Midwifery *Care*

Compassion	***Communication***	***Committment***	***Courage***	***Competence***
Infections in pregnancy Minor disorders of pregnancy Promoting normality Contraception and sexual health Domestic abuse	Bio-physical tests Gestational diabetes First stage of labour Cord prolapse Postpartum haemorrhage Postnatal mental illness Obesity Sepsis	Pre-conceptual health Pharmacological and non-pharmacological analgesia Promoting normality	Anxiety and depression Shoulder dystocia Breech birth	Bleeding in pregnancy Intrahepatic cholestasis of pregnancy Pre-eclampsia Occipito-posterior position Second stage of labour Perineal trauma assessment Waterbirth Third stage of labour Recognising the deteriorating woman

Rapid midwifery compassionate care map – linked throughout the book with green highlighted text and adapted from the 6Cs: DH (2012) *Compassion in Practice*, Department of Health, London.

PART I

Antenatal Care

Rapid Midwifery, First Edition. Sarah Snow, Kate Taylor, and Jane Carpenter.

Antenatal Health Assessment

The main objective of antenatal care is to support the woman through pregnancy and to monitor the health and well-being of the woman and fetus. Although pre-conceptual care is advised (see Section 1.10), antenatal care generally commences at booking. The National Institute for Health and Care Excellence (NICE) provides a framework and recommended schedules for routine antenatal care (NICE 2014c); however, timely referral is required if the woman or fetus is at increased risk. All care should be evidence based and woman centred, enabling her to make informed choices about her care.

KEY POINTS

- The first antenatal contact with the woman requires comprehensive history taking, including relevant obstetric, medical and personal details. Determining risk, offering an early ultrasound scan for gestational age, together with health screening checks and tests should be discussed (NICE 2014b).
- Blood pressure monitoring, urinalysis and abdominal examination are all essential components of antenatal care; however, other physical and emotional issues need to be considered.
- **Breast examination:** This is not routinely recommended (NICE 2014b); however, the woman may find information about breast changes to be reassuring. Breast tenderness and tingling often occur early in pregnancy and an early increase in size often occurs. Colostrum leakage is common.
- **Blood pressure:** A number of factors can influence blood pressure measurements, including time of day, size of cuff, maternal position and variations in technique. Midwives must fully understand the principal mechanisms that control blood pressure and other factors that can influence systolic and diastolic pressures, blood pressure phases and Korotkoff sounds.
- **Urinalysis:** Observation of the volume, colour, smell, deposits and specific gravity of urine offers a unique insight into the physiological workings of many body systems (Blows 2012).
  - **Colour:** This is dependent on concentration and varies from pale straw (normal) to amber. Diet, drugs, bilirubinuria and haematuria affect the colour of urine. Haematuria is not normal and may be indicative of infection or trauma.
  - **Clarity:** Urine should be clear. Cloudy or foamy urine can be caused by protein; cloudy and thick urine may be indicative of the presence of bacteria (Blows 2012). Routine midstream urine (MSU) screening for asymptomatic bacteriuria early in pregnancy to exclude asymptomatic pyelonephritis is currently recommended by NICE (2014b).
  - **Odour:** The odour of urine can be influenced by food. However, a smell of pear-drops or nail-polish remover indicates the presence of ketones which may be due to fasting, vomiting or uncontrolled diabetes mellitus. Infection may cause the urine to smell offensive and, when accompanied by the presence of nitrates and/or leucocytes on test strips, further laboratory culture is required.
  - **Specific gravity** is affected by both the water concentration and solute concentration in a urine sample and reflects the kidney's ability to concentrate or dilute urine.
  - **pH** reflects the acidity or alkalinity of urine and a low pH may predispose to the formation of calculi (stones) in the kidneys or bladder (Waugh and Grant 2014).
- Altered renal tubular function can increase renal excretion of glucose and protein. This needs to be considered when analysing urine.
- **Abdominal examination** is carried out from 24 weeks and is achieved by inspection, palpation and auscultation.
  - **Inspection:** The uterus should be ovoid in shape, being longer than it is broad. The size and shape of the abdomen can give clues to the size and position of the

fetus as pregnancy progresses. However, a full bladder, distended colon and obesity can make the assessment of fetal size difficult. Skin changes, such as linea nigra and striae gravidarum and scars from previous surgery, self-harm or domestic violence may be evident on abdominal inspection. Fetal movements may be reported from around 20 weeks (Bharj and Henshaw 2011).

- **Fundal palpation** determines the presence of a head or breech in the fundus. The head is hard and round and much more distinctive in outline than the breech.
- Symphysis–fundal height (SFH) should be measured (in centimetres) and recorded at each antenatal appointment from 24 weeks (NICE 2014b). Measurements should be plotted on a customised chart. Further investigation is required if a single measurement plots below the 10th centile or serial measurements show slow growth by crossing centiles (RCOG 2013).
- **Lateral palpation** determines the position of the fetal back. This feels like a smooth continuous line of resistance, while fetal limbs feel like small irregular shapes on the opposite side. The fetal back cannot be felt if the fetus is in the occipito-posterior position (see Section 2.1.2), although fetal limbs can be felt on both sides of the midline (Bharj and Henshaw 2011).
- **Pelvic palpation** determines the presentation of the fetus, the attitude and degree of engagement. This is best carried out using a two-hand approach. If the head is above the pelvic brim then the head is not engaged. Once engaged, if the fingers of one hand slide further into the pelvis than the other, then the head is flexed. NICE (2014b) recommends that presentation should not be assessed by abdominal palpation prior to 36 weeks.

- **Auscultation** of the fetal heart is best heard at a point over the fetal shoulder, hence lateral palpation to identify the fetal back is useful. When the fetus is in the occipito-posterior position, the fetal heart can be heard at the midline or lateral borders. NICE (2014b) does not recommend antenatal auscultation or electronic fetal heart rate monitoring in women with uncomplicated pregnancies.
- **Vaginal discharge** often increases in pregnancy. It is usually white, non-offensive and non-irritant. If the discharge is associated with pain on micturition, soreness, itching or an offensive smell, then further investigations are required (see Section 1.7).
- **Oedema** should not be present at the initial assessment. However, it may occur as pregnancy progresses due to physiological changes. Oedema that is visible in the woman's face and hands and becomes increasingly pitted in the lower limbs may be indicative of hypertension, especially if other markers are present.
- **Varicosities** are common in pregnancy owing to the effect of progesterone on the smooth muscles of blood vessel walls. Redness and tenderness/pain and areas that appear white may be indicative of deep vein thrombosis and require medical referral.
- **Maternal weight and height** should be measured at the first contact with the pregnant woman. Routine weighing during pregnancy is not recommended unless clinical management can be influenced or if nutrition is a concern (NICE 2014b). Women who have a body mass index (BMI) of <18 or $\geq 30\,kg/m^2$ need referral to a consultant and other health professionals working in nutrition and weight management (NICE 2010) (see Section 4.3).

ESSENTIALS OF MIDWIFERY CARE NICE (2014b) offers comprehensive guidance for the provision of antenatal care, a summary of which is provided below to aid revision.

- Management of care will depend on the individual needs of the woman. A holistic woman-centred approach is paramount and observations of physical characteristics are important, as these may give clues to current problems or problems that may arise.

- When women are assessed and remain low risk, a midwifery-led model of care should be offered.
- If problems arise, a clear referral pathway should be established to ensure that the woman is managed and treated by appropriate specialist team members (NICE 2014c).
- Urinalysis for protein should be carried out at each antenatal visit to screen for pre-eclampsia; however, routine urinalysis for glycosuria is not recommended as pregnancy affects glomerular filtration and exceeds the renal threshold for glucose (Blackburn 2013).
- Urinalysis is an everyday task in midwifery practice; however, its relevance in identifying underlying disease processes and infection should not be undervalued.
- Although formal fetal movement counting is not recommended, women should be encouraged to be aware of their baby's usual pattern of movements. The Royal College of Obstetricians and Gynaecologists (RCOG) gives guidance on the management of women with reduced fetal movements (RCOG 2011c).
- Ultrasound estimation for suspected large for gestational age babies is not recommended for low-risk women. However, the RCOG (2013) recommends that women with a single SFH that plots below the 10th centile or serial measurements that demonstrate slow or static growth by crossing centiles should be referred for ultrasound measurement of fetal size.
- Vaginal discharge should be differentiated from unexplained vaginal wetness to exclude amniotic fluid leak.

PROFESSIONAL ACCOUNTABILITY

- The midwife is required to facilitate and respect maternal choice. This can occur only if information is timely and appropriate.
- Midwives should be aware of local protocols and national guidelines to ensure that referral to appropriate members of the multidisciplinary team is made when deviations from the norm are identified.
- Accurate, contemporaneous documentation should reflect all care given and planned.

Further Resources

Geeky Medics. *How to Take an Accurate Blood Pressure*, https://www.youtube.com/watch?v=f6HtqolhKqo.

Anxiety and Depression

It is important to recognise that depression, anxiety and stress during pregnancy are at least as common as an altered emotional state during the puerperium. Glover (2014) identified that the emotional health of women during pregnancy remains a neglected aspect of maternity care. In addition, Brockington (1998) observed that the focus on the concept of 'postnatal depression' has detracted from the need to recognise and manage it like any other depressive illness that occurs during a woman's life span.

