitive early infant diagnosis, generally performed at around four to six weeks of age, with a positive result confirmed by a second, independent test, and a negative result at this stage followed by further testing later in infancy, particularly if breastfeeding continues, given the ongoing exposure risk this represents.

Fill in the blank: Standard antibody-based HIV testing cannot reliably diagnose infection in an infant, as maternal antibodies persist for up to _____ months. Definitive early infant diagnosis requires _____ testing, directly detecting the virus itself.

3.3.3 Postnatal care and follow-up

Comprehensive postnatal follow-up for both mother and infant is genuinely essential, including continued maternal antiretroviral therapy adherence support, structured infant testing at defined intervals, ongoing feeding support and counselling, and appropriate referral to paediatric HIV services should infant infection ultimately be confirmed, delivered as an integrated, coordinated package of care rather than a series of disconnected individual appointments.

Sensitive, ongoing psychosocial support for the mother throughout this entire process, addressing any anxiety around infant testing results and broader concerns about disclosure, stigma, and family dynamics, represents a genuinely essential, integral component of comprehensive postnatal care in this specific population, recognising the considerable emotional burden this period of uncertainty can place on a mother already managing her own HIV diagnosis.

Fill in the blank: Comprehensive postnatal follow-up includes maternal treatment adherence support, structured infant _____, and feeding support. Sensitive, ongoing psychosocial support should address anxiety, _____, and family dynamics.

Age	Prophylaxis	Testing
Birth	Start neonatal antiretroviral prophylaxis (e.g., nevirapine or zidovudine)	Baseline HIV PCR if available
6 Weeks	Continue/complete prophylaxis course	HIV PCR test at 6 weeks
3 Months	No prophylaxis unless indicated	Repeat HIV PCR if earlier test positive/indeterminate
6 Months	Ongoing monitoring	HIV PCR if breastfeeding continues
9 Months	—	HIV antibody test (if ≥9 months and breastfeeding stopped ≥6 weeks)
12 Months	—	HIV PCR if still breastfeeding
18 Months	—	Final HIV antibody test to confirm status (after cessation of breastfeeding)

Table 3.3: Timeline of monitoring and testing for the HIV-exposed infant.

Pilot questions 3.3

1. Describe the monitoring required for infants born to mothers living with HIV. (Linked to SLO 3.6)
2. Describe the role and timing of co-trimoxazole prophylaxis in the exposed infant. (Linked to SLO 3.6)
3. Explain why standard antibody-based testing cannot reliably diagnose HIV infection in a young infant. (Linked to SLO 3.6)
4. Describe the virological testing used for definitive early infant diagnosis. (Linked to SLO 3.6)
5. Describe the components of comprehensive postnatal follow-up for mother and infant. (Linked to SLO 3.6)

3.4 Malaria and Viral Infections in Pregnancy

3.4.1 Malaria in pregnancy

Malaria in pregnancy is a genuinely significant contributor to maternal and perinatal morbidity and mortality in Nigeria and other endemic settings, with pregnant women, particularly primigravidae, at increased risk of severe disease compared with non-pregnant adults, reflecting pregnancy-related immunological changes and, for Plasmodium falciparum specifically, the parasite's particular affinity for the placenta.

Malaria in pregnancy is associated with maternal anaemia, an increased risk of severe malaria and its complications, and, through placental parasitisation, foetal growth restriction and low birth weight, with prevention through intermittent preventive treatment in pregnancy (using sulfadoxine-pyrimethamine at each scheduled antenatal visit from the second trimester) and consistent use of insecticide-treated bed nets representing genuinely essential, evidence-based components of routine antenatal care in endemic settings.

Fill in the blank: Plasmodium falciparum has a particular affinity for the _____ during pregnancy. Intermittent preventive treatment in pregnancy uses _____ at each scheduled antenatal visit from the second trimester.

3.4.2 Common viral infections in pregnancy

Rubella infection in early pregnancy carries a substantial risk of congenital rubella syndrome, causing cardiac, ophthalmic, and auditory abnormalities in the foetus, with the risk of foetal damage highest when infection occurs in the first trimester, making pre-pregnancy rubella immunity screening and vaccination genuinely important preventive strategies, given that rubella vaccine itself, being a live attenuated vaccine, cannot be safely administered during pregnancy itself.

Other significant viral infections in pregnancy include cytomegalovirus (the most common congenital viral infection, capable of causing significant neurodevelopmental impairment), varicella (chickenpox, carrying risk of both congenital varicella syndrome if infection occurs in early pregnancy and severe maternal pneumonia if infection occurs later), and hepatitis B (with vertical transmission risk requiring infant immunoprophylaxis at birth), each requiring specific antenatal consideration and, where relevant, appropriate screening or prevention.

Fill in the blank: Congenital rubella syndrome causes cardiac, ophthalmic, and auditory abnormalities, with risk highest when infection occurs in the first _____. Cytomegalovirus is the most common congenital viral infection, capable of causing significant neurodevelopmental _____.

3.4.3 Prevention and management principles for infectious disease in pregnancy

General principles for managing infectious disease in pregnancy include prompt recognition and treatment to reduce both maternal complications and the risk of vertical transmission where relevant, careful selection of antimicrobial agents with established safety in pregnancy, and, wherever genuinely possible, prevention through vaccination (using inactivated rather than live vaccines during pregnancy itself), vector control, and appropriate antenatal screening.

Antenatal screening programmes for infectious disease, including HIV, hepatitis B, and syphilis, allow early identification and appropriate management to reduce vertical transmission risk, representing a genuinely essential, evidence-based, and highly cost-effective component of comprehensive antenatal care that should be offered universally, consistently, and without stigma to every woman attending antenatal services, regardless of her perceived individual risk.

Fill in the blank: Prevention of infectious disease in pregnancy includes vaccination using _____ rather than live vaccines during pregnancy itself. Antenatal screening for infectious disease should be offered universally, consistently, and without _____.

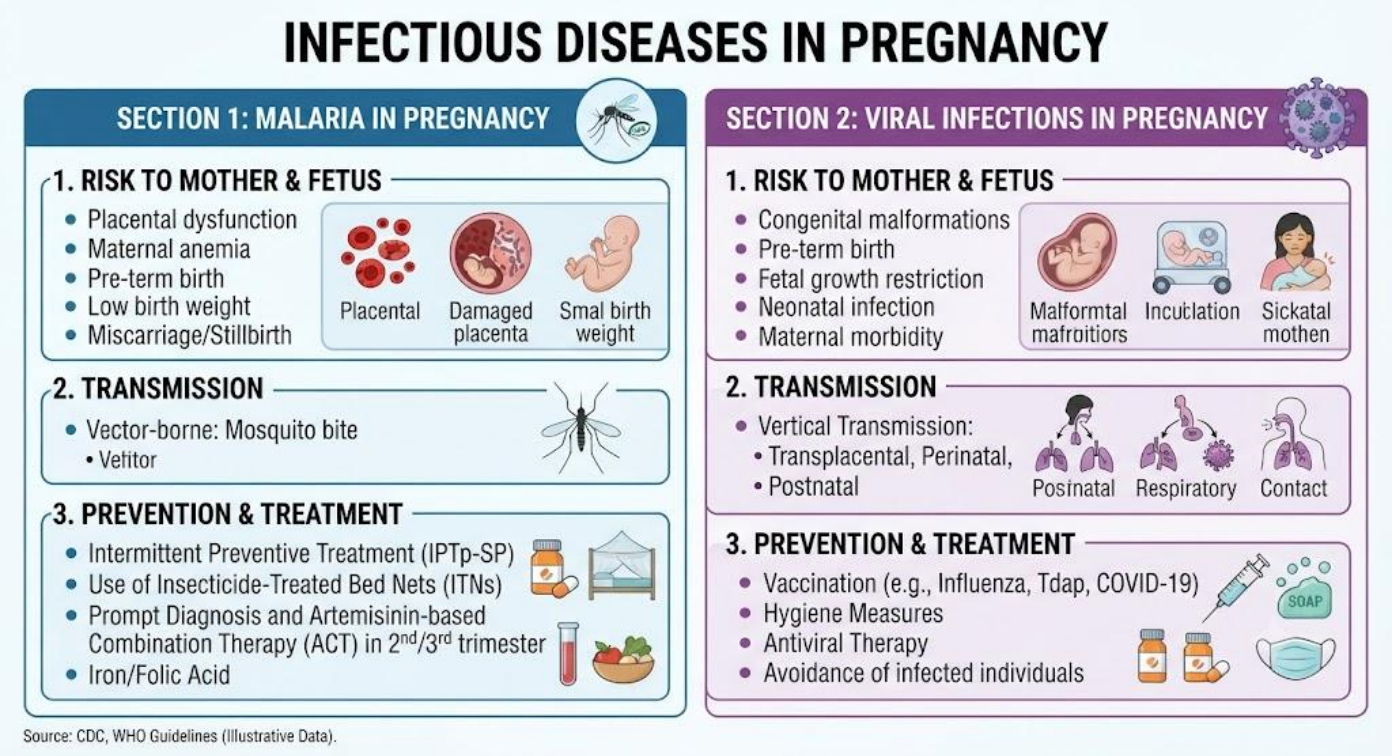

Figure 3.4: Malaria and viral infections in pregnancy: maternal and foetal risk, and prevention.

Pilot questions 3.4

1. Describe the impact of malaria on pregnancy outcome. (Linked to SLO 3.7)
2. Describe the prevention of malaria in pregnancy. (Linked to SLO 3.7)
3. Describe congenital rubella syndrome and its prevention. (Linked to SLO 3.8)
4. Describe the risks associated with cytomegalovirus, varicella, and hepatitis B in pregnancy. (Linked to SLO 3.8)
5. Describe the general principles for preventing and managing infectious disease in pregnancy. (Linked to SLO 3.8)

Series Summary

This Series has covered HIV in pregnancy, its pathophysiology and mother-to-child transmission, followed by antiretroviral treatment, prevention of mother-to-child transmission,

and breastfeeding issues. It went on to examine monitoring and care of infants of HIV-infected mothers, before concluding with malaria and other viral infections in pregnancy.

You should now be able to define the causative agent of HIV, describe its mother-to-child transmission, enumerate drug therapy and prevention methods, discuss breastfeeding issues, illustrate infant monitoring, and describe malaria and common viral infections in pregnancy (Linked to SLOs 3.1 to 3.8).