KEY POINTS

- Around 3–17% of women experience depressive illness during pregnancy (Leight *et al*. 2010).
- Mindfulness-based cognitive therapy is associated with a significant reduction in both the incidence and reoccurrence of depression. It may also be an effective strategy for women who do not respond to other therapies such as cognitive behavioural therapy (CBT) (Segal *et al*. 2012).
- Consideration and understanding of the context of a pregnant woman's anxiety or depression are crucial when determining care (Dunkel Schetter and Tanner 2012).
- Anxiety and depressive symptoms in pregnancy are associated with preterm birth and low birth weight infants (Dunkel Schetter and Tanner 2012).
- Evidence suggests that if a woman is stressed, anxious or depressed during pregnancy, her child is more likely to experience adverse outcomes, including emotional problems (O'Connor *et al*. 2002) and cognitive impairment (van den Bergh and Marcoen 2004).
- The Family Nurse Partnership (2015) remains the only intervention that starts in pregnancy and is associated with improved outcomes for child behaviour (Glover 2014). It also has one of the most robust evidence bases for successful interventions with the care of vulnerable parents and babies.
- The Mind 'Building Resilience for Better Mental Health' project reports that supporting pregnant women and new mothers to adopt strategies that manage altered mood helps them to stay well (Steen *et al*. 2015).

ESSENTIALS OF MIDWIFERY CARE

- NICE (2014a) offers a number of recommendations for the care and support of women, including:
  - Asking questions that are designed to identify depression as part of the general discussion about the woman's mental health at booking. This may then trigger referral to her GP or mental health professional. Examples of such questions include: *During the past month, have you often been bothered by feeling down, depressed or hopeless? During the past month, have you often been bothered by having little interest or pleasure in doing things?*
  - Providing information to the woman and her partner about mental health during pregnancy, including treatment and prevention options, for example, psychological interventions and medication.
  - Monitoring symptoms regularly throughout pregnancy and referring women where appropriate for facilitated, self-help interventions. More severe symptoms may require high-intensity psychological interventions such as CBT.
  - Involving the woman (and her partner/family) in all aspects of her care and acknowledging the woman's central role in decision-making.
  - Recognising the impact of any mental health issue on the woman's relationship with her partner and family.

- Developing an integrated care plan that clearly sets out the care and treatment of the mental health problem. This includes the involvement of other agencies, for example, mental health services.

PROFESSIONAL ACCOUNTABILITY

- Asking pregnant women sensitive questions about their mental health requires courage; however, a midwife's duty of care encompasses all aspects of a woman's mental and physical health.
- Record keeping is an important aspect of caring for women with mental health needs and these records may not be conventional written ones. For example, women may value a record of their consultation in a variety of formats, e.g. audio, visual or verbal (NICE 2014a).
- When working with girls and young women who disclose mental health issues, midwives must be clear about local and national guidelines regarding confidentiality and safeguarding.

Further Resources

Family Nurse Partnership,
http://fnp.nhs.uk/.

Bio-physical Tests

Blood Tests

Blood tests in pregnancy fall into two main categories, diagnostic and screening. NICE (2014b) further categorises blood testing into screening for haematological conditions, screening for haemoglobinopathies, screening for Down syndrome (and other trisomies) and screening for infection. Some blood tests are routinely offered at the initial assessment. Others are offered at specific times during pregnancy or as indicated, in order to determine and manage the sequelae of specific complications. At the initial antenatal assessment, women are also routinely offered screening for certain infections (see Section 1.10).

Blood tests offered at the initial assessment include the following.

ABO Blood Group and Rhesus (Rh) Factor

KEY POINTS

- What determines a blood group is the presence or absence of a range of different proteins (antigens) on the red blood cell membrane.
- Antigens on the red blood cell membrane can stimulate an immune response from antibodies in the plasma if transferred from one individual to another (Waugh and Grant 2014), in this instance between mother to baby.
- Confirmation of a woman's blood group and Rh status is necessary to prevent a potentially fatal transfusion reaction (should a blood transfusion be required) and to prevent haemolytic disease of the newborn (HDN)[1] (Qureshi *et al*. 2014).
- Determined by genetic control, the Rh grouping system involves many different antigens (which produce antibodies), with D being the most potent antigen and the one most commonly involved in incompatibility between mother and fetus causing HDN.

ESSENTIALS OF MIDWIFERY CARE Both the British Committee for Standards in Haematology (Qureshi *et al*. 2014) and the RCOG (2014) give guidance for the management of women with red cell antibodies during pregnancy. It is essential that midwives are aware of the following in order to provide effective care:

- To reduce the incidence of HDN, women should be screened for atypical red cell alloantibodies early in pregnancy and again at 28 weeks, regardless of RhD status.
- All RhD-negative women should be offered antenatal anti-D immunoglobulin (Ig) prophylaxis in accordance with local guidelines for dosage and timing of administration (NICE 2014b). If a sensitising episode should occur, for example, miscarriage, amniocentesis or external cephalic version, further administration of anti-D is required and within 72 hours of the event (Qureshi *et al*. 2014; RCOG 2014).
- The amount of anti-D required is assessed by a Kleihauer blood test, which confirms the presence and estimates the number of fetal cells in the maternal circulation.
- Consideration should be given to offering testing to the woman's partner in order to determine whether anti-D prophylaxis is necessary (NICE 2014b), although this can be a sensitive paternity issue.

Full Blood Count

KEY POINTS

- A full blood count is one of the most common blood tests taken in pregnancy as it can provide important 'clues' to a woman's general health.

[1] Haemolytic disease of the newborn is an immune-mediated breakdown of red blood cells that occurs in Rhesus and ABO incompatibility.

- There are three types of blood cells: erythrocytes (red cells and the most abundant), platelets (thrombocytes) and leucocytes (white cells).
- Haemoglobin (Hb) is the most frequently referred to index (Blann 2006), with almost the entire weight of an erythrocyte (red blood cell) consisting of haemoglobin.
- Each haemoglobin molecule consists of a pigmented iron-containing complex called haem and a polypeptide protein (globulin). The iron atoms play a key role in the oxygen-carrying capacity of erythrocytes (Waugh and Grant 2014).
- Physiological anaemia describes a fall in Hb concentration due to the physiological changes that occur in normal pregnancy.
- If the concentration of erythrocytes is low, as indicated by the red cell count (RCC), this may also be indicative of anaemia. If concentrations are high, then polycythaemia should be considered.
- When the mean cell volume (MCV) is low, then serum ferritin levels should be investigated. Serum ferritin is a stable glycoprotein that accurately reflects iron stores.
- Iron deficiency represents a spectrum of anaemias ranging from iron depletion to iron deficiency anaemia (Pavord *et al*. 2012).
- Abnormal clinical findings may indicate a spectrum of anaemic disorders, polycythaemia or congenital haemoglobinopathies such as sickle cell disease and thalassaemia (Blann 2006).
- Leucocytes are normally found in low concentrations; however, rising white cell numbers usually indicate infection or trauma. They therefore play an important role in the body's defence mechanism.
- Other white blood cells include neutrophils, which protect the body from bacterial invasion; eosinophils, which have a specialist role in the elimination of parasites; basophils, which are associated with allergic reactions; and monocytes, which defend the body from bacterial, fungal and other pathogens by phagocytosis.
- Lymphocytes make immunoglobulins (antibodies capable of recognising and attacking invading pathogens) and aid antibody production (Blann 2006).
- Platelets (thrombocytes) play an important role in haemostasis. Platelets quickly adhere to each other when blood vessels are damaged, releasing substances that attract more platelets to the site to form a platelet plug (Waugh and Grant 2014).

ESSENTIALS OF MIDWIFERY CARE

- A full blood count is taken at the initial assessment and routinely during pregnancy, typically at 28 weeks (NICE 2014b).
- NICE (2014b) recommends that when Hb levels fall outside the normal range for pregnancy (11 g/100 ml at first contact and 10.5 g/100 ml at 28 weeks), this should be investigated and iron supplementation considered.
- Routine iron supplementation for all women is not recommended in the United Kingdom. However, all women should be given dietary information to maximise iron intake and absorption (Pavord *et al*. 2012).
- In pregnancy, platelet levels may fall but usually remain within the normal range for non-pregnant women. A rise may be indicative of infection and an abnormal decrease should be viewed with suspicion and therefore investigated (Boyle 2011).

Haemoglobinopathies are a complex group of genetically acquired conditions. They occur in individuals who inherit two haemoglobin gene variants which lead to the synthesis of abnormal haemoglobin and increased red cell membrane fragility. The resulting reductions in the oxygen-carrying capacity and life span of the red cells are characteristics of sickle cell anaemia and thalassaemia (Blackburn 2013).

Sickle Cell Disease

KEY POINTS

- Sickle cell disease (SCD) exhibits geographical variations, with the highest prevalence amongst those of Black African and Black Caribbean family origin. Sickle cell disease affects 1 in every 2000 births in England (NHS 2011).
- The pattern of inheritance is such that one gene from each parent (homozygous genotype for HbSS) results in a sickle cell-positive offspring.
- Offspring who inherit one gene (heterozygote) have sickle cell trait (HbAS) and usually do not display the disease (Yerby 2010a).
- In SCD, the characteristic sickle-shaped erythrocytes result when abnormal, deoxygenated haemoglobin molecules become misshaped.
- Sickle cells do not move smoothly through the circulation and therefore cause an obstruction to blood flow, resulting in intravascular clotting, tissue ischaemia and infarction (Waugh and Grant 2014).
- Normal haematological, cardiovascular, renal and respiratory changes during pregnancy place the woman and infant at greater risk of 'sickle crises' and complications such as an increased risk of thromboembolic events, antepartum haemorrhage and pre-eclampsia.
- Fetal and neonatal complications such as prematurity and growth restriction may arise due to placental infarction and fetal hypoxia (RCOG 2011a; Blackburn 2013).

Thalassaemias

KEY POINTS

- Thalassaemias are a group of hereditary haemolytic anaemias, most prevalent in those of Mediterranean, African-Caribbean, Chinese and Asian origin.
- They are characterised by an impaired and unbalanced synthesis of either the two α-globin or two β-globin chains (Waugh and Grant 2014).
- The phenotype and severity of those with α-thalassaemia are dependent on the number of missing or altered genes involved in α-chain production.
- Those with one or two affected genes have either a silent presentation or mild anaemia. If all four genes are missing, the fetus cannot synthesise either normal fetal haemoglobin or adult haemoglobin. These infants develop cardiac failure and hydrops fetalis and are often stillborn.
- Until stem cell transplants are readily available, affected individuals require lifelong blood transfusions (Blackburn 2013).
- β-Thalassaemia major results from the inheritance of a defective β-globin gene from each parent and therefore the fetus is homozygous.
- This results in a severe transfusion-dependent anaemia. Many girls with thalassaemia major die in childhood or adolescence and those who survive are often amenorrheic and infertile.
- The heterozygous state, β-thalassaemia trait (thalassaemia minor) causes mild to moderate microcytic anaemia. Those affected are generally asymptomatic, although haemoglobin levels are reduced.

ESSENTIALS OF MIDWIFERY CARE Both sickle cell and β-thalassaemia major can restrict a child's or adult's ability to conduct normal daily activities. The NHS sickle cell and thalassaemia screening programme (NHS 2011) sets out standards for antenatal and newborn screening and the RCOG (2011a) guideline makes recommendations for the management

of sickle cell disease in pregnancy. These, together with the RCOG (2014) *Management of Beta Thalassaemia in Pregnancy* provide evidence-based guidance for care:

- Information about screening for sickle cell diseases and thalassaemias, including the implications of carrier status, should be given to pregnant women at the first contact with the midwife, ideally before 10 weeks.
- In low-prevalence trusts, a family origin questionnaire (FOQ) should be used to assess risk. In high-prevalence trusts, all pregnant women should also be offered screening.
- When the woman is identified as being affected or a carrier, the father of the baby should also be offered screening.
- Care for all women whose pregnancy is complicated by any form of haemoglobinopathy should be provided by a multidisciplinary team including an obstetrician, a midwife with experience of high-risk antenatal care and a haematologist with an interest in haemoglobinopathies (RCOG 2011a, 2014).

Screening tests for Down (T21), Edwards (T18) and Patau (T13) Syndromes

KEY POINTS

- Where a fault during meiosis occurs, three copies of a chromosome may result and give rise to a named trisomy (Waugh and Grant 2014), for example, Down syndrome. In the United Kingdom, all pregnant women are therefore offered antenatal screening.
- The eligibility criterion for Down syndrome screening is all women with a singleton or twin pregnancy at ≤20+0 weeks. The eligibility criterion for Edwards and Patau syndromes is all women with singleton or twin pregnancy at <14+1 weeks. In each case, the gestational age in weeks must be confirmed by ultrasound scan (Public Health England 2015).
- Women presenting in the first trimester between 10+0 and 14+1 weeks are offered the combined test to calculate the risk of the pregnancy being affected by Down, Edwards and Patau syndromes.
- The combined test uses maternal age, the nuchal translucency (NT) measurement and two biochemical markers, together with gestational age, which is calculated from the fetal crown–rump length (CRL).
- Women presenting between 14+2 and 20+0 weeks are offered the quadruple test for Down (T21) syndrome only. The optimal time for this test is 16 weeks.
- The quadruple test uses maternal age and four biochemical markers, including AFP and hCG.

ESSENTIALS OF MIDWIFERY CARE Both NICE (2014b) and the NHS fetal anomaly screening programme (FASP) offer guidance regarding anomaly screening (Public Health England 2015). A summary of this guidance is provided below.

- Women should be given information about screening at the first contact with the midwife and understand that the choice to embark on screening remains with them.
- Women should be informed that screening does not provide a definitive diagnosis and an explanation regarding risk scoring should be given. Nationally agreed screening protocols use a cut-off of 1:150 at term.
- In cases where screening is accepted, but it is not possible to obtain the NT measurement at the first attempt, at least one other attempt should be offered.
- The midwife should be aware of varying screening pathways, the NHS FASP and their local trust arrangements. For example, for first trimester tests, maternal blood may be taken (within the recommended parameters) prior to the ultrasound scan or the blood

test can be taken at the same time as the ultrasound scan. The laboratory takes prime responsibility for the risk calculation.

- When results are low risk, women should be notified within 2 weeks of the test being taken.
- When results are high risk, the woman should be notified within 3 days and offered face-to-face discussion with a suitably experienced health professional to discuss her care options. Prompt referral should be made to an obstetrician with specialist knowledge in fetal medicine.
- Women with a high-risk result should be offered diagnostic testing which they can decline or accept. This should be documented. Good clinical practice is to obtain formal written consent for the procedure.
  - Chorionic villus sampling (CVS) and amniocentesis are both invasive diagnostic procedures performed under continuous ultrasound guidance.
  - CVS can be carried out between 10 and 15 weeks and amniocentesis is usually performed after 15 weeks of pregnancy.
  - Both carry risk of miscarriage and the woman must be made fully aware of the relative risks of undertaking either of these invasive procedures.
- The woman must be informed that diagnostic testing will give results for Down, Edwards and Patau syndromes irrespective of the initial screening choices.

Ultrasound

KEY POINTS

- All pregnant women should be offered an early ultrasound scan between 10+0 and 13+6 weeks to determine gestation and to detect multiple pregnancies.
- Crown–rump length (CRL) measurements should be used to determine gestational age. If the CRL is more than 84 mm, the gestational age should be determined using head circumference.
- The CRL can influence the timing of nuchal translucency measurements. A CRL measurement of less than 45.0 mm requires recall for a further scan. If the CRL is greater than 84.0 mm, second trimester anomaly tests should be offered.
- The NHS FASP recommends that a mid-pregnancy scan should be offered between 18+0 and 20+6 weeks of pregnancy to screen for major fetal anomalies (Public Health England 2015).
- The main structures that are assessed can indicate a number of specific conditions and women may choose to be screened for all or only some of these.

ESSENTIALS OF MIDWIFERY CARE Both NICE (2014b) and the NHS FASP (Public Health England 2015) offer guidance regarding anomaly screening, summarised below to aid revision:

- Midwives should inform women of the conditions that can be screened for.
- Women should be informed of the limitations of routine ultrasound screening and that detection rates vary by the type of fetal anomaly, the woman's BMI and the position of the unborn baby at the time of scan.
- Some fetal anomalies will be confirmed by scan alone, others will require prenatal, invasive, diagnostic testing.
- When routine ultrasound screening is performed to detect neural tube defects, α-fetoprotein testing is not required.

- If fetal anomaly is suspected or detected, the woman should be informed at the time of the scan by either the sonographer or the midwife to discuss further investigations.
- The discussion should include sufficient information to ensure that the woman is aware of the purpose, benefits, limitations and implications of undergoing further investigations.
- The woman should be referred to an obstetrician with an interest in fetal medicine within 3 days or should be referred to a tertiary unit by the obstetrician within 5 days.
- Women should be counselled and supported in their decision to terminate or continue the pregnancy. Referral to appropriate paediatric and support services should be made.

Other Biophysical Tests

A number of tests can be carried out during the antenatal period to assess fetal well-being. Tests may include fetal movement monitoring, fetal heart rate activity, growth scans, Doppler ultrasound and assessment of amniotic fluid volume. Although these tests are not routinely performed, one or a combination can be utilised when there are concerns in order to optimise care and the time of birth.

KEY POINTS

- **A biophysical profile (BPP)** uses ultrasound to assess five variables: fetal movement; tone; breathing; the amniotic fluid volume; and heart rate activity.
- Each variable is assigned a maximum score of 2. A total score between 8 and 10 indicates a potentially healthy fetus; a score of 6 or less is suspicious (Lalor *et al*. 2008).
- A BPP is used to aid detection of central nervous system depression in the fetus.
- A modified profile (MBPP) may be used first; this involves a CTG to monitor heart rate activity, plus assessment of amniotic fluid volume.
- **Fetal movements** are a sign of fetal well-being. Most women are aware of fetal movements by 20 weeks' gestation (multiparous women usually by 16 weeks and primiparous by 20 weeks) (RCOG 2011c).
- Fetal movements can be defined as discrete kicks, flutters, a swish or a roll. Changes in the number and nature of fetal movements as the fetus matures are a reflection of normal neurological development (Blackburn 2013).
- **Fetal heart rate activity** can be an indication of fetal well-being if certain parameters are met. Features of a reassuring fetal heart rate include a baseline rate between 100 and 160 beats per minute; baseline variability of 5 or more; accelerations and no decelerations (NICE 2014b).
- **Growth scans:** Diagnosis of a small for gestational age fetus usually relies on ultrasound measurement of fetal abdominal circumference (AC) or estimation of fetal weight (EFW). Where the fetal AC or EFW is <10th centile or there is evidence of reduced growth velocity, women should be offered serial assessment of fetal size and umbilical artery Doppler (RCOG 2013).
- **Doppler ultrasound** provides a non-invasive insight into feto-maternal circulation. Normally, the umbilical artery presents low resistance to blood flow and this is indicated by a low PI (pulsatile index) and therefore a desirable high profusion. A high PI indicates increased resistance and low profusion (Stampalija *et al*. 2010).
- **Amniotic fluid volume** is estimated by measuring the single vertical pocket. Alternatively, an amniotic fluid index (AFI) can be estimated by measuring the liquor in each of four quadrants around the fetus which are devoid of umbilical cord or fetal parts. An AFI of <5–6 cm is defined as oligohydramnious and is associated with growth restriction, some congenital anomalies and post-maturity. An AFI of >24 cm is defined as polyhydramnios and is associated with some congenital anomalies, maternal diabetes, multiple pregnancies and hydrops fetalis (Blackburn 2013).