Glossary of Terms

1. **Antiretroviral therapy (ART):** combination drug treatment suppressing HIV viral replication.
2. **Co-trimoxazole prophylaxis:** antibiotic prophylaxis given to HIV-exposed infants to protect against opportunistic infection.
3. **Congenital rubella syndrome:** a pattern of cardiac, ophthalmic, and auditory foetal abnormalities from maternal rubella infection in early pregnancy.
4. **Human immunodeficiency virus (HIV):** a retrovirus that infects and depletes CD4-positive T-lymphocytes.
5. **Intermittent preventive treatment in pregnancy (IPTp):** scheduled administration of sulfadoxine-pyrimethamine to prevent malaria in pregnancy.
6. **Mixed feeding:** combining breastfeeding with other foods or fluids, associated with higher HIV transmission risk than exclusive feeding.
7. **Mother-to-child transmission (MTCT):** transmission of HIV from mother to child during pregnancy, labour, delivery, or breastfeeding.
8. **PCR testing:** polymerase chain reaction testing, used for definitive early diagnosis of HIV infection in an exposed infant.
9. **Viral load:** the quantity of HIV virus in the blood, the single most important determinant of mother-to-child transmission risk.
10. **Cytomegalovirus:** the most common congenital viral infection, capable of causing significant neurodevelopmental impairment.
11. **Vertical transmission:** transmission of an infection from mother to child during pregnancy, delivery, or breastfeeding.
12. **Placental parasitisation:** infiltration of the placenta by malaria parasites, contributing to foetal growth restriction.

Concept Check Questions [Series 3]

Objective questions

- HIV is a retrovirus that infects and progressively depletes CD4-positive _____.
- Without intervention, mother-to-child transmission risk is historically estimated at approximately 15 to _____ percent.
- Co-trimoxazole prophylaxis is generally commenced in the HIV-exposed infant from around four to _____ weeks of age.
- Standard antibody-based HIV testing cannot reliably diagnose infection in an infant, as maternal antibodies persist for up to _____ months.
- Plasmodium falciparum has a particular affinity for the _____ during pregnancy.

Short-answer questions

1. Explain why maternal viral load is the single most important determinant of transmission risk. (Linked to SLO 3.2)
2. Describe the mode of delivery considerations for a woman with well-suppressed HIV. (Linked to SLO 3.4)
3. Explain why standard antibody-based testing cannot reliably diagnose HIV infection in a young infant. (Linked to SLO 3.6)
4. Describe the prevention of malaria in pregnancy. (Linked to SLO 3.7)
5. Describe congenital rubella syndrome and its prevention. (Linked to SLO 3.8)

Long-answer questions

6. Define the causative agent of HIV and describe its mother-to-child transmission. (Linked to SLO 3.1, SLO 3.2)
7. Describe antiretroviral therapy and the methods of preventing mother-to-child transmission of HIV. (Linked to SLO 3.3, SLO 3.4)
8. Discuss breastfeeding issues in HIV-infected mothers. (Linked to SLO 3.5)

9. Illustrate how to monitor babies of infected mothers, including testing and diagnosis. (Linked to SLO 3.6)
10. Describe malaria and common viral infections in pregnancy. (Linked to SLO 3.7, SLO 3.8)

Answers to Concept Check Questions [Series 3]

Objective questions

11. T-lymphocytes.
12. 45.
13. Six.
14. 18.
15. Placenta.

Short-answer questions

16. Higher viral load is associated with substantially increased transmission risk, while an undetectable viral load carries very low risk.
17. Vaginal delivery does not meaningfully increase transmission risk with a well-suppressed, undetectable viral load, so standard obstetric indications apply.
18. Maternal antibodies cross the placenta and persist in the infant's circulation, so a positive antibody test does not confirm infant infection.
19. Intermittent preventive treatment with sulfadoxine-pyrimethamine and consistent use of insecticide-treated bed nets.
20. Cardiac, ophthalmic, and auditory abnormalities from first-trimester infection, prevented by pre-pregnancy immunity screening and vaccination.

Long-answer questions

21. **Basic response:** HIV is a retrovirus depleting CD4 T-lymphocytes, transmitted to the child during pregnancy, labour and delivery, and breastfeeding.

Value-added response: Comprehensive prevention measures can reduce transmission risk from up to 45 percent to below 2 percent, a genuine public health success.

22. **Basic response:** Combination antiretroviral therapy is recommended for all pregnant women with HIV, combined with careful intrapartum management and infant prophylaxis for PMTCT.

Value-added response: Mode of delivery can follow standard obstetric indications when viral load is well suppressed, reflecting the central importance of viral suppression.

23. **Basic response:** Breastfeeding recommendations vary by setting, with exclusive breastfeeding and maternal ART generally preferred in resource-limited settings.

Value-added response: Counselling must always be individualised according to setting, resources, and the woman's own informed preference.

24. **Basic response:** HIV-exposed infants require co-trimoxazole prophylaxis and PCR testing for definitive diagnosis, since antibody testing is unreliable in early infancy.

Value-added response: Comprehensive postnatal follow-up should include coordinated testing, feeding support, and sensitive psychosocial support for the mother.

25. **Basic response:** Malaria in pregnancy increases maternal and foetal risk, prevented by IPTp and bed nets; viral infections including rubella and CMV carry specific foetal risks.

Value-added response: Universal antenatal screening for infectious disease is a highly cost-effective component of comprehensive antenatal care.

Answers to Pilot Questions [Series 3]

Part 3.1

1. HIV is a retrovirus, most commonly HIV-1, infecting and depleting CD4-positive T-lymphocytes, leading to AIDS if untreated.
2. Pregnancy (placental transfer), labour and delivery (blood and secretion contact), and breastfeeding.
3. Without intervention, risk is 15 to 45 percent; with comprehensive intervention, risk falls to below 2 percent.

4. Higher viral load is associated with substantially increased transmission risk, and suppression is the most important intervention.
5. Prolonged rupture of membranes, invasive procedures, preterm delivery, and mixed feeding during breastfeeding.

Part 3.2

6. Combination antiretroviral therapy, typically three drugs, recommended for every pregnant woman regardless of CD4 count.
7. Achieving viral suppression well before delivery is associated with the lowest transmission risk.
8. Maternal ART, careful intrapartum management, consideration of caesarean section if viral load is detectable, and infant prophylaxis.
9. Standard obstetric indications can guide mode of delivery, as vaginal delivery does not meaningfully increase risk with suppression.
10. Exclusive breastfeeding with maternal ART in resource-limited settings; avoidance of breastfeeding may be recommended where formula feeding is safely accessible.

Part 3.3

11. Growth and development assessment, monitoring for infection signs, and adherence to infant antiretroviral prophylaxis.
12. Commenced around four to six weeks of age, protecting against opportunistic infection, particularly Pneumocystis pneumonia.
13. Maternal antibodies persist in the infant's circulation for up to 18 months, so a positive antibody test does not confirm infection.
14. HIV DNA or RNA PCR testing, performed around four to six weeks, with a positive result confirmed by a second test.
15. Maternal treatment adherence support, structured infant testing, feeding support, and paediatric referral if infection is confirmed.

Part 3.4

1. Increased maternal anaemia and severe disease risk, and foetal growth restriction and low birth weight from placental parasitisation.
2. Intermittent preventive treatment with sulfadoxine-pyrimethamine and consistent use of insecticide-treated bed nets.
3. Cardiac, ophthalmic, and auditory abnormalities from first-trimester infection, prevented by pre-pregnancy vaccination.
4. CMV causes neurodevelopmental impairment; varicella risks congenital syndrome or maternal pneumonia; hepatitis B requires infant immunoprophylaxis.
5. Prompt recognition and treatment, safe antimicrobial selection, vaccination with inactivated vaccines, and universal antenatal screening.

References and Attributions [Series 3]

Textual References

1. Cunningham, F. G., Leveno, K. J., Dashe, J. S. et al. (2022). Williams Obstetrics (26th ed.). McGraw Hill.
2. World Health Organization (2021). Consolidated Guidelines on HIV Prevention, Testing, Treatment, Service Delivery and Monitoring. WHO Press.
3. World Health Organization (2022). WHO Guidelines for Malaria. WHO Press.
4. National Population Commission and ICF (2019). Nigeria Demographic and Health Survey 2018. NPC and ICF.

Figures, Plates, Tables, and Boxes

1. Figure 3.1: Periods and risk of mother-to-child HIV transmission, with and without intervention. AI-generated using the prompt: "Create a professional medical diagram titled Mother-to-Child Transmission of HIV, showing transmission periods and risk with and without intervention. Clean clinical educational diagram style."

2. Box 3.2: Components of comprehensive prevention of mother-to-child transmission of HIV. AI-generated using the prompt: "Create a simple single-column reference box with an outside border titled PMTCT Components, listing maternal, intrapartum, infant, and feeding elements. Clinical reference box style."
3. Table 3.3: Timeline of monitoring and testing for the HIV-exposed infant. AI-generated using the prompt: "Create a clean reference table titled HIV-Exposed Infant Monitoring Timeline, listing prophylaxis and testing steps by age. Simple clinical reference table style with outside border."
4. Figure 3.4: Malaria and viral infections in pregnancy: maternal and foetal risk, and prevention. AI-generated using the prompt: "Create a professional medical diagram titled Infectious Diseases in Pregnancy, comparing malaria and viral infections by risk and prevention. Clean clinical educational diagram style."

Course code: OBG 508

Course title: Medical Disorders in Pregnancy

Course credit load: 2 Units

Series 4: Metabolic, Surgical and Systemic Disorders

- **Part 4.1: Obesity in Pregnancy**
  - Sub Part 4.1.1: Epidemiology and classification of obesity in pregnancy
  - Sub Part 4.1.2: Maternal and foetal effects of obesity in pregnancy
  - Sub Part 4.1.3: Management of obesity in pregnancy
- **Part 4.2: Vomiting in Pregnancy**
  - Sub Part 4.2.1: Nausea and vomiting of pregnancy
  - Sub Part 4.2.2: Hyperemesis gravidarum
  - Sub Part 4.2.3: Management of hyperemesis gravidarum
- **Part 4.3: Liver Diseases in Pregnancy**
  - Sub Part 4.3.1: Physiological liver changes in pregnancy
  - Sub Part 4.3.2: Pregnancy-specific liver disorders
  - Sub Part 4.3.3: Pre-existing and incidental liver disease in pregnancy
- **Part 4.4: Surgical Disorders in Pregnancy**
  - Sub Part 4.4.1: Approach to the acute abdomen in pregnancy
  - Sub Part 4.4.2: Common surgical emergencies in pregnancy
  - Sub Part 4.4.3: Principles of surgery and anaesthesia in pregnancy

Introduction

In the last Series, we explored infectious and immunological challenges in pregnancy. We now turn to a genuinely varied collection of metabolic, hepatic, and surgical conditions that can

complicate pregnancy: obesity, the spectrum from ordinary morning sickness to genuinely severe hyperemesis gravidarum, liver disease both specific to pregnancy and incidental to it, and the surgical emergencies that occasionally demand urgent operative intervention during pregnancy itself.