ESSENTIALS OF MIDWIFERY CARE The use of the biophysical profile test for high-risk pregnancies is controversial; however, there can be no doubt of the value of timely fetal surveillance. It is essential that midwives are able to recognise deviations from the norm, make sound clinical judgements and then institute timely referral to appropriate members of the multidisciplinary team.

- A biophysical profile is usually reserved for those pregnancies deemed high risk. However, there may be more than one reason for abnormal findings.
- Women should be advised of the need to be aware of fetal movements up to and including the onset of labour and to report any changes (RCOG 2011c).
- Accurate assessment of fetal heart rate is essential as this may affect a plan of care. NICE (2014b) does not support the use of routine, antenatal, electronic fetal heart rate monitoring for women with uncomplicated pregnancies.
- In high-risk pregnancies, a uterine artery Doppler ultrasound at 20–24 weeks of pregnancy has moderate predictive value for the severely small for gestational age neonate. Other indications for referral for Doppler ultrasound include oligohydramnious, disparity in fetal growth in multiple pregnancies, previous intrauterine growth restriction (IUGR) and some maternal conditions.
- A clinical assessment of amniotic fluid can be made during abdominal palpation in the second and third trimesters. Suspicion of either oligohydramnious or polyhydramnios needs referral for ultrasound evaluation.

ADDITIONAL EVIDENCE POINTS

- Non-invasive fetal genotyping using maternal blood is now possible for many blood cell antigens. This test should be performed in the first instance for the relevant antigen when maternal red cell antibodies are present (RCOG 2014).
- Sickle cell disease remains a high-risk condition. Chase *et al*. (2010) suggested that successful pregnancy outcomes can be achieved for women with SCD and that early access to specialist antenatal care is essential.
- Lalor *et al*. (2008) reviewed trials that compared BPP or MBPP with conventional monitoring (CTG) in outcomes of high- risk pregnancies. They were unable to come to any firm conclusion about the benefits or otherwise of BPP as a test of fetal well-being.

PROFESSIONAL ACCOUNTABILITY

- Midwives need to gain informed consent for all procedures.
- Midwives are required to make timely referral to appropriate members of the multidisciplinary team.
- Midwives need to be aware of national and local guidelines in order to deliver evidence-based care.
- Sensitive counselling and support should be given to the woman and her partner.
- The NMC Code (NMC 2015) requires midwives to document all care, identifying risk to ensure that colleagues who use the records have all the information they need. Therefore, communication is a vital requirement of effective care.

Further Resources

Down's Syndrome Association, http://www.downs-syndrome.org.uk/.

Sickle Cell Society, http://sicklecellsociety.org/.

United Kingdom Thalassaemia Society, http://ukts.org/home.html.

Bleeding in Pregnancy

Any degree of bleeding in pregnancy is not normal and needs urgent attention in order to identify and manage the cause. This cannot always be identified, however antenatal bleeding of unknown origin (ABUO) is by far the most common form of antepartum haemorrhage (Bhandari *et al*. 2014). Antepartum haemorrhage (APH) is defined as bleeding from or in the genital tract that occurs from 24 weeks' gestation and prior to the birth of the baby; placenta praevia and placental abruption are significant causes (RCOG 2011d). Bleeding before the 24th week of pregnancy can be caused by implantation, abortion, hydatidiform mole, cervical lesions, vaginitis and ectopic pregnancy (Hutcherson 2011).

Both RCOG guidelines cited in this section (RCOG 2011d, e) are supported by a comprehensive evidence base. Although both focus mainly on the two most important causes of bleeding in pregnancy, these are not the most common. As APH complicates 3–5% of pregnancies and is the leading cause of perinatal and maternal mortality worldwide, bleeding due to other causes is significant. Studies by McCormack *et al*. (2008) and Bhandari *et al*. (2014) that examined the consequences of antepartum bleeding of unknown origin are therefore also highly relevant.

KEY POINTS

- **Abruption** is more likely to be related to conditions that occur during pregnancy (Yang *et al*. 2009).
- Predisposing risk factors are numerous and include:
  - previous history of abruption;
  - bleeding in the first trimester;
  - pre-eclampsia;
  - fetal growth restriction;
  - non-vertex presentation;
  - polyhydramnios;
  - advanced maternal age;
  - premature rupture of membranes;
  - substance use (RCOG 2011e).
- When placental abruption occurs, a haematoma is formed that separates the placenta from the maternal vascular system. The bleeding can be revealed or concealed or a combination of both. Note that blood loss is often underestimated.
- The uterus will be hard and woody on palpation and may be tender, and the woman usually experiences pain. Blood loss is darker than that seen in placenta praevia (Yerby 2010c).
- **Placenta praevia** is implicated in one-third of all cases of APH and is more likely to be related to conditions that existed prior to pregnancy (Yang *et al*. 2009). It is a consequence of unusual development and implantation of the placenta, including vasa praevia[2] and velamentous cord insertion. Vasa praevia is associated with significant risk to the fetus. The loss of small amounts of blood can have a major impact on the fetus given that the fetal blood volume at term is around 80–100 ml/kg (Blackburn 2013).
- Risk factors include:
  - placental anomalies;
  - multiple pregnancy;
  - *in vitro* fertilisation (RCOG 2011e);

[2] Vasa praevia describes fetal vessels that run through the membrane unprotected by placental tissue or the umbilical cord.

  - previous caesarean section;
  - maternal age;
  - previous placenta praevia (Yerby 2010c).
- Placenta praevia is classified by the degree to which the placenta covers or partially covers the internal cervical os. If the placenta wholly covers the os then it is considered major praevia. If the leading edge of the placenta is in the lower uterine segment but not covering the os, it is classified as minor or partial praevia (RCOG 2011e).
- Marginal to major signs and symptoms of placenta praevia include: a painless, bright red blood loss, a non-tender or tense abdomen, fetal malpresentation and a non-engaged presenting part (RCOG 2011e).
- APH, particularly major haemorrhage in cases of abruption, can result in fetal hypoxia and abnormalities of the fetal heart pattern in addition to maternal collapse.
- Disseminated intravascular coagulation (DIC) is a significant concern when haemorrhage occurs.
- All women at risk of pre-term birth between 24 and 34+6 weeks should be given antenatal corticosteroids to reduce neonatal morbidity.
- A Kleihauer test should be taken in all cases when women are RhD negative in order to determine the dose of anti-D immunoglobulin required (see Section 1.3.1).

ESSENTIALS OF MIDWIFERY CARE Both of the RCOG Green-top Guidelines (RCOG 2011d,e) offer care management guidance for antepartum haemorrhage. A summary is provided below to aid revision:

- Women should be made aware of the importance of reporting any blood loss during pregnancy.
- Women need to be aware early in pregnancy that pregnancy can be unpredictable and, if haemorrhage is significant, a transfusion may be necessary.
- Anti-D should be given to all RhD-negative women in addition to any routine prophylactic doses already given.
- Women should be managed according to their individual needs.
- Midwives need to be aware of predisposing causes and risks associated with both placental abruption and placenta praevia.
- Women should be advised and encouraged to change modifiable risk factors such as smoking and drug use.
- Midwives need to be vigilant and aware that trauma may be a result of domestic violence (see Section 4.2).
- Haemoglobin levels below the normal UK range for pregnancy should be investigated and iron supplementation considered.
- Midwives need to be aware that young, fit, pregnant women with significant haemorrhage compensate remarkably well and therefore hypotension is always a very late sign of hypovolaemia (Paterson-Brown and Bamber 2014).
- A multidisciplinary team, including midwifery, obstetric, neonatal and anaesthetic staff, and haematology are required.
- When haemorrhage is significant, blood tests are required for full blood count (FBC) and coagulation screen, cross-match, urea and electrolytes and liver function tests (LFTs).
- Blood transfusion requirements should be based on full clinical assessment as initial haemoglobin levels may not reflect the amount of blood loss.

- Antenatal haemorrhage of unknown origin poses particular challenges; however, all women who present with bleeding in pregnancy should be referred for prompt consultant review.
- Placental location is usually identified at routine ultrasound scanning at 20 weeks. Definitive diagnosis of placenta praevia relies on follow-up imaging and this can influence the management of care.
- Vaginal and rectal examination should be avoided for women with placenta praevia and they should be advised against penetrative sexual intercourse.
- Blood loss can be defined as:
  - spotting;
  - minor, <50 ml that has settled;
  - major, 50–100 ml, with no signs of clinical shock;
  - massive, >1000 ml and/or signs of clinical shock.
- Clinical shock and the presence of fetal compromise or fetal demise are important indicators of volume depletion.
- The midwife must be aware of any signs or predisposing risk of DIC and be aware of the signs of coagulation failure (Hutcherson 2011).
- In cases of hypovolaemic shock, fluid replacement and correction of lost coagulation factors are essential (Ferns 2007).
- Emergency delivery may be indicated to aid resuscitation of the woman, as the gravid uterus limits venous return and cardiac output and also limits the effectiveness of cardiac compressions (Billington and Stevenson 2007).
- The fetal heart rate should be assessed once the woman is stable or resuscitation has commenced. The appropriate mode of delivery can then be determined.

PROFESSIONAL ACCOUNTABILITY

- Appropriate and prompt action and referral are essential in all cases of bleeding in pregnancy.
- Transfer to delivery suite rather than A&E is required for all women experiencing APH in the community. Delivery suite should be alerted in order to ensure that the appropriate multiprofessional team is in attendance.
- Midwives should be aware of current local and national guidelines for the management of obstetric haemorrhage and attend regular emergency skills drills to optimise timely and effective care.
- Documentation and communication are essential.
- Women, their families and the midwives caring for them may welcome debriefing.
- The NMC Code (NMC 2015) charges all nurses and midwives to work within their limits of competence … *to make timely and appropriate referral to another practitioner when it is in the best interest of the individual needing any action, care or treatment*.

Fetal Growth and Development

The potential for new life begins at fertilisation and culminates with the birth of the baby. This remarkable journey begins when two gametes unite and takes around 266 days (38 weeks), during which time the transformation from zygote to embryo is complex. The development from embryo to fetus takes almost 9 weeks and results in the formation of all the major body systems. External features become established and begin to develop and a recognisable human being can be seen on ultrasound scan.

Growth throughout the fetal period is rapid and there is further differentiation of body structures and a gradual increase in functionality by week 20. From 20 weeks to term, further maturation of organ body systems occurs. This growth and development are dependent on factors such as genetic determination, maternal health and nutrition, availability of growth substrates, hormones and vascular support via the placenta (Moore and Persaud 2003a; Blackburn 2013). Clinically, the gestational period of embryonic and fetal development is calculated from the first day of the last menstrual period, which equates to 280 days (40 weeks) and is divided into three trimesters.

KEY POINTS

- *Week 9*: The crown–rump length is approximately 5 cm. The head is large and measures half the fetal crown–rump length. External genitalia are not distinguishable and intestinal coils may still be outside the body cavity. The eyes are fused and the ears are low set.
- *Week 10*: Intestinal coils have all re-entered the body cavity. If this does not occur, the abdominal wall fails to close and the baby is born with exomphalos or gastroschisis.
- *Week 12*: The fetal length has more than doubled. The upper limbs have reached a length proportional to the fetal trunk; however, the lower limbs remain short. External genitalia begin to appear. Erythropoiesis decreases in the liver and now begins in the spleen. Formation and excretion of urine begin and the fetus swallows the amniotic fluid. Primary ossification centres of the skull and long bones develop and the beginning of fetal muscle movement occurs.
- *Weeks 13–16*: These are a period of rapid growth. The head is now proportionally smaller than the trunk and the lower limbs are nearing their correct proportions. There is active ossification of the skeleton and coordinated limb movements now occur. The eyes and ears are closer to normal positions and slow eye movements begin. External genitalia are now apparent and the differentiated ovaries contain primordial follicles.
- *Weeks 17–20*: Fetal growth slows. Limbs reach mature proportions and fetal movements are felt by the mother. The skin is covered in a protective layer of vernix caseosa. Lanugo covers the whole body by 20 weeks and hair and eyebrows are visible. Brown fat deposits are formed.
- *Weeks 21–25*: The fetus gains weight but the skin lacks subcutaneous fat and is therefore wrinkled, red and translucent. The fetus now has periods of sleep and activity. Rapid eye movement begins and blink–startle responses to sound occur. Surfactant secretions begin and although the respiratory system remains immature the fetus may still be viable if born prematurely. Fingernails are present.
- *Weeks 26–29*: The central nervous system can control breathing and intrauterine respiratory movements are made. The lungs are capable of breathing air, allowing gaseous exchange. Erythropoiesis moves from spleen to bone marrow. White subcutaneous fat is laid down under the skin. Head and lanugo hair is well established, eyes are open and toenails are visible.
- *Weeks 30–34*: White fat increases and now constitutes up to 8% of body weight. The skin is pink, opaque and smooth. Pupillary light reflex is present and lanugo disappears from the face. The fetus begins to store iron from 32 weeks. Most fetuses born at this gestation will survive.

- *Weeks 35–40*: The circumferences of the head and abdomen are approximately the same. By 38 weeks, body fat is about 16% of the body weight. The skin appears bluish pink and body lanugo disappears. Breast tissue is present in both sexes and, in the male, testes are in the scrotum. Nails reach the tips of the fingers and the fetus will have a firm grasp. (Moore and Persaud 2003a, b; Stables 2010; Coad and Dunstall 2012).
- Maternal conditions known to be associated with poor fetal growth and development include hypertension, chronic renal disease, diabetes, sickle cell anaemia, severe cardiac disease and malnutrition.
- Any condition that restricts placental perfusion and blood flow can have an adverse effect. When blood flow is poor, the blood is redirected to the brain at the expense of other tissue, resulting in asymmetric growth. This redistribution does not completely protect brain function so some abnormal neurological development may occur (Coad and Dunstall 2012).
- Other conditions that affect fetal growth and development include hyperthyroidism, hypothyroidism and phenylketonuria.
- Alcohol, smoking and drug misuse are all known to have adverse effects on the developing fetus.
- The list of teratogenic agents that can affect growth and development is vast and their pathological consequences can have varying degrees of severity. Moore and Persaud (2003a) gave a detailed account of these and a useful timeline of the most critical and sensitive periods of development.
- The effect of drug exposure on the developing fetus depends on several factors, such as timing of exposure, dosage, concomitant maternal disease and genetic susceptibility.
- Some infections are also known to have an adverse effect on the developing fetus (see Section 1.7).
- The causes of most common anomalies in growth and development can be categorised as malformation, disruption or deformation.
  - **Malformation** is a morphological defect that results from an intrinsically abnormal developmental process, such as a chromosomal abnormality.
  - **Disruption** occurs when there is an interference with an originally normal developmental process, as in exposure to drugs or viruses; for example, congenital amputation of an extremity or a facial cleft caused by amniotic bands (a disruption cannot be inherited).
  - **Deformation** is usually the result of mechanical forces that affect the form, shape or position of a body part, such as equinovarus foot (Moore and Persaud 2003b).

ESSENTIALS OF MIDWIFERY CARE Many factors can affect the growth and development of the fetus and it is important that the midwife is aware of this when assessing risk and planning care.

- Women with pre-existing medical conditions that require medication need urgent referral to obstetric and specialist members of the multidisciplinary team. Ideally, these women should seek pre-conceptual care as some medications are known teratogens.
- It is essential that clinicians use correct terminology when referring to fetal growth. Small for gestational age and fetal growth restriction are not the same:
  - Fetuses with a weight <10th percentile are not necessarily growth restricted – they may be healthy but constitutionally small.
  - Weight >10th percentile does not necessarily indicate 'normal' fetal growth. The fetus may undergo a pathological decline but still remain above the 10th percentile. The term fetal growth restriction is then appropriate.

- The introduction of individualised growth charts has, to some extent, aided clarity in terms of the progression of normal growth (Zhang *et al*. 2010).

PROFESSIONAL ACCOUNTABILITY

- Timely and appropriate referral is essential if there are any concerns regarding fetal growth and development. Accurate, contemporaneous documentation should reflect all care and referrals.
- The midwife should have a good understanding of screening and diagnostic procedures available and the different methods employed to monitor fetal health.
- Midwives are required to facilitate, respect and support maternal choice.
- The midwife should be aware of relevant legislation regarding human fertilisation and embryology.

Further Resources

Pardi, G. and Cetein, I. (2006) Human fetal growth and organ development: 50 years of discoveries. *American Journal of Obstetrics and Gynecology*, **194** (4), 1088–1099.

This interesting paper discusses developments in our knowledge of intrauterine growth and development over the past 50 years. It focuses on a 'progressive walk backwards' in terms of a deeper understanding of anatomy, function and fetal diseases.

Gestational Diabetes Mellitus

Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance that is first diagnosed during pregnancy. Its diagnosis may represent previously undiagnosed type 1 or type 2 diabetes and may predispose women to type 2 diabetes later in life (Mielke *et al*. 2013). Diagnosis of GDM places women in a higher risk category, requiring care from a multidisciplinary team. Although NICE (2014b) antenatal care guidelines do not recommend routine testing for glycosuria, screening for gestational diabetes and assessment of risk factors are recommended.

KEY POINTS

- Maternal physiological changes to ensure fetal growth and development, the transition to extrauterine life and to meet increasing maternal demands require major changes in metabolic processes and endocrine function.
- Human placental lactogen (hPL), oestrogen and progesterone in particular influence metabolic changes by altering glucose utilisation and insulin action. These changes contribute to the diabetogenic effects of pregnancy and can predispose to GDM (Blackburn 2013).
- Pregnancy causes an increase in insulin resistance resulting in altered glucose metabolism. Women with GDM also have decreased numbers of insulin receptors and decreased binding of insulin to target cells, which result in a progressive alteration in glucose tolerance (Blackburn 2013).
- GDM commonly manifests from 20 weeks' gestation when increasing levels of placental hormones block the body's ability to use insulin effectively (Wylie and Bryce 2008; Robson and Waugh 2013).
- Glycosuria is a poor predictor of GDM and usually reflects the hyperfiltration which occurs in pregnancy (Robson and Waugh 2013).
- Diagnosis of GDM is made by an oral glucose tolerance test (a drink containing 75 g of glucose is given and blood samples are taken).
- Gestational diabetes is diagnosed if the woman has either:
  - a fasting plasma glucose level of 5.6 mmol/l or above; or
  - a 2-hour plasma glucose level of 7.8 mmol/l or above (NICE 2015b).
- Poor blood glucose control throughout pregnancy will increase the risk of fetal macrosomia, shoulder dystocia and trauma during birth for the woman and her baby; also, induction of labour and/or caesarean section, neonatal hypoglycaemia and perinatal death.
- Mielke *et al*. (2013) identified that women with GDM experience intensive monitoring during pregnancy, yet often felt that concern for their health and that of their newborn dissipated soon after giving birth.