The aim of this Series is to equip you with a thorough understanding of obesity in pregnancy, vomiting and hyperemesis gravidarum, liver diseases in pregnancy, and surgical disorders in pregnancy.

We shall commence this Series by examining obesity in pregnancy, its classification, effects, and management. Next, we will consider vomiting in pregnancy, from normal nausea through to hyperemesis gravidarum. Following that, our attention turns to liver diseases in pregnancy, both pregnancy-specific and pre-existing. Finally, we will conclude by examining surgical disorders in pregnancy.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 4.1:** describe the epidemiology and classification of obesity in pregnancy,
- **SLO 4.2:** describe the maternal and foetal effects and management of obesity in pregnancy,
- **SLO 4.3:** describe nausea and vomiting of pregnancy and hyperemesis gravidarum,
- **SLO 4.4:** describe the management of hyperemesis gravidarum,
- **SLO 4.5:** describe the physiological liver changes of pregnancy and pregnancy-specific liver disorders,
- **SLO 4.6:** describe pre-existing and incidental liver disease in pregnancy,
- **SLO 4.7:** describe the approach to the acute abdomen and common surgical emergencies in pregnancy, and
- **SLO 4.8:** describe the principles of surgery and anaesthesia in pregnancy.

4.1 Obesity in Pregnancy

4.1.1 Epidemiology and classification of obesity in pregnancy

Obesity (defined as a body mass index of 30 or greater at booking) is an increasingly common finding in antenatal populations globally and in Nigeria specifically, reflecting broader societal trends in nutrition and physical activity, with obesity further classified into class I (30 to 34.9), class II (35 to 39.9), and class III or severe obesity (40 or greater), a distinction of genuine practical importance given the progressively increasing risk associated with each successive class.

Accurate booking weight and height measurement to calculate body mass index is a genuinely essential, routine component of every antenatal booking assessment, allowing appropriate risk stratification and individualised antenatal care planning from the very earliest point in pregnancy, rather than obesity being identified only incidentally or later in pregnancy once specific complications have already begun to develop.

Fill in the blank: Obesity in pregnancy is defined as a body mass index of _____ or greater at booking. Class III or severe obesity is defined as a body mass index of _____ or greater.

4.1.2 Maternal and foetal effects of obesity in pregnancy

Maternal complications associated with obesity in pregnancy include an increased risk of gestational diabetes, hypertensive disorders of pregnancy, venous thromboembolism, and an increased likelihood of instrumental or caesarean delivery, alongside specific anaesthetic and surgical challenges, including more technically difficult regional anaesthesia and a higher risk of wound infection following caesarean section.

Foetal and neonatal complications associated with maternal obesity include an increased risk of macrosomia, congenital anomaly (particularly neural tube defects), stillbirth, and, longer-term, an increased risk of childhood obesity and metabolic disease in the offspring, reflecting the genuinely significant, multigenerational implications that maternal obesity can carry well beyond the immediate pregnancy itself.

Fill in the blank: Maternal obesity is associated with more technically difficult regional _____ and a higher risk of wound infection following caesarean section. Maternal obesity is associated with a longer-term increased risk of childhood obesity and metabolic disease in the _____.

4.1.3 Management of obesity in pregnancy

Antenatal management of obesity in pregnancy includes individualised dietary and lifestyle advice (avoiding restrictive dieting during pregnancy itself, instead focusing on healthy eating and appropriate weight gain according to established guidance), screening for gestational diabetes given the substantially increased risk, thromboprophylaxis according to individual risk assessment, and careful, advance planning for labour and delivery, including anaesthetic assessment where significant obesity is present.

Delivery planning for a woman with significant obesity should address the specific practical and clinical challenges this may present, including equipment requirements, anaesthetic

considerations, and an individualised assessment of the safest mode and setting for delivery, with pre-pregnancy or interpregnancy weight management, where genuinely achievable, representing the most effective long-term strategy for reducing the risks associated with obesity in any future pregnancy.

Fill in the blank: Antenatal management of obesity avoids restrictive _____ during pregnancy itself, instead focusing on healthy eating and appropriate weight gain. Delivery planning for significant obesity should address equipment requirements and _____ considerations.

BMI Class	Range	Associated Risks
Overweight	BMI 25–29.9	Increased risk of gestational hypertension, gestational diabetes, macrosomia
Obesity Class I	BMI 30–34.9	Higher risk of pre-eclampsia, caesarean delivery, postpartum haemorrhage
Obesity Class II	BMI 35–39.9	Greater risk of thromboembolism, sleep apnoea, wound complications
Obesity Class III (Severe/Morbid)	BMI ≥40	Marked risk of maternal morbidity, stillbirth, congenital anomalies, anaesthetic complications

Table 4.1: Classification of obesity in pregnancy and associated complications.

Pilot questions 4.1

- Describe the classification of obesity in pregnancy by body mass index. (Linked to SLO 4.1)
- Explain why accurate booking BMI calculation is genuinely essential. (Linked to SLO 4.1)
- Describe the maternal complications associated with obesity in pregnancy. (Linked to SLO 4.2)
- Describe the foetal and neonatal complications associated with maternal obesity. (Linked to SLO 4.2)
- Describe the principles of antenatal management of obesity in pregnancy. (Linked to SLO 4.2)

4.2 Vomiting in Pregnancy

4.2.1 Nausea and vomiting of pregnancy

Nausea and vomiting of pregnancy affects the great majority of pregnant women to some degree, typically beginning around six weeks of gestation, peaking around nine to eleven weeks, and generally resolving by 16 to 20 weeks, believed to reflect the rising level of human chorionic gonadotropin and, to a lesser extent, oestrogen during this specific period of pregnancy.

While generally self-limiting and manageable with simple measures including dietary modification (small, frequent meals, avoiding specific triggers) and, where genuinely needed, antiemetic medication with an established safety profile in pregnancy, nausea and vomiting of pregnancy can nonetheless meaningfully impair a woman's quality of life and functional capacity, deserving genuine clinical attention and support rather than dismissal as an inevitable, unavoidable feature of early pregnancy to simply be endured.

Fill in the blank: Nausea and vomiting of pregnancy typically peaks around nine to _____ weeks of gestation. Nausea and vomiting of pregnancy is believed to reflect the rising level of human chorionic _____ during this period.

4.2.2 Hyperemesis gravidarum

Hyperemesis gravidarum is the severe end of the nausea and vomiting spectrum, characterised by persistent vomiting causing weight loss (typically defined as more than 5 percent of pre-pregnancy body weight), dehydration, and electrolyte disturbance, sufficiently severe to require medical intervention and, frequently, hospital admission for intravenous fluid and electrolyte replacement.

Risk factors for hyperemesis gravidarum include multiple pregnancy, molar pregnancy (given the exceptionally high beta-hCG levels characteristic of this condition), a previous history of hyperemesis in an earlier pregnancy, and a family history of the condition, with the diagnosis principally clinical, though relevant investigations, including urinalysis for ketones and assessment of electrolytes and renal function, help both confirm the diagnosis and guide the intensity of required treatment.

Fill in the blank: Hyperemesis gravidarum is typically defined by weight loss of more than _____ percent of pre-pregnancy body weight. Molar pregnancy is a recognised risk factor for hyperemesis given its exceptionally high beta-_____ levels.

4.2.3 Management of hyperemesis gravidarum

Management of hyperemesis gravidarum includes intravenous fluid and electrolyte replacement for dehydration, antiemetic medication (with several classes considered safe in pregnancy, generally escalated in a stepwise manner according to response), thiamine

supplementation to prevent Wernicke's encephalopathy in a woman with prolonged, severe vomiting, and thromboprophylaxis given the increased venous thromboembolism risk associated with dehydration and reduced mobility.

Psychological support for a woman with hyperemesis gravidarum is genuinely important, given the substantial impact this condition can have on quality of life, work, and family functioning, sometimes extending across much of the pregnancy in severe, persistent cases, with a supportive, validating clinical approach, avoiding any suggestion that the woman's symptoms are being exaggerated or are simply a normal, expected part of pregnancy to be tolerated without adequate treatment.

Fill in the blank: Thiamine supplementation is given in hyperemesis gravidarum to prevent Wernicke's _____. A supportive, validating clinical approach avoids any suggestion that symptoms are being _____.