ESSENTIALS OF MIDWIFERY CARE NICE (2015a) offers a number of recommendations for the care and support of women, including:

- Risk factors for gestational diabetes should be determined at the booking appointment. These include:
  - BMI >30 kg/m^2;
  - previous macrosomic baby weighing 4.5 kg or above;
  - previous gestational diabetes;
  - first-degree relative with diabetes;
  - family origin with a high prevalence of diabetes (South Asian, Black Caribbean and Middle Eastern).

- Women need to be fully informed of the risks associated with gestational diabetes in order to make decisions about their care.
- Offer early self-monitoring of blood glucose or a 2-hour 75 g oral glucose tolerance test (OGTT) at 16–18 weeks to test for gestational diabetes if the woman has had gestational diabetes previously, followed by OGTT at 28 weeks if the first test is normal.
- Offer an OGTT at 24–28 weeks if the woman has any other risk factors.
- Some women with GDM will respond well to lifestyle changes; for example, a low glycaemic diet and exercise may help minimise the increase in insulin resistance.
- Women with a BMI >27 kg/m^2 should be encouraged and supported to lose weight.
- Oral hypoglycaemic agents or insulin therapy may be needed if diet and exercise do not control and maintain blood glucose targets over a period of 1–2 weeks.
- Extra monitoring and care may be needed during pregnancy (and labour). If an ultrasound scan shows incipient fetal macrosomia, then hypoglycaemic therapy should be considered for women with gestational diabetes.
- All women will need referral to the multidisciplinary team, including a dietician and specialist midwife/nurse, who will advise the woman regarding self-monitoring of blood glucose and individualise targets for blood glucose and regimes/doses of hypoglycaemic therapy.
- The midwife plays a key role within the multidisciplinary team to ensure that information regarding the normal aspects of a pregnancy is not lost within a medical model of care (Abayomi *et al*. 2013).
- Ensure that the woman has contact details should she become unwell or have concerns about fetal movements.
- Psychological support and advice should be offered and any reassurance should be realistic.

PROFESSIONAL ACCOUNTABILITY

- Regular communication with the woman and the multidisciplinary team is essential for effective care.
- The NMC Code (NMC 2015) requires midwives and nurses to communicate effectively and urges us to *take reasonable steps to meet people's language and communication needs*. This is particularly pertinent given that one of the risk factors is family origin and some women may not have English as their first language.
- Midwives must ensure that care is evidence based and that they are familiar with national and local guidelines.
- All care plans, including those for birth, should be made in partnership with the woman and documented in her notes.

Further Resources

NHS Choices. *Diabetes and Pregnancy*,
http://www.nhs.uk/conditions/pregnancy-and-baby/pages/diabetes-pregnant.aspx#close.

Infections in Pregnancy

Pregnancy poses a significant immunological challenge to the mother's immune system. Although most women are not immunocompromised, suppression of cell-mediated immunity means that some infections are a cause for concern and can place the woman, fetus and neonate at increased risk (Blackburn 2013). Routine screening for some infections in pregnancy is therefore recommended by NICE (2014b) and the Department of Health (DOH 2014).

NICE (2014b) recommends routine infection screening in early pregnancy for hepatitis B virus, HIV, rubella susceptibility and syphilis. Screening for other infections such as asymptomatic bacterial vaginosis, chlamydia, cytomegalovirus, hepatitis C, group B streptococcus and toxoplasmosis is not routinely offered, mainly due to insufficient evidence to support its clinical and cost effectiveness. However, investigation of these infections can be undertaken on an individual needs basis. The acronym TORCH (Toxoplasmosis, Other, Rubella, Cytomegalovirus and Herpes) can be used to remind midwives of some of the infections that can affect the mother and fetus. The following is an overview of these and other infections that are known to have adverse effects on the fetus, mother and the neonate (see also section 4.5).

Hepatitis B Virus (HBV)

KEY POINTS

- Hepatitis B virus is highly infectious and can be found in the blood and body fluids of infected women.
- Affecting the liver, it can cause acute and chronic illness and key complications include liver cirrhosis, liver failure and hepatocellular carcinoma (Robson and Waugh 2013).
- Hepatitis B is diagnosed by a blood test that shows a positive reaction to the hepatitis B surface antigen (HBs Ag). This indicates that the disease is highly infectious and that there is a 70–90% probability of vertical transmission (UK National Screening Committee 2010).

ESSENTIALS OF MIDWIFERY CARE NICE (2013) provides comprehensive guidance for the care of those with chronic hepatitis B. The DOH (2011) recommends hepatitis B antenatal screening and a newborn immunisation programme in their best practice guidance. A summary drawn from both is offered below to aid revision:

- Pregnant women should be offered screening so that interventions that decrease the risk of vertical transmission from mother to fetus can be offered where infection is present.
- If hepatitis B is identified, referral to an obstetrician and specialist physician, for example a hepatologist, gastroenterologist or infectious disease specialist, is required within 6 weeks of the screening test results.
- Women who book for antenatal care beyond 24 weeks' gestation should be referred immediately for clinical evaluation.
- Women should be counselled about the risks to partners and other family members.
- Women should be aware of the importance of vaccination for the baby and that a four-dose regime is required: the first dose within 24 hours of birth, then one at 1 month, at 2 months and at 1 year.
- Woman should be given advice regarding breastfeeding, including abstinence of breastfeeding if nipples are cracked or bleeding (Robson and Waugh 2013).

Syphilis

KEY POINTS

- Syphilis is caused by *Treponema pallidum*, a spirochaete bacterium that enters the body through a break in the skin and is acquired by direct sexual contact.
- The progress of the infection is described in stages. The primary stage can be overlooked as chancres[3] are painless and often difficult to see (Gould and Brooker 2008).
- *Treponema pallidum* readily crosses the placental membranes early in pregnancy and therefore infection is transmitted to the fetus.
- The fetus can become infected at any stage of the disease or at any stage of pregnancy.
- Infection can cause spontaneous miscarriage, stillbirth and congenital syphilis.
- Primary maternal infection (acquired during pregnancy) almost always causes serious fetal infection. Congenital syphilis anomalies include hydrocephalis, congenital deafness, intellectual disability and abnormal teeth and bones.
- Secondary maternal infection (acquired before pregnancy) rarely results in fetal disease or anomalies.
- Appropriate treatment of the mother kills the organism and prevents transmission across the placenta.
- Early detection through screening permits prompt treatment that prevents vertical transmission.

ESSENTIALS OF MIDWIFERY CARE NICE (2014b) provides recommendations for practice that include the following:

- Screening for syphilis should be offered to all pregnant women early in pregnancy.
- A positive result does not always mean that the woman has syphilis and repeat testing may be required.
- Women who screen positive should be referred for assessment and treatment by a genitourinary specialist within the multidisciplinary team.
- Women booking late who screen positive should be referred immediately for clinical evaluation and treatment.
- Midwives and women need to be aware that the earlier the maternal infection occurs, the greater is the effect on the fetus.

HIV

KEY POINTS

- Human immunodeficiency viruses (HIV-1 and HIV-2) are ribonucleic acid (RNA) retroviruses that multiply aggressively.
- Infection of the CD4T lymphocytes (essential components of the immune system) occurs, which progressively destroys the immune system (Gould and Brooker 2008).
- This gradual deterioration in immune function leaves the body susceptible to any form of infection (Robson and Waugh 2013).
- The virus is transferred by infected blood and body fluids from one person to another and through vertical transmission from infected mothers to infants.

[3] Common name given to the painless ulcer that presents in stage 1 of the infection.

- Antibodies appear about 3 months after exposure and HIV infection usually progresses in four stages, the full manifestation of the disease being acquired immune deficiency syndrome (AIDS).
- HIV crosses the placenta, a significant route for transmission, as are mode of delivery and breastfeeding.
- Prompt HAART (highly active antiretroviral therapy) is available to prevent vertical transmission. Without treatment, there is a one in four chance the baby will become infected with HIV.
- Women who are HIV positive have a small increased risk of miscarriage, stillbirth, fetal abnormality, IUGR, low birth weight and premature delivery (Robson and Waugh 2013).

ESSENTIALS OF MIDWIFERY CARE NICE (2014b) offers some basic guidance but the need for sensitive care from a midwife that addresses all the woman's needs is essential:

- Women should be offered screening for HIV early in pregnancy because appropriate intervention can reduce mother-to-child transmission of HIV infection.
- Those women who know they are HIV positive or screen HIV positive require referral for consultant care and care from appropriate members of the multidisciplinary team.
- Women should be well informed of delivery options and be actively involved in a plan of care for delivery. Vaginal birth may be an option for women with a low viral load.
- The midwife should provide sensitive advice regarding infant feeding. Breastfeeding is not advised because of the risk of vertical transmission.

Rubella

KEY POINTS

- Rubella is caused by a togavirus and is spread by droplet infection.
- Infection is transmitted from 1 week before the symptoms develop and for up to 4 days after the rash first appears.
- The rubella virus crosses the placenta hence infection is significant in pregnancy as the virus disrupts fetal development (see Section 1.5). The risk of congenital rubella defect is high during the first 20 weeks of pregnancy particularly if contracted during the first 12 weeks of pregnancy.
- Features of congenital rubella syndrome include cataracts, cardiac defects and deafness.
- The risk of anomalies when infection occurs during the second and third trimesters is lower, although functional defects to the central nervous system and internal ear and eye may occur (Moore and Persaud 2003a).
- Babies born with congenital rubella are highly infectious and may excrete rubella virus in the urine for up to 12 months. Babies require follow-up observation as neurological disorders may not be immediately obvious (Bates 2011).