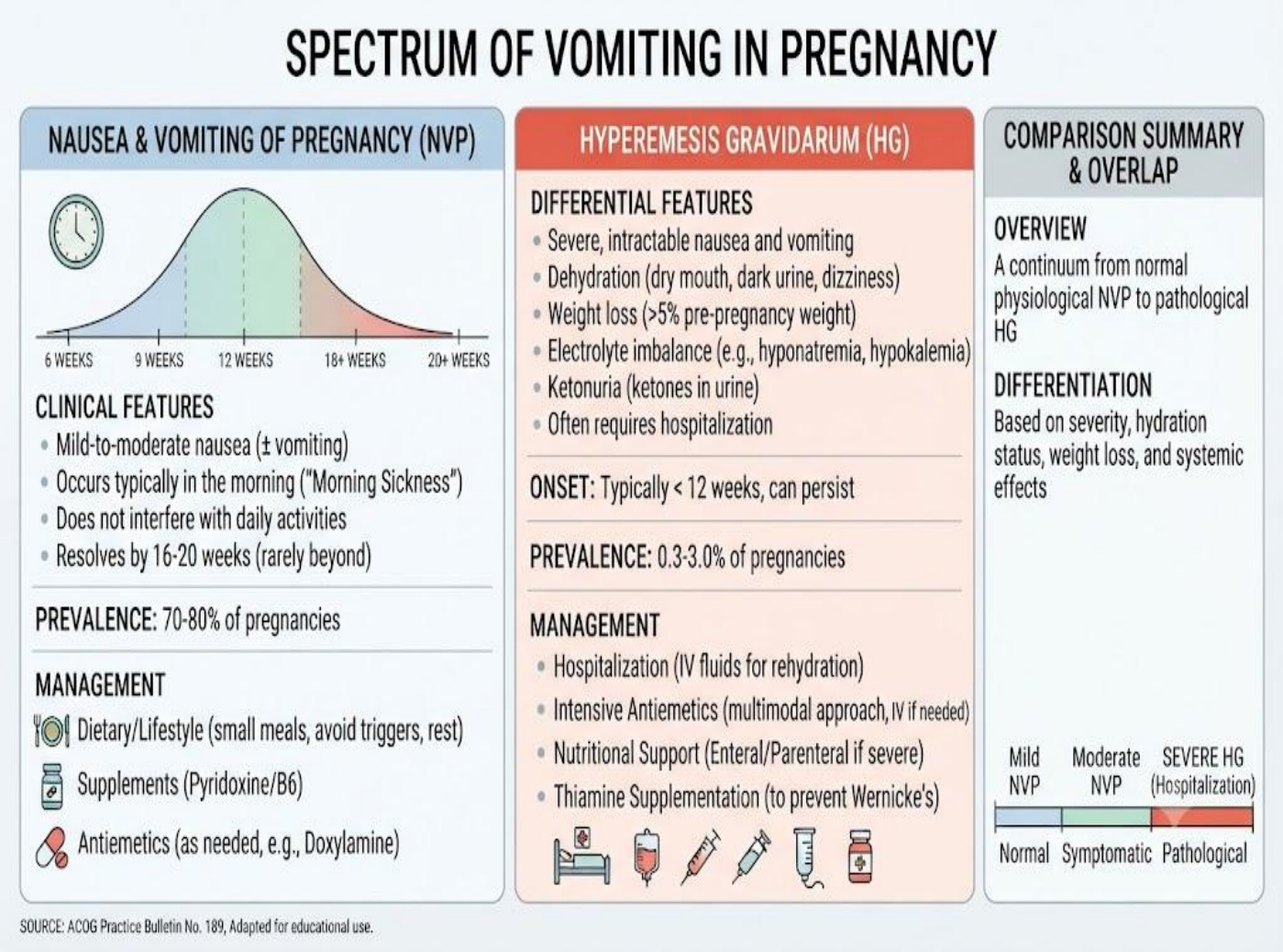

Figure 4.2: The spectrum of nausea and vomiting in pregnancy, from NVP to hyperemesis gravidarum.

Pilot questions 4.2

1. Describe the typical timeline and presumed cause of nausea and vomiting of pregnancy. (Linked to SLO 4.3)
2. Define hyperemesis gravidarum and its diagnostic criteria. (Linked to SLO 4.3)
3. List the risk factors for hyperemesis gravidarum. (Linked to SLO 4.3)
4. Describe the management of hyperemesis gravidarum. (Linked to SLO 4.4)
5. Explain the importance of psychological support in managing hyperemesis gravidarum. (Linked to SLO 4.4)

4.3 Liver Diseases in Pregnancy

4.3.1 Physiological liver changes in pregnancy

Pregnancy induces recognised physiological changes in liver function, including a modest rise in alkaline phosphatase (predominantly from placental rather than hepatic origin, and therefore not necessarily indicative of genuine hepatic pathology), while other liver function tests, including transaminases and bilirubin, generally remain within the normal non-pregnant range, meaning any significant abnormality in these specific parameters should prompt genuine further investigation rather than being attributed reflexively to pregnancy alone.

Understanding these physiological changes is genuinely important for correctly interpreting liver function tests in pregnancy, avoiding both inappropriate reassurance when a genuinely abnormal result is incorrectly attributed to normal pregnancy physiology, and unnecessary anxiety or over-investigation when a truly physiological change is mistakenly interpreted as pathological.

Fill in the blank: The modest rise in alkaline phosphatase during pregnancy is predominantly from _____ rather than hepatic origin. Transaminases and bilirubin generally remain within the _____ non-pregnant range during normal pregnancy.

4.3.2 Pregnancy-specific liver disorders

Intrahepatic cholestasis of pregnancy (obstetric cholestasis) presents with generalised pruritus, particularly affecting the palms and soles, typically in the third trimester, without a primary skin rash, associated with elevated bile acids and, to a lesser extent, transaminases, carrying an increased risk of stillbirth, meconium-stained liquor, and preterm birth, meaning careful monitoring and, in many protocols, consideration of earlier delivery is genuinely warranted once this diagnosis is confirmed.

Acute fatty liver of pregnancy is a rare but potentially life-threatening condition, typically presenting in the third trimester with nausea, vomiting, abdominal pain, and, as the condition progresses, jaundice and features of liver failure including coagulopathy and hypoglycaemia, representing a genuine obstetric emergency requiring prompt recognition, supportive management, and expedited delivery, which remains the only truly definitive treatment for this specific condition.

Fill in the blank: Intrahepatic cholestasis of pregnancy presents with generalised pruritus, particularly affecting the palms and _____. Acute fatty liver of pregnancy is a genuine obstetric emergency for which expedited _____ remains the only truly definitive treatment.

4.3.3 Pre-existing and incidental liver disease in pregnancy

Pre-existing liver disease (such as chronic viral hepatitis or autoimmune liver disease) requires careful antenatal assessment and, where relevant, coordination with hepatology services, given the potential for pregnancy to affect the underlying liver condition and, conversely, for the liver condition and any associated medication to carry specific implications for the pregnancy itself, including, for chronic viral hepatitis specifically, the need for appropriate measures to reduce vertical transmission risk.

Incidental liver disease diagnosed during pregnancy (such as gallstone disease presenting with biliary colic or cholecystitis) requires the same fundamental diagnostic and management principles applied outside pregnancy, adapted as genuinely necessary for the pregnant state, including careful consideration of imaging modality and the specific timing and approach to any surgical intervention that may ultimately be required.

Fill in the blank: Chronic viral hepatitis in pregnancy requires appropriate measures to reduce _____ transmission risk. Incidental liver disease diagnosed during pregnancy follows the same fundamental principles applied outside pregnancy, adapted as _____.

Condition	Details
Obstetric Cholestasis	Pruritus (especially palms/soles), raised bile acids, mild transaminase elevation; no jaundice in most cases; risk of preterm labour, fetal distress, stillbirth; management with ursodeoxycholic acid, vitamin K supplementation, and planned delivery at 37–38 weeks

Condition	Details
Acute Fatty Liver of Pregnancy	Rare but life-threatening; occurs in 3rd trimester; nausea, vomiting, abdominal pain, jaundice, hypoglycaemia, coagulopathy, encephalopathy; associated with mitochondrial fatty acid oxidation defects; management is urgent delivery and intensive supportive care

Box 4.3: Comparison of intrahepatic cholestasis and acute fatty liver of pregnancy.

Pilot questions 4.3

1. Describe the physiological changes in liver function tests during normal pregnancy. (Linked to SLO 4.5)
2. Describe the presentation and risks of intrahepatic cholestasis of pregnancy. (Linked to SLO 4.5)
3. Describe the presentation and management of acute fatty liver of pregnancy. (Linked to SLO 4.5)
4. Describe the considerations relevant to pre-existing liver disease in pregnancy. (Linked to SLO 4.6)
5. Describe the management principles for incidental liver disease diagnosed during pregnancy. (Linked to SLO 4.6)

4.4 Surgical Disorders in Pregnancy

4.4.1 Approach to the acute abdomen in pregnancy

Assessment of the acute abdomen in pregnancy is genuinely complicated by the altered anatomical position of abdominal organs as the pregnancy advances (with the appendix, for example, displaced progressively upward and laterally as the uterus enlarges), and by the physiological changes of pregnancy that can mask or alter the classic clinical signs of an underlying surgical condition, meaning a genuinely high index of clinical suspicion is required to avoid dangerous diagnostic delay.

A broad differential diagnosis must always be considered in a pregnant woman with acute abdominal pain, encompassing both pregnancy-specific obstetric causes (such as placental abruption, uterine rupture, or ovarian torsion of an enlarged corpus luteal cyst) and non-obstetric surgical causes (such as appendicitis or cholecystitis) that would be considered in any non-pregnant patient, with the two categories genuinely requiring simultaneous, parallel consideration rather than a purely sequential diagnostic approach.

Fill in the blank: The appendix is displaced progressively upward and laterally as the _____ enlarges during pregnancy. A broad differential diagnosis for acute abdominal pain in pregnancy must consider both obstetric and non-obstetric _____ causes.

4.4.2 Common surgical emergencies in pregnancy

Appendicitis is the most common non-obstetric surgical emergency in pregnancy, with diagnosis genuinely complicated by the atypical location of pain resulting from appendiceal displacement as pregnancy advances, and by the overlap of some normal pregnancy symptoms, such as mild nausea, with early appendicitis, meaning delayed diagnosis, and the corresponding increased risk of perforation, remains a genuine, recognised concern in this specific population.

Acute cholecystitis and symptomatic gallstone disease are also relatively common in pregnancy, reflecting pregnancy-related changes in bile composition and gallbladder motility that predispose to gallstone formation, presenting with the same characteristic right upper quadrant pain seen outside pregnancy, with ultrasound the imaging investigation of choice given its established safety throughout pregnancy, and surgical management, where genuinely indicated, generally preferred over prolonged conservative management given the risk of recurrent, worsening symptoms throughout the remainder of the pregnancy.

Fill in the blank: Delayed diagnosis of appendicitis in pregnancy carries an increased risk of _____. Ultrasound is the imaging investigation of choice for suspected gallstone disease in pregnancy given its established _____.

4.4.3 Principles of surgery and anaesthesia in pregnancy

Surgery during pregnancy should be performed when genuinely clinically indicated, without unnecessary delay purely on account of the pregnancy itself, given that delaying necessary surgical treatment frequently carries greater risk to both mother and foetus than the surgery performed promptly, with the specific surgical approach, open or laparoscopic, individualised according to gestational age, the specific condition being treated, and surgeon experience.

Anaesthetic considerations specific to the pregnant surgical patient include awareness of aortocaval compression (addressed by left lateral tilt positioning), the increased aspiration risk of pregnancy requiring specific airway management precautions, and, where the pregnancy is at a viable gestational age, availability of continuous foetal heart rate monitoring where practically feasible and appropriate, alongside genuinely close, coordinated communication between the surgical, anaesthetic, and obstetric teams throughout any surgical procedure performed during pregnancy.

Fill in the blank: Surgery during pregnancy should be performed when genuinely indicated, as delaying necessary treatment frequently carries greater risk than surgery performed _____. Anaesthetic considerations include aortocaval compression, addressed by left lateral _____ positioning.

Condition	Diagnostic Considerations	Management
Appendicitis	**Right iliac fossa pain may shift upward with advancing gestation; ultrasound preferred; MRI if uncertain**	**Prompt surgical intervention (laparoscopic or open appendectomy); antibiotics**
Ovarian Torsion	**Sudden unilateral pelvic pain; adnexal mass on ultrasound with absent Doppler flow**	**Emergency detorsion or oophorectomy depending on viability**
Ruptured Ectopic Pregnancy	**Acute abdominal pain, shock, positive pregnancy test; ultrasound showing free fluid**	**Immediate resuscitation and surgical removal (salpingectomy/salpingostomy)**
Intestinal Obstruction	**Colicky pain, vomiting, distension; plain X-ray limited; MRI safer**	**Nasogastric decompression, IV fluids, surgical correction if unresolved**
Splenic Rupture (rare)	**Left upper quadrant pain, hypovolaemia; ultrasound/FAST scan**	**Emergency laparotomy, splenectomy if required**
Cholecystitis/Cholelithiasis	**RUQ pain, fever, gallstones on ultrasound**	**Conservative management initially; laparoscopic cholecystectomy if recurrent/severe**

Table 4.4: Common surgical emergencies in pregnancy: diagnosis and management.

Pilot questions 4.4

1. Explain why assessment of the acute abdomen is complicated in pregnancy. (Linked to SLO 4.7)
2. Describe the broad differential diagnosis for acute abdominal pain in pregnancy. (Linked to SLO 4.7)
3. Describe the diagnostic challenges of appendicitis in pregnancy. (Linked to SLO 4.7)
4. Describe the presentation and management of gallstone disease in pregnancy. (Linked to SLO 4.7)
5. Describe the anaesthetic considerations relevant to surgery in pregnancy. (Linked to SLO 4.8)

Series Summary

This Series has covered obesity in pregnancy, its classification, effects, and management, followed by vomiting in pregnancy, from normal nausea through to hyperemesis gravidarum. It went on to examine liver diseases in pregnancy, both pregnancy-specific and pre-existing, before concluding with surgical disorders in pregnancy.

You should now be able to describe the classification and effects of obesity in pregnancy, describe nausea and vomiting of pregnancy and hyperemesis gravidarum, describe pregnancy-specific and pre-existing liver disease, and describe the approach to the acute abdomen and surgery in pregnancy (Linked to SLOs 4.1 to 4.8).

Glossary of Terms

1. **Acute fatty liver of pregnancy:** a rare, potentially life-threatening liver condition of pregnancy requiring expedited delivery as definitive treatment.
2. **Body mass index (BMI):** a measure of weight relative to height, used to classify obesity in pregnancy.
3. **Hyperemesis gravidarum:** severe nausea and vomiting of pregnancy causing significant weight loss, dehydration, and electrolyte disturbance.
4. **Intrahepatic cholestasis of pregnancy:** a pregnancy-specific liver disorder causing pruritus and elevated bile acids, with increased stillbirth risk.
5. **Nausea and vomiting of pregnancy (NVP):** common, generally self-limiting nausea and vomiting affecting the great majority of pregnant women.
6. **Wernicke's encephalopathy:** a neurological complication of thiamine deficiency, a risk in prolonged, severe hyperemesis gravidarum.
7. **Acute abdomen:** a clinical presentation of severe abdominal pain requiring urgent assessment to identify a surgical or obstetric cause.
8. **Appendicitis:** the most common non-obstetric surgical emergency in pregnancy, with diagnosis complicated by appendiceal displacement.

9. **Aortocaval compression:** compression of the aorta and inferior vena cava by the gravid uterus in the supine position.
10. **Class III obesity:** severe obesity, defined as a body mass index of 40 or greater.
11. **Cholecystitis:** inflammation of the gallbladder, relatively common in pregnancy given pregnancy-related changes in bile composition.
12. **Ketonuria:** the presence of ketones in the urine, assessed as part of the evaluation of hyperemesis gravidarum.

Concept Check Questions [Series 4]

Objective questions

- Obesity in pregnancy is defined as a body mass index of _____ or greater at booking.
- Nausea and vomiting of pregnancy typically peaks around nine to _____ weeks of gestation.
- Hyperemesis gravidarum is typically defined by weight loss of more than _____ percent of pre-pregnancy body weight.
- The modest rise in alkaline phosphatase during pregnancy is predominantly from _____ rather than hepatic origin.
- The appendix is displaced progressively upward and laterally as the _____ enlarges during pregnancy.

Short-answer questions

1. Describe the foetal and neonatal complications associated with maternal obesity. (Linked to SLO 4.2)
2. List the risk factors for hyperemesis gravidarum. (Linked to SLO 4.3)
3. Describe the presentation and risks of intrahepatic cholestasis of pregnancy. (Linked to SLO 4.5)
4. Describe the considerations relevant to pre-existing liver disease in pregnancy. (Linked to SLO 4.6)
5. Describe the diagnostic challenges of appendicitis in pregnancy. (Linked to SLO 4.7)

Long-answer questions

6. Describe the classification, effects, and management of obesity in pregnancy. (Linked to SLO 4.1, SLO 4.2)
7. Describe nausea and vomiting of pregnancy and the management of hyperemesis gravidarum. (Linked to SLO 4.3, SLO 4.4)
8. Describe the pregnancy-specific liver disorders and their management. (Linked to SLO 4.5)
9. Describe pre-existing and incidental liver disease in pregnancy. (Linked to SLO 4.6)
10. Describe the approach to the acute abdomen and the principles of surgery in pregnancy. (Linked to SLO 4.7, SLO 4.8)

Answers to Concept Check Questions [Series 4]

Objective questions

11. 30.
12. Eleven.
13. Five.
14. Placental.
15. Uterus.

Short-answer questions

16. Increased risk of macrosomia, congenital anomaly, stillbirth, and longer-term childhood obesity and metabolic disease.
17. Multiple pregnancy, molar pregnancy, a previous history of hyperemesis, and a family history of the condition.
18. Generalised pruritus of palms and soles in the third trimester, with elevated bile acids and increased stillbirth risk.

19. Coordination with hepatology, monitoring of the underlying condition, and, for viral hepatitis, measures to reduce vertical transmission.

20. Displacement of the appendix as pregnancy advances alters the typical location of pain, and mild nausea overlaps with normal pregnancy.

Long-answer questions

21. **Basic response:** Obesity in pregnancy is classified by BMI and increases maternal and foetal risk, managed with individualised dietary advice and risk-based screening.

Value-added response: Maternal obesity carries multigenerational implications, including increased risk of childhood obesity and metabolic disease in the offspring.

22. **Basic response:** Nausea and vomiting of pregnancy is common and self-limiting, with hyperemesis gravidarum representing its severe end requiring fluid and antiemetic treatment.

Value-added response: Psychological support is genuinely important in hyperemesis gravidarum, given its substantial impact on quality of life.

23. **Basic response:** Pregnancy-specific liver disorders include intrahepatic cholestasis, causing pruritus and stillbirth risk, and acute fatty liver, a rare emergency requiring delivery.

Value-added response: Understanding physiological liver changes is essential to correctly interpret liver function tests and avoid both false reassurance and unnecessary investigation.

24. **Basic response:** Pre-existing liver disease requires specialist coordination, while incidental liver disease follows standard principles adapted for pregnancy.

Value-added response: Chronic viral hepatitis specifically requires attention to vertical transmission risk reduction measures.

25. **Basic response:** The acute abdomen in pregnancy requires a broad differential considering both obstetric and non-obstetric causes, given altered anatomy and physiology.

Value-added response: Necessary surgery should not be delayed on account of pregnancy, given that delay frequently carries greater risk than prompt intervention.

Answers to Pilot Questions [Series 4]

Part 4.1

1. Class I (30 to 34.9), class II (35 to 39.9), and class III or severe obesity (40 or greater).
2. It allows appropriate risk stratification and individualised antenatal care planning from the earliest point in pregnancy.
3. Gestational diabetes, hypertensive disorders, venous thromboembolism, and increased instrumental or caesarean delivery.
4. Macrosomia, congenital anomaly, stillbirth, and longer-term childhood obesity and metabolic disease.
5. Individualised dietary advice, gestational diabetes screening, thromboprophylaxis, and advance delivery planning.

Part 4.2

6. Begins around six weeks, peaks at nine to eleven weeks, and resolves by 16 to 20 weeks, reflecting rising hCG levels.
7. Persistent vomiting causing more than 5 percent weight loss, dehydration, and electrolyte disturbance.
8. Multiple pregnancy, molar pregnancy, previous history, and family history.
9. Intravenous fluid and electrolyte replacement, antiemetics, thiamine supplementation, and thromboprophylaxis.
10. It substantially impacts quality of life and functioning, deserving genuine support rather than dismissal.

Part 4.3

11. A modest, predominantly placental rise in alkaline phosphatase, with transaminases and bilirubin generally remaining normal.
12. Pruritus of the palms and soles in the third trimester, with elevated bile acids and increased stillbirth risk.

13. Nausea, vomiting, abdominal pain, and progressive liver failure, requiring expedited delivery as definitive treatment.
14. Careful antenatal assessment and hepatology coordination, given potential interaction between the condition and pregnancy.
15. The same fundamental principles applied outside pregnancy, adapted for imaging and surgical timing as necessary.

Part 4.4

1. Altered organ position and physiological changes can mask or alter classic surgical signs, requiring high clinical suspicion.
2. Both obstetric causes such as abruption or torsion, and non-obstetric causes such as appendicitis or cholecystitis.
3. Displaced pain location and symptom overlap with normal pregnancy nausea can delay diagnosis, risking perforation.
4. Right upper quadrant pain, diagnosed by ultrasound, with surgical management generally preferred over prolonged conservative treatment.
5. Aortocaval compression addressed by left lateral tilt, increased aspiration risk, and foetal monitoring where appropriate.

References and Attributions [Series 4]

Textual References

1. Cunningham, F. G., Leveno, K. J., Dashe, J. S. et al. (2022). Williams Obstetrics (26th ed.). McGraw Hill.
2. Royal College of Obstetricians and Gynaecologists (2015). Green-top Guideline No. 72: The Management of Nausea and Vomiting of Pregnancy and Hyperemesis Gravidarum. RCOG Press.
3. Royal College of Obstetricians and Gynaecologists (2011). Green-top Guideline No. 43: Obstetric Cholestasis. RCOG Press.
4. National Institute for Health and Care Excellence (2010). Weight Management Before, During and After Pregnancy: NICE Guideline PH27. NICE.

Figures, Plates, Tables, and Boxes

1. Table 4.1: Classification of obesity in pregnancy and associated complications. AI-generated using the prompt: "Create a clean reference table titled Obesity in Pregnancy: Classification and Complications, listing BMI classes and associated risks. Simple clinical reference table style with outside border."
2. Figure 4.2: The spectrum of nausea and vomiting in pregnancy, from NVP to hyperemesis gravidarum. AI-generated using the prompt: "Create a professional medical diagram titled Spectrum of Vomiting in Pregnancy, comparing NVP timeline with hyperemesis gravidarum features and management. Clean clinical educational diagram style."
3. Box 4.3: Comparison of intrahepatic cholestasis and acute fatty liver of pregnancy. AI-generated using the prompt: "Create a simple single-column reference box with an outside border titled Pregnancy-Specific Liver Disorders, comparing obstetric cholestasis and acute fatty liver of pregnancy. Clinical reference box style."
4. Table 4.4: Common surgical emergencies in pregnancy: diagnosis and management. AI-generated using the prompt: "Create a clean reference table titled Surgical Emergencies in Pregnancy, listing conditions with diagnostic considerations and management. Simple clinical reference table style with outside border."