ESSENTIALS OF MIDWIFERY CARE NICE (2014b) offers some guidance but an understanding of immunological responses is useful when interpreting screening results:

- Rubella susceptibility screening should be offered to all women early in pregnancy.
- If rubella infection is suspected, a blood test should be obtained. Presence of IgM antibodies indicates a new rubella infection whereas the presence of IgG antibodies indicates past infection or immunisation. If both are absent, then this indicates neither infection nor immunity from the virus (DeSantis *et al*. 2006).
- Women who are not immune should be offered vaccination in the postnatal period.

- Women should be made aware of the risks of rubella infection in pregnancy and the infectious status of babies born with congenital rubella (Public Health England 2014).

Other Infections in Pregnancy
Chicken Pox

KEY POINTS

- Varicella zoster virus is a DNA virus of the herpes family and is responsible for chickenpox.
- It is highly contagious and is transmitted by respiratory droplets and by direct contact with vesicle fluid or indirectly via fomites such as skin cells, hair, clothing and bedding.
- The incubation period is between 1 and 3 weeks and the disease is infectious 48 hours before the rash appears and continues to be infectious until the vesicles crust over.
- Following the primary infection, the virus remains dormant but can be reactivated later in life and cause shingles.
- Pregnant women with no or uncertain history of chickenpox who have been exposed to infection should be tested to determine immunity.
- If the non-immune woman has had significant exposure, then varicella zoster immunoglobulin should be given and is effective when given up to 10 days after contact (Robson and Waugh 2013).
- Varicella infection in the pregnant woman is associated with pneumonia, hepatitis and encephalitis and, rarely, may result in death.
- The effect of maternal varicella infection on the fetus is determined by gestational age at the time of infection.
- Maternal varicella infection in the first 20 weeks of pregnancy results in congenital varicella syndrome in about 20% of neonates, causing chorioretinitis, skin lesions, skeletal abnormalities, encephalitis and neurological damage.
- Maternal infection developing within 5 days before or 2 days after delivery has serious implications because the fetus is unprotected by maternal antibodies and the viral dose is high.
- Maternal varicella pneumonia complicates10–20% of cases of chickenpox in pregnancy (Lamont *et al*. 2011).

ESSENTIALS OF MIDWIFERY CARE The RCOG Green-top Guideline (RCOG 2015b) provides comprehensive guidance regarding care and treatment, including the following:

- Women should be asked about previous chickenpox/shingles infection at booking.
- Women who have not had chickenpox or are known to be seronegative for chickenpox should be advised to avoid contact with chickenpox or shingles during pregnancy and to inform the midwife or GP should exposure occur.
- A pregnant woman who develops chickenpox should be isolated from other pregnant women.
- Varicella vaccination is an option pre-pregnancy or postnatally for women who are found to be seronegative.
- Oral acyclovir should be prescribed for pregnant women with chickenpox if they present within 24 hours of the onset of the rash and if they are beyond 20 weeks' gestation. Before 20 weeks' gestation it should be considered with caution.
- Timing and mode of delivery must be individualised.

- Pregnant women with varicella zoster virus are at risk of pneumonia and should be hospitalised for monitoring and to initiate antiviral therapy (Lamont *et al*. 2011).
- Babies should be given varicella zoster immunoglobulin to reduce the risk of serious complications, including hepatic disorders and pneumonia.
- Acyclovir can be given to the neonate prophylactically.

Toxoplasmosis

KEY POINTS

- Toxoplasmosis is caused by the protozoan parasite *Toxoplasma gondii* and is a common parasitic infection.
- It occurs when infected meat is consumed or during contact with infected pets or livestock. Cats frequently harbour *T. gondii* (Gould and Brooker 2008) and their faeces can contaminate soil for up to 18 months (Robson and Waugh 2013).
- Infection is usually asymptomatic or may result in mild flu-like symptoms.
- The *T. gondii* organism crosses the placenta and infects the fetus, causing destructive changes in the brain and eye and other anomalies (Moore and Persaud 2003a).
- The risk of adverse outcome is highest following exposure in the first trimester of pregnancy. First and second trimester infection can cause miscarriage; third trimester infection can cause stillbirth.
- Clinical signs of neonatal toxoplasmosis include low birth weight, enlarged spleen and liver, hydrocephalus, jaundice and anaemia.
- A large percentage of congenitally infected infants will be asymptomatic at birth but many will develop complications including seizures and reduced cognitive function over time (Bates 2011).
- Diagnosis can be confirmed by history of clinical symptoms and antibody testing.

ESSENTIALS OF MIDWIFERY CARE NICE (2014b) guidelines do not recommend routine antenatal serological screening for toxoplasmosis. However, they advise that pregnant women should be informed of primary prevention measures:

- Midwives need to advise women to seek medical advice if they feel unwell as symptoms can be mistaken for other illness.
- Women should be aware that infection can also be asymptomatic.
- Midwives should inform women how the infection can be acquired and to take all reasonable precautions, such as:
  - hand washing;
  - thoroughly washing all fruit and vegetables;
  - cooking all raw and ready prepared meals thoroughly;
  - wearing gloves and thoroughly washing hands after gardening;
  - avoiding cat faeces in cat litter or in soil.
- Referral to the multidisciplinary team for advice on treatment is required where infection is present. Spiramycin can be used to reduce the risk of transmission of the infection. Other medication is required if tests reveal fetal infection (Robson and Waugh 2013).

Listeriosis

KEY POINTS

- Listeriosis is caused by the Gram-positive bacillus *Listeria monocytogenes*.
- It is a food-borne pathogen found throughout the environment in soil and water and also on vegetation.

- Most people develop immunity through exposure to the bacteria in the environment and some are asymptomatic carriers.
- Infection occurs with consumption of contaminated food and the incubation period is 7–70 days.
- Infection in pregnancy may be asymptomatic or women may develop flu-like symptoms.
- *Listeria* crosses the placenta and can cause spontaneous miscarriage, pre-term labour, amnionitis, stillbirth or delivery of an acutely ill baby.
- Neonatal listeriosis is classified as early or late onset. In early onset the infant has a widespread rash with septicaemia, pneumonia and meningitis. With late-onset listeriosis, meningitis is the most common presentation.
- Diagnosis is made by blood, placenta or liquor cultures and it can be treated with penicillin and erythromycin (Stables 2010; Bates 2011; Robson and Waugh 2013).

ESSENTIALS OF MIDWIFERY CARE

- There is no routine screening for listeriosis in the United Kingdom.
- Women should be advised to seek medical advice if they develop any flu-like symptoms.
- Midwives need to make women aware of the causes and risks associated with listeria.
- Women should be given information about the possible sources of infection.
- Consumption of unpasteurised milk, including milk products, brie, camembert and blue vein cheese, undercooked chicken and prepared salads such as coleslaw should be avoided.
- Food hygiene and storage are essential as *Listeria* grows at temperatures as low as 2 °C and multiplies in refrigerated food and at temperatures up to 40 °C (Gould and Brooker 2008).
- If maternal listeriosis is suspected or diagnosed, then referral for treatment together with regular monitoring of maternal and fetal well-being is required.

Cytomegalovirus

KEY POINTS

- Cytomegalovirus (CMV) belongs to the double-stranded DNA herpes family of viruses.
- It is transmitted by contact with infected blood, saliva or urine or by sexual contact (Stables 2010).
- After primary infection it remains latent but may become active if immunity is compromised.
- Infection in pregnancy crosses the placenta.
- If primary infection occurs in pregnancy it may cause abortion, pre-term labour, intrauterine growth restriction or fetal death.
- The greatest risk to the fetus is within the first 20 weeks of pregnancy. The virus may damage the fetal liver and nervous system.
- Clinical signs and symptoms associated with congenital CMV include microcephaly, cerebral palsy, pneumonitis, jaundice, thrombocytopenia and viral shedding.
- A small proportion of infants with congenital CMV will develop one or more physical or mental problems later in life, including hearing loss, visual impairment and learning difficulties.
- Neonatal infection occurs in two thirds of infants born by vaginal delivery.
- CMV can pass via breast milk; however, the benefits of breastfeeding outweigh the risk. One exceptional circumstance is prematurity (Bates 2011).

ESSENTIALS OF MIDWIFERY CARE

- Women should be advised to seek medical advice if they develop any flu-like symptoms.
- Midwives need to make women aware of the causes and risks associated with CMV.
- Midwives can endorse good levels of hygiene such as hand washing before preparing and eating food, before and after going to the toilet and after changing a baby's nappy.

Herpes Simplex Virus

KEY POINTS

- Herpes simplex virus (HSV) is a DNA virus responsible for cold sores and genital ulceration. HSV-1 is primarily isolated from oral lesions and HSV-2 is primarily isolated from genital lesions (Gould and Brooker 2008).
- Following primary infection the virus remains dormant. Reactivation can be provoked by stress and viral infections.
- The virus is spread by close personal contact, kissing or sexual contact.
- Some women show no clinical signs of infection, with diagnosis made following the appearance of neonatal infection acquired during birth.
- Intrauterine infection during the first 20 weeks of pregnancy can lead to miscarriage, stillbirth and congenital anomalies characterised by skin vesicles or scarring, eye lesions, neurological damage, growth restriction and impaired psychomotor development.
- Genital infection may lead to serious neonatal infection. An infected baby may develop localised lesions, encephalitis or generalised herpes infection, including viraemia, liver dysfunction and coagulopathy.
- Treatment should commence as soon as diagnosis is made by culture of the virus from affected skin and blood testing for specific antibodies.
- The infected neonate requires treatment with systemic acyclovir.