Course code: OBG 508

Course title: Medical Disorders in Pregnancy

Course credit load: 2 Units

Series 5: Maternal Mental Health and Perinatal Care

- **Part 5.1: Mental Disorders in Pregnancy**
  - Sub Part 5.1.1: Common mental health conditions in pregnancy
  - Sub Part 5.1.2: Risk factors and screening for antenatal mental illness
  - Sub Part 5.1.3: Management principles for mental disorders in pregnancy
- **Part 5.2: Perinatal Mental Health: Puerperal Conditions**
  - Sub Part 5.2.1: Postpartum blues and postnatal depression
  - Sub Part 5.2.2: Postpartum psychosis
  - Sub Part 5.2.3: Recognition and urgent management of severe perinatal mental illness
- **Part 5.3: Medication and Multidisciplinary Care in Perinatal Mental Health**
  - Sub Part 5.3.1: Psychotropic medication considerations
  - Sub Part 5.3.2: Multidisciplinary perinatal mental health services
  - Sub Part 5.3.3: Supporting the family and reducing stigma
- **Part 5.4: Principles of Patient Care and Course Synthesis**
  - Sub Part 5.4.1: Principles of patient care in pregnancy, labour, and puerperium
  - Sub Part 5.4.2: Coordinating multidisciplinary care across medical disorders
  - Sub Part 5.4.3: Course synthesis: from blood to brain

Introduction

In the last Series, we explored metabolic, surgical, and systemic disorders in pregnancy. We conclude this course, and this journey through Medical Disorders in Pregnancy, by turning to maternal mental health, a genuinely essential area of perinatal care deserving the same rigorous clinical attention as any other medical disorder covered throughout this course. We close with a Series bringing together the principles of patient care that have run consistently through every condition explored, from the blood to the brain.

The aim of this Series is to equip you with a thorough understanding of mental disorders in pregnancy and the puerperium, and to synthesise the principles of patient care across the full range of medical disorders in pregnancy covered throughout this course.

We shall commence this Series by examining mental disorders in pregnancy, their risk factors, screening, and management. Next, we will consider perinatal mental health in the puerperium, including postpartum blues, postnatal depression, and postpartum psychosis. Following that, our attention turns to medication considerations and multidisciplinary care in perinatal mental health. Finally, we will conclude by examining the principles of patient care and synthesising this course as a whole.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 5.1:** describe common mental disorders in pregnancy and their risk factors,
- **SLO 5.2:** describe screening and management principles for antenatal mental illness,
- **SLO 5.3:** describe postpartum blues, postnatal depression, and postpartum psychosis,
- **SLO 5.4:** describe the recognition and urgent management of severe perinatal mental illness,
- **SLO 5.5:** describe psychotropic medication considerations in pregnancy and breastfeeding,
- **SLO 5.6:** describe multidisciplinary perinatal mental health care and family support, and
- **SLO 5.7:** enumerate the principles of patient care in pregnancy, labour, and puerperium.

5.1 Mental Disorders in Pregnancy

5.1.1 Common mental health conditions in pregnancy

Depression and anxiety disorders are the most common mental health conditions encountered in pregnancy, affecting a genuinely significant proportion of pregnant women, with symptoms including persistent low mood, loss of interest or pleasure in usual activities, excessive worry, and changes in sleep or appetite, some of which can overlap with normal, expected physical symptoms of pregnancy itself, occasionally making recognition and diagnosis genuinely more challenging.

Pregnancy does not confer protection against mental illness, and a woman with a pre-existing mental health condition may experience continuation, worsening, or, less commonly, improvement of her symptoms during pregnancy, while other women experience the onset of a genuinely new mental health condition for the very first time during pregnancy itself, meaning ongoing, attentive assessment throughout antenatal care matters just as much as assessment at any single booking visit alone.

Fill in the blank: Depression and anxiety disorders are the most common mental health conditions encountered in _____. A pre-existing mental health condition may continue, worsen, or, less commonly, improve during _____.

5.1.2 Risk factors and screening for antenatal mental illness

Recognised risk factors for antenatal mental illness include a personal or family history of mental health conditions, limited social support, intimate partner violence or other significant psychosocial stressors, an unplanned or unwanted pregnancy, and a previous history of pregnancy loss or a complicated obstetric outcome, with these risk factors ideally identified through routine, sensitive enquiry at booking and reassessed throughout pregnancy as circumstances can genuinely change.

Routine screening for antenatal mental illness, using simple, validated questions asked sensitively as a routine part of every antenatal visit, allows earlier identification and support than waiting for a woman to volunteer symptoms she may feel hesitant, embarrassed, or genuinely uncertain about raising herself, reflecting the same principle of proactive, structured enquiry that underlies effective screening throughout obstetric practice more broadly.

Fill in the blank: Risk factors for antenatal mental illness include a personal or family history of mental health conditions and limited social _____. Routine screening allows earlier identification than waiting for a woman to _____ symptoms herself.

5.1.3 Management principles for mental disorders in pregnancy

Management of mental disorders in pregnancy is genuinely individualised, considering the severity of the condition, the woman's own preferences, and the balance between the benefits of treatment and any potential risks associated with a specific intervention, with psychological therapies, including cognitive behavioural therapy, an important, effective option for mild to moderate depression and anxiety, avoiding some of the medication-related considerations discussed later in this Series.

A collaborative, non-judgemental approach that genuinely listens to the woman's own experience, validates her concerns, and involves her fully in decisions about her own care is essential throughout, recognising that a woman experiencing mental health difficulties in pregnancy may already carry considerable guilt or self-criticism, and that clinical care should actively support rather than inadvertently compound this genuinely difficult emotional experience.

Fill in the blank: Psychological therapies, including cognitive behavioural _____, are an important, effective option for mild to moderate antenatal depression and anxiety. Management should be genuinely individualised, considering severity, the woman's own preferences, and the balance of treatment benefits and _____.

Category	Details
Risk Factors	Personal or family history of psychiatric illness; unplanned or unwanted pregnancy; poor social support; intimate partner violence; substance use; chronic medical conditions; stressful life events
Management Principles	Multidisciplinary care (obstetrician, psychiatrist, psychologist, social worker); careful risk–benefit analysis of psychotropic medications; preference for non-pharmacological interventions (counselling, CBT) when possible; close monitoring of maternal mental state and fetal well-being; postpartum follow-up for risk of relapse or postpartum depression

Box 5.1: Risk factors and management principles for mental disorders in pregnancy.

Pilot questions 5.1

- Describe the common mental health conditions encountered in pregnancy. (Linked to SLO 5.1)
- Explain why pregnancy does not confer protection against mental illness. (Linked to SLO 5.1)
- List the risk factors for antenatal mental illness. (Linked to SLO 5.1)
- Explain the value of routine screening for antenatal mental illness. (Linked to SLO 5.2)
- Describe the general principles of managing mental disorders in pregnancy. (Linked to SLO 5.2)

5.2 Perinatal Mental Health: Puerperal Conditions

5.2.1 Postpartum blues and postnatal depression

Postpartum blues (the 'baby blues') is an extremely common, transient, self-limiting experience affecting the great majority of women in the days following delivery, characterised by mood lability, tearfulness, and mild anxiety, generally resolving spontaneously within one to two weeks without specific treatment, and requiring reassurance and support rather than active clinical intervention in most cases.

Postnatal depression is distinguished from postpartum blues by its greater severity, persistence beyond the first two weeks, and genuine impairment of daily functioning, presenting with persistent low mood, loss of interest or pleasure, and, frequently, excessive guilt or feelings of inadequacy as a mother, symptoms that should always be actively, sensitively enquired about at routine postnatal contacts rather than assumed to simply reflect the normal, expected adjustment to early motherhood.

Fill in the blank: Postpartum blues generally resolves spontaneously within one to _____ weeks without specific treatment. Postnatal depression is distinguished by its greater severity, persistence, and genuine impairment of daily _____.

5.2.2 Postpartum psychosis

Postpartum psychosis is a rare but genuinely severe psychiatric emergency, typically developing within the first two weeks after delivery, presenting with a rapid, dramatic change in mental state including confusion, agitation, perceptual disturbance, and, at its most severe, a loss of contact with reality, requiring immediate, urgent psychiatric assessment given the genuine risk this condition poses to the safety and wellbeing of both the woman and her baby.

Recognised risk factors for postpartum psychosis include a personal or family history of bipolar disorder or a previous episode of postpartum psychosis itself, with a woman identified as having these specific risk factors ideally benefiting from proactive, specialist perinatal mental health input arranged well in advance of delivery, given how rapidly and severely this particular condition can develop in the immediate postpartum period.

Fill in the blank: Postpartum psychosis typically develops within the first _____ weeks after delivery. A personal or family history of _____ disorder is a recognised risk factor for postpartum psychosis.

5.2.3 Recognition and urgent management of severe perinatal mental illness

Prompt recognition of severe perinatal mental illness, including postpartum psychosis and severe postnatal depression with associated risk, requires genuine, sustained clinical vigilance from every member of the maternity and primary care team, given how rapidly symptoms can

escalate and how significant the potential consequences of delayed recognition can genuinely be for both the woman and her infant.

Any woman identified as experiencing a severe perinatal mental health crisis requires urgent, same-day specialist psychiatric assessment, ideally by a specialist perinatal mental health team where one is available, with immediate attention to the safety of both the woman and her baby, and genuine, active involvement of her family and support network throughout this acute, frightening period, alongside compassionate, non-judgemental support that recognises this as a genuine medical emergency rather than a reflection of the woman's own capability or character as a mother.

Fill in the blank: Any woman experiencing a severe perinatal mental health crisis requires urgent, same-_____ specialist psychiatric assessment. Severe perinatal mental illness should be recognised as a genuine medical emergency rather than a reflection of the woman's own _____ as a mother.

Condition	Onset	Duration	Features	Urgency
Postpartum Blues	Within 2–3 days postpartum	Resolves within 1–2 weeks	Tearfulness, mood swings, irritability, anxiety, insomnia	Self-limiting; reassurance and support
Postpartum Depression	Usually within 4–6 weeks postpartum	Persists >2 weeks, may last months	Persistent low mood, anhedonia, fatigue, poor bonding, suicidal ideation	Requires prompt psychiatric evaluation and treatment
Postpartum Psychosis	Rapid onset within days to weeks postpartum	Variable, often acute	Delusions, hallucinations, disorganized behavior, severe mood disturbance	Psychiatric emergency; urgent hospitalization and specialist care

Table 5.2: Comparison of postpartum blues, postnatal depression, and postpartum psychosis.

Pilot questions 5.2

1. Distinguish postpartum blues from postnatal depression. (Linked to SLO 5.3)
2. Describe the clinical presentation of postpartum psychosis. (Linked to SLO 5.3)

3. List the risk factors for postpartum psychosis. (Linked to SLO 5.3)
4. Explain why prompt recognition of severe perinatal mental illness matters. (Linked to SLO 5.4)
5. Describe the urgent management approach for a woman experiencing a severe perinatal mental health crisis. (Linked to SLO 5.4)

5.3 Medication and Multidisciplinary Care in Perinatal Mental Health

5.3.1 Psychotropic medication considerations

Decisions about psychotropic medication in pregnancy and breastfeeding require careful, individualised weighing of the risks of untreated maternal mental illness, which itself carries genuine, recognised risks to both mother and baby, against the potential risks of the specific medication under consideration, recognising that abruptly stopping an effective, established treatment can itself precipitate a genuinely serious relapse with its own significant risks.

Certain psychotropic medications have a more established safety profile in pregnancy and breastfeeding than others, and specialist perinatal psychiatric input should be sought wherever genuinely possible when making or reviewing these decisions, given the specific, evolving evidence base in this particular area and the genuinely significant consequences, in either direction, of getting this specific balance wrong for an individual woman.

Fill in the blank: Abruptly stopping an effective, established psychotropic treatment can itself precipitate a genuinely serious _____. Specialist perinatal psychiatric input should be sought wherever genuinely possible given the specific, evolving evidence _____ in this area.

5.3.2 Multidisciplinary perinatal mental health services

Specialist perinatal mental health services bring together obstetric, psychiatric, midwifery, and, where relevant, social work and health visiting expertise to provide genuinely coordinated care for women with significant mental health needs during pregnancy and the postnatal period, with mother and baby units, where available, allowing joint admission of a severely unwell mother and her infant together rather than separation at a genuinely critical, formative period for their relationship.

Clear referral pathways and effective communication between obstetric, midwifery, primary care, and mental health services genuinely matter throughout pregnancy and the postnatal period, ensuring a woman identified as having significant mental health needs does not fall through gaps between services at any point along this specific, sometimes genuinely complex care pathway.

Fill in the blank: Mother and baby units allow joint admission of a severely unwell mother and her infant together rather than separation at a genuinely critical, _____ period. Clear referral pathways ensure a woman does not fall through gaps between _____.

5.3.3 Supporting the family and reducing stigma

Family members and partners play a genuinely important role in supporting a woman experiencing perinatal mental illness, and should themselves be offered information, support, and, where appropriate, involvement in care planning, recognising that perinatal mental illness affects the entire family unit, not the woman in complete isolation, and that a genuinely well-supported family is better equipped to support her own recovery in turn.

Reducing stigma around perinatal mental illness, through open, matter-of-fact clinical communication and genuine normalisation of routine mental health enquiry as an ordinary, expected part of antenatal and postnatal care, helps women feel genuinely able to disclose symptoms honestly and seek help promptly, rather than concealing genuine difficulty out of fear of judgement or, in some cases, unfounded concern about inappropriate involvement of child protection services.

Fill in the blank: Family members and partners should be offered information, support, and involvement in _____ planning. Reducing stigma helps women feel genuinely able to disclose symptoms honestly and seek _____ promptly.

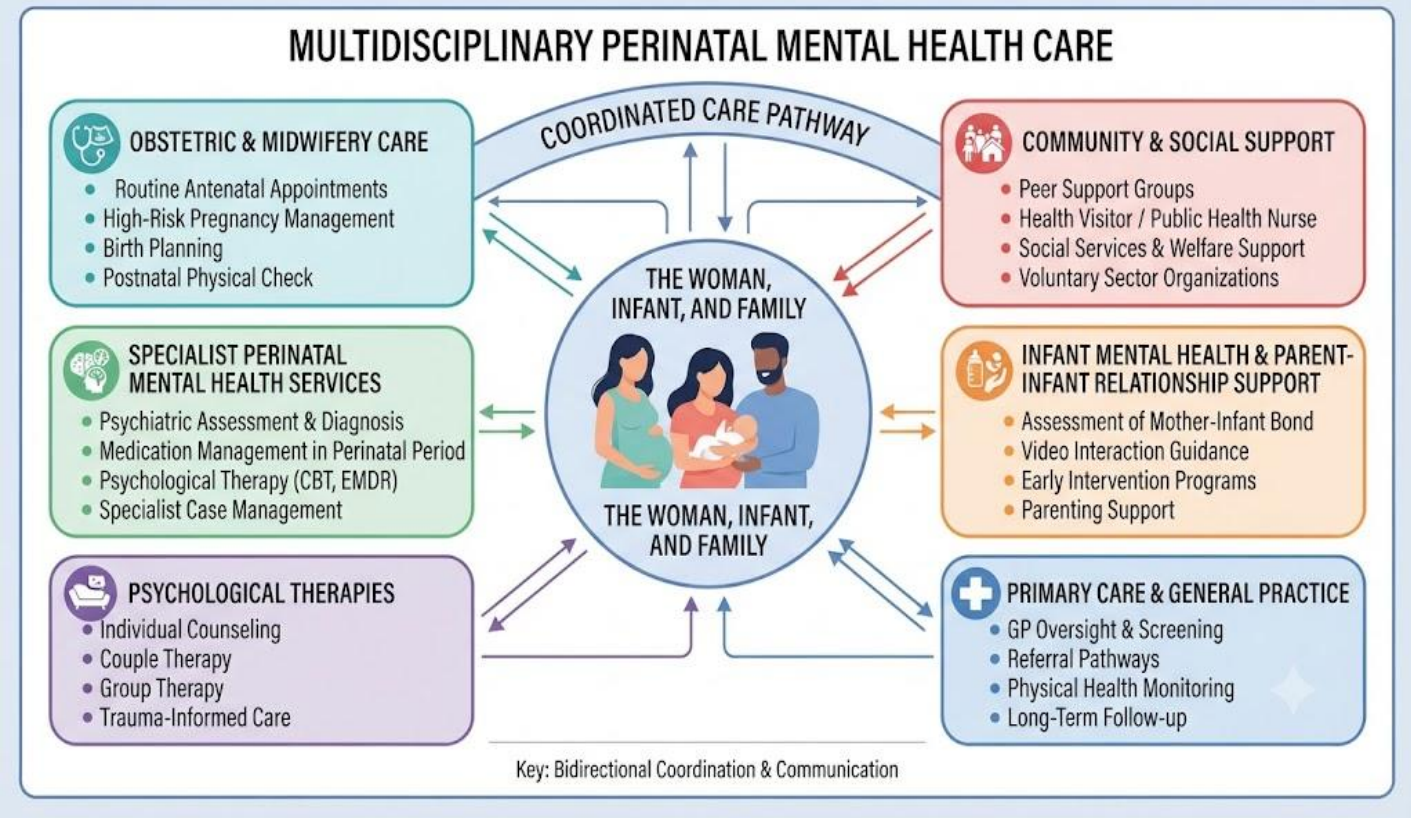

Figure 5.3: The multidisciplinary team and care pathway in perinatal mental health.

Pilot questions 5.3

1. Describe the considerations relevant to psychotropic medication use in pregnancy and breastfeeding. (Linked to SLO 5.5)
2. Explain why abruptly stopping established psychotropic treatment carries risk. (Linked to SLO 5.5)
3. Describe the components of specialist perinatal mental health services. (Linked to SLO 5.6)
4. Describe the role of mother and baby units in perinatal mental health care. (Linked to SLO 5.6)
5. Describe the importance of family support and reducing stigma in perinatal mental illness. (Linked to SLO 5.6)

5.4 Principles of Patient Care and Course Synthesis

5.4.1 Principles of patient care in pregnancy, labour, and puerperium

Across every medical disorder covered throughout this course a consistent set of principles genuinely underpins good patient care: accurate, timely diagnosis and risk assessment, ideally beginning before pregnancy wherever genuinely possible, individualised antenatal surveillance appropriate to the specific condition and its severity, careful delivery planning, and structured postnatal follow-up, delivered throughout with genuine respect for the woman's own autonomy, informed consent, and active participation in decisions about her own care.

Clear, honest communication with the woman about her specific condition, its implications for her pregnancy, and the reasoning behind recommended management, delivered in a manner she can genuinely understand and engage with, remains genuinely essential throughout, recognising that a woman managing a significant medical disorder during pregnancy is navigating a genuinely demanding, often frightening experience deserving of consistently compassionate, clear, and respectful care.

Fill in the blank: Good patient care principles include accurate diagnosis, individualised surveillance, careful delivery planning, and structured postnatal _____. Clear, honest communication should be delivered in a manner the woman can genuinely _____ and engage with.

5.4.2 Coordinating multidisciplinary care across medical disorders

Medical disorders in pregnancy frequently require genuinely coordinated, multidisciplinary care, bringing together obstetric, medical, and, where relevant, specific specialist expertise, whether haematology, cardiology, endocrinology, infectious disease, hepatology, surgery, or psychiatry, reflecting the same fundamental principle running throughout this entire course, that no single specialist working alone can adequately address the full, genuinely complex breadth of a woman's needs when a significant medical condition complicates her pregnancy.

Effective coordination between these different specialties requires clear, timely communication, shared, accessible documentation, and a genuinely designated point of overall clinical responsibility to ensure the woman's care remains coherent, consistent, and genuinely centred on her own specific circumstances, rather than fragmented across multiple, poorly coordinated specialist opinions delivered in isolation from one another.

Fill in the blank: Medical disorders in pregnancy frequently require coordinated, _____ care across obstetric and specialist expertise. Effective coordination requires clear communication and a genuinely designated point of overall clinical _____.

5.4.3 Course synthesis: from blood to brain

Across this entire course we have travelled from the blood, through anaemia and haemoglobinopathies, to the heart and endocrine system, through infection and immunology, to the liver, the abdomen, and, in this final Series, the mind itself, a deliberate progression reflecting the genuinely wide-ranging, systemic nature of medical disorders that can complicate pregnancy, and the consistently high standard of knowledge and compassionate care every one of these conditions genuinely deserves.

As you move forward into clinical practice, remember that behind every laboratory result, every classification system, and every management algorithm covered throughout this course stands an individual woman navigating pregnancy while also managing a genuinely significant medical condition, and that excellent care in this specific area of practice combines rigorous, evidence-based clinical knowledge with the same genuine warmth, respect, and clear communication that has been emphasised consistently throughout this entire curriculum.

Fill in the blank: This course has progressed from the blood through the heart, endocrine system, infection, liver, and abdomen to, in this final Series, the _____ itself. Excellent care combines rigorous, evidence-based clinical knowledge with genuine warmth, respect, and clear _____.

Category	Details
Core Principles	Early identification and diagnosis; individualized risk assessment; balance maternal and fetal well-being; minimize teratogenic drug exposure; optimize maternal disease control before and during pregnancy; regular monitoring of maternal and fetal status

Category	Details
Coordination	Multidisciplinary team approach (obstetrician, physician specialist, anesthetist, neonatologist, midwife); clear communication between care providers; integration of antenatal, intrapartum, and postpartum care; patient education and counselling; continuity of care across settings

Box 5.4: Core principles of patient care and multidisciplinary coordination across medical disorders in pregnancy.

Pilot questions 5.4

1. Enumerate the principles of patient care in pregnancy, labour, and puerperium. (Linked to SLO 5.7)
2. Explain the importance of clear, honest communication in caring for a woman with a medical disorder in pregnancy. (Linked to SLO 5.7)
3. Describe the value of multidisciplinary coordination across medical disorders in pregnancy. (Linked to SLO 5.7)
4. Describe the components required for effective coordination between specialties. (Linked to SLO 5.7)
5. Reflect on how this course has progressed across the range of medical disorders in pregnancy. (Linked to SLO 5.7)

Series Summary

This Series has covered mental disorders in pregnancy, their risk factors, screening, and management, followed by perinatal mental health in the puerperium, including postpartum blues, postnatal depression, and postpartum psychosis. It went on to examine medication considerations and multidisciplinary care in perinatal mental health, before concluding with the principles of patient care and a synthesis of this course on Medical Disorders in Pregnancy as a whole.

You should now be able to describe common mental disorders in pregnancy, describe screening and management principles, describe puerperal mental health conditions and urgent management of severe illness, describe medication considerations and multidisciplinary care, and enumerate the principles of patient care in pregnancy, labour, and puerperium (Linked to SLOs 5.1 to 5.7).

Glossary of Terms

1. **Antenatal:** occurring or provided before birth, relating to the period during pregnancy.
2. **Mother and baby unit:** a specialist inpatient unit allowing joint admission of a mother with severe mental illness and her infant.
3. **Perinatal mental health:** mental health during pregnancy and the first year after birth.
4. **Postnatal depression:** depression occurring after childbirth, distinguished from postpartum blues by its severity and persistence.
5. **Postpartum blues:** a common, transient experience of mood lability and tearfulness in the days following delivery.
6. **Postpartum psychosis:** a rare, severe psychiatric emergency typically developing within the first two weeks after delivery.
7. **Psychotropic medication:** medication affecting mental state, requiring careful risk-benefit consideration in pregnancy and breastfeeding.
8. **Puerperium:** the period following childbirth during which the maternal body returns towards its pre-pregnancy state.
9. **Multidisciplinary team:** a team of professionals from different specialties working together to provide coordinated care.
10. **Cognitive behavioural therapy:** a structured psychological therapy, an effective option for mild to moderate antenatal depression and anxiety.
11. **Stigma:** negative social attitudes that can discourage a person from disclosing symptoms or seeking help.
12. **Risk assessment:** structured evaluation of an individual's specific risk factors to guide clinical decision-making.

Concept Check Questions [Series 5]

Objective questions

- Depression and anxiety disorders are the most common mental health conditions encountered in _____.

- Postpartum blues generally resolves spontaneously within one to _____ weeks without specific treatment.
- Postpartum psychosis typically develops within the first _____ weeks after delivery.
- Abruptly stopping an effective, established psychotropic treatment can itself precipitate a genuinely serious _____.
- Mother and baby units allow joint admission of a severely unwell mother and her _____ together.

Short-answer questions

1. List the risk factors for antenatal mental illness. (Linked to SLO 5.1)
2. List the risk factors for postpartum psychosis. (Linked to SLO 5.3)
3. Explain why prompt recognition of severe perinatal mental illness matters. (Linked to SLO 5.4)
4. Explain why abruptly stopping established psychotropic treatment carries risk. (Linked to SLO 5.5)
5. Describe the importance of family support and reducing stigma in perinatal mental illness. (Linked to SLO 5.6)

Long-answer questions

6. Describe common mental disorders in pregnancy, their risk factors, screening, and management. (Linked to SLO 5.1, SLO 5.2)
7. Describe postpartum blues, postnatal depression, and postpartum psychosis, and the urgent management of severe perinatal mental illness. (Linked to SLO 5.3, SLO 5.4)
8. Describe psychotropic medication considerations and multidisciplinary perinatal mental health care. (Linked to SLO 5.5, SLO 5.6)
9. Describe the role of family support and reducing stigma in perinatal mental health care. (Linked to SLO 5.6)
10. Enumerate the principles of patient care in pregnancy, labour, and puerperium. (Linked to SLO 5.7)

Answers to Concept Check Questions [Series 5]

Objective questions

11. Pregnancy.
12. Two.
13. Two.
14. Relapse.
15. Infant.

Short-answer questions

16. Personal or family history of mental illness, limited social support, intimate partner violence, and unplanned pregnancy or previous loss.
17. A personal or family history of bipolar disorder or a previous episode of postpartum psychosis itself.
18. Symptoms can escalate rapidly, with genuinely significant potential consequences for both the woman and her infant if delayed.
19. It can precipitate a serious relapse of the underlying mental illness, itself carrying genuine risk.
20. Reducing stigma helps women disclose symptoms honestly and seek help promptly, while family support aids recovery.

Long-answer questions

21. **Basic response:** Depression and anxiety are common in pregnancy, with risk factors identified through routine screening and management individualised, including psychological therapy.

Value-added response: Collaborative, non-judgemental care that validates the woman's experience is essential given the guilt many women feel about mental health difficulties in pregnancy.

22. **Basic response:** Postpartum blues is common and self-limiting, postnatal depression is more persistent and impairing, and postpartum psychosis is a rare, severe emergency requiring urgent assessment.

Value-added response: Severe perinatal mental illness should be recognised as a genuine medical emergency, not a reflection of the woman's capability as a mother.

23. **Basic response:** Psychotropic medication decisions balance the risks of untreated illness against medication risk, supported by specialist perinatal mental health services and mother and baby units.

Value-added response: Clear referral pathways and coordinated communication ensure women do not fall through gaps between services.

24. **Basic response:** Family support and reduced stigma help women disclose symptoms honestly, recognising perinatal mental illness affects the whole family, not the woman alone.

Value-added response: Open, matter-of-fact clinical communication normalises routine mental health enquiry as an ordinary part of antenatal and postnatal care.

25. **Basic response:** Principles of patient care include accurate diagnosis, individualised surveillance, delivery planning, and postnatal follow-up, delivered with respect for autonomy.

Value-added response: Coordinated multidisciplinary care across specialties, with clear communication and designated clinical responsibility, ensures coherent, woman-centred care.

Answers to Pilot Questions [Series 5]

Part 5.1

1. Depression and anxiety disorders, with symptoms including low mood, excessive worry, and changes in sleep or appetite.
2. Pregnancy does not protect against mental illness; conditions may continue, worsen, or newly develop during pregnancy.

3. Personal or family history of mental illness, limited social support, intimate partner violence, and unplanned pregnancy or loss.
4. It allows earlier identification and support than waiting for a woman to volunteer symptoms herself.
5. Individualised, considering severity and preference, with psychological therapy an effective option, delivered collaboratively and non-judgementally.

Part 5.2

6. Blues is common, transient, and self-limiting within two weeks; depression is more severe, persistent, and impairing.
7. Rapid change in mental state including confusion, agitation, perceptual disturbance, and loss of contact with reality.
8. Personal or family history of bipolar disorder or a previous episode of postpartum psychosis.
9. Symptoms can escalate rapidly with significant potential consequences for the woman and infant if recognition is delayed.
10. Urgent, same-day specialist psychiatric assessment, attention to safety, and involvement of family and support network.

Part 5.3

11. Weighing risks of untreated illness against medication risk, with specialist input given the evolving evidence base.
12. It can precipitate a serious relapse of the underlying illness, itself carrying genuine risk.
13. Coordinated obstetric, psychiatric, midwifery, social work, and health visiting expertise.
14. They allow joint admission of a severely unwell mother and her infant together, rather than separation.
15. It helps women disclose symptoms honestly and supports the whole family in aiding the woman's recovery.

Part 5.4

1. Accurate diagnosis, individualised surveillance, careful delivery planning, structured postnatal follow-up, and respect for autonomy.
2. It ensures the woman genuinely understands her condition and the reasoning behind recommended management.
3. It ensures no single specialist working alone addresses the full complexity of a woman's needs.
4. Clear, timely communication, shared documentation, and a designated point of overall clinical responsibility.
5. The course has progressed from the blood through the heart, endocrine, infectious, hepatic, and surgical systems to the mind.

References and Attributions [Series 5]

Textual References

1. Royal College of Obstetricians and Gynaecologists (2011). Green-top Guideline No. 45: Management of Women with Mental Health Issues During Pregnancy and the Postnatal Period. RCOG Press.
2. National Institute for Health and Care Excellence (2020). Antenatal and Postnatal Mental Health: NICE Guideline CG192. NICE.
3. Cunningham, F. G., Leveno, K. J., Dashe, J. S. et al. (2022). Williams Obstetrics (26th ed.). McGraw Hill.
4. World Health Organization (2016). WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience. WHO Press.

Figures, Plates, Tables, and Boxes

1. Box 5.1: Risk factors and management principles for mental disorders in pregnancy. AI-generated using the prompt: "Create a simple single-column reference box with an

outside border titled Mental Disorders in Pregnancy, listing risk factors and management principles. Clinical reference box style."

2. Table 5.2: Comparison of postpartum blues, postnatal depression, and postpartum psychosis. AI-generated using the prompt: "Create a clean reference table titled Puerperal Mental Health Conditions, comparing onset, duration, features, and urgency of postpartum blues, depression, and psychosis. Simple clinical reference table style with outside border."
3. Figure 5.3: The multidisciplinary team and care pathway in perinatal mental health. AI-generated using the prompt: "Create a professional diagram titled Multidisciplinary Perinatal Mental Health Care, showing coordinated services around the woman and family. Clean clinical educational diagram style."
4. Box 5.4: Core principles of patient care and multidisciplinary coordination across medical disorders in pregnancy. AI-generated using the prompt: "Create a simple single-column reference box with an outside border titled Principles of Care in Medical Disorders of Pregnancy, listing core principles and coordination. Clinical reference box style."