(Straface *et al*. 2012; Robson and Waugh 2013).

ESSENTIALS OF MIDWIFERY CARE Robson and Waugh (2013) suggest that:

- A history of HSV infection should be obtained at booking and the woman should be advised to report any symptoms of genital herpes.
- Swabs should be obtained to confirm diagnosis and genitourinary referral should be part of care.
- If lesions are present within 6 weeks of delivery, blood tests should be taken to compare the presence of antibodies. If they are of the same type as isolated from the genital swab, this could confirm an episode of primary infection or recurrent origin.
- General hygiene advice and advice regarding pain relief should be given.
- Mode of delivery should be discussed.
- Counselling and support should be offered.

Erythrovirus (Parvovirus) B19

KEY POINTS

- This is also known as slapped cheek syndrome and fifth disease.
- Human parvovirus B19 is a small, single-stranded, non-enveloped DNA virus and a member of the Parvoviridae family.
- It is responsible for erythema infectiosum (fifth disease), the erythrovirus being a potent inhibitor of erythropoiesis.

- Infection usually occurs through respiratory droplets and hand-to-mouth contact but can also be transmitted by blood, blood-derived products and the placenta.
- Viraemia occurs 4–14 days after exposure and may last for up to 20 days.
- A rash may begin around day 15 by which time the person is usually no longer infectious. Many remain asymptomatic.
- Infection with parvovirus B19 during pregnancy can cause miscarriage and serious fetal complications.
- Parvovirus B19 has been associated with intrauterine death, non-immune hydrops fetalis, thrombocytopenia, myocarditis and neurological manifestations. However, there are few reports of congenital anomalies.
- The interval between maternal infection/viraemia and the occurrence of fetal hydrops is often 4–5 weeks.
- Timely intrauterine fetal transfusions may improve fetal outcomes (de Jong *et al*. 2011).

ESSENTIALS OF MIDWIFERY CARE

- Women should be made aware that parvovirus B19 can be problematic and to seek medical advice. Early referral for diagnosis, monitoring and treatment is essential in the management of complications.
- Some reassurance can be given as 50% of children over 15 years of age have detectable B19 IgG, and many women will therefore be immune.
- Midwives need to be aware that parvovirus B19-specific antibodies become detectable within 7–10 days after infection and therefore before signs are apparent (de Jong *et al*. 2011).

Streptococcal Infection

Streptococci are Gram-positive, chain-forming cocci classified by Rebecca Lancefield in 1933 into sub-groups A–S. Lancefield groups A and B are of most significance in childbearing (Gould and Brooker 2008; Robson and Waugh 2013).

Group B streptococcus (GBS)

KEY POINTS

- Group B streptococcus (GBS) or *Streptococcus agalactiae* is a commensal found in the gastrointestinal tract and vagina in 15–30% of woman in the United Kingdom (Feldman 2001).
- GBS is a common cause of meningitis, septicaemia and pneumonia in the newborn infant. Early-onset infection is defined as infection at less than 7 days of age and late-onset infection occurs between 7 and 90 days.
- Infection can occur *in utero* when the organism's enzymes make microscopic holes in the amniotic sac, allowing passage to the amniotic fluid or at delivery.
- Many women are asymptomatic carriers although it may cause urinary tract infection (Gould and Brooker 2008). Therefore, GBS is often identified through opportunistic analysis of a midstream specimen of urine and can be treated.
- Antenatal prophylaxis with oral benzylpenicillin for vaginal/rectal colonisation does not reduce the likelihood of GBS colonisation at the time of delivery.
- GBS bacteriuria is associated with a higher risk of chorioamnionitis and therefore serious maternal and neonatal morbidity.
- Intrapartum antibiotic prophylaxis (IAP) is offered to women with recognised risk factors for early-onset GBS, which include known carrier status, previous infant affected with

GBS, prematurity, prolonged rupture of membranes (>18 hours) and maternal fever during labour (>36 °C) (RCOG 2012).

ESSENTIALS OF MIDWIFERY CARE Whereas NICE (2014b) does not recommend routine antenatal screening for group B streptococcus in the United Kingdom, the RCOG (2012) offers guidelines for the prevention of early-onset neonatal group B streptococcal disease which include:

- Midwives need to be aware of the risks to the neonate and therefore timely referral is essential.
- Women presenting with GBS bacteriuria should be treated; GBS identified on a vaginal/rectal swab should not.
- If chorioamnionitis is suspected, a broad-spectrum antibiotic including an agent active against GBS should replace GBS-specific treatment and induction of labour should be considered.
- Antibiotic prophylaxis specific for GBS is not required for women undergoing planned caesarean section in the absence of labour and with intact membranes.
- Women need to be advised to contact the labour ward if they suspect pre-term labour or premature rupture of membranes.
- Immediate induction of labour is indicated for women known to be colonised who present at term with pre-labour rupture of membrane.
- Ideally intravenous antibiotics should be given for at least 4 hours prior to delivery.

ADDITIONAL EVIDENCE POINTS

- Evidence suggests that most hepatitis B immunisation programmes fail to provide full protection for all babies at risk, partly due to the organisation of services. However, it is the uptake of immunisation doses two and four that poses most concern (UK National Screening Committee 2010).
- The British HIV Association offers extensive guidelines for the management of HIV infection in pregnant women and provides guidance on best clinical practice, including the use of antiviral therapy both to prevent mother-to-child HIV transmission and for the welfare of the mother.
- Since the introduction of the MMR vaccine in the 1980s, controversies surrounding its administration to infants may have compromised the percentage of women immune to the rubella virus (Boyle 2011). This is an important consideration as the age group that it affected are now of childbearing age.
- Rubella was the first virus demonstrated to be a teratogen (De Santis *et al*. 2006).
- Lamont *et al*. (2011) outlined the serious nature of varicella zoster virus infection in pregnancy and discussed the role of maternal varicella zoster immunoglobulin administration.
- Elbaz *et al*. (2007) assessed the awareness of both front and second-line staff of parvovirus B19 as a potential and treatable cause of hydrops fetalis. They found that there was a need for education updates on the effect of parvovirus B19 infection during pregnancy.

PROFESSIONAL ACCOUNTABILITY

- Midwives should be aware of local protocols to ensure multidisciplinary links and timely referral.
- The acceptance or declining of all screening and/or treatment should be documented.

- A contemporaneous record of the date and time of any blood samples and swabs taken should be kept. All results and subsequent care plan should be discussed and documented.
- Results should be conveyed to the woman in a sensitive and timely manner.
- The woman's infection status should be appropriately documented in her central hospital record in order to maintain confidentiality.
- Informed consent should be obtained for all aspects of care and this should be documented.
- Some infections in pregnancy can be of a sensitive nature and women need to be treated in a non-judgemental manner. The NMC Code (NMC 2015) urges midwives to treat people with dignity and this translates to empathy, compassion and intelligent kindness.

Further Resources

Health Protection Agency (2004) *"Good Practice" Recommendations for the Prevention of Early Onset Neonatal Group B Streptococcal (GBS) Infection in the UK*, http://www.blf.net/fo/uk_goodpractice_gbs.pdf.

British HIV Association. *Clinical Guidelines*, http://www.bhiva.org/guidelines.aspx.

Public Health England (2014) *Immunisation Against Infectious Disease. The Green Book*, https://www.gov.uk/government/collections/immunisation-against-infectious-disease-the-green-book.

Intrahepatic Cholestasis of Pregnancy

Intrahepatic cholestasis of pregnancy (ICP), also referred to as obstetric cholestasis (OC), is a common form of liver disease unique to pregnancy and is associated with significant perinatal mortality and maternal morbidity. It is characterised by otherwise unexplained pruritus, elevated transaminases and bile acids in the late second half and third trimester of pregnancy, although it has been reported as early as 6–10 weeks' gestation in multiple pregnancies. The exact pathophysiology of ICP is unknown but genetic, endocrine and environmental factors are implicated (Wickström Shemer *et al*. 2013).

KEY POINTS

- ICP is defined as an impairment or cessation of bile flow. Bile acids are a major constituent of bile, hence any degree of suppression leads to a reduction in clearance of bile acids.
- Accumulation of bile acids within the liver increases bile acid levels which may cause widespread pruritus. When the itching involves the palms of the hands and soles of the feet and is typically worse at night, this is particularly suggestive of obstetric cholestasis.
- Differential diagnosis is determined by exclusion of other causes of pruritus and abnormal LFTs, for example, hepatitis A, B and C, biliary cirrhosis, gallbladder disease, duct dilatation and other liver pathology.
- The causal role of oestrogens is unclear; however, the manifestation of IPC in the third trimester when oestrogen levels are high and in multiple pregnancies when oestrogen concentrations are elevated imply a cholestatic response to high levels of oestrogens. Progesterone metabolites have also been implicated in the aetiopathogenesis of ICP (Vallejo *et al*. 2006).
- Women with IPC may experience insomnia, fatigue, depression, upper right quadrant discomfort, nausea, vomiting, weight loss and jaundice. Malabsorption of fat-soluble vitamin K can predispose to postpartum haemorrhage.
- Fetal compromise is caused by an increase in the flow of bile from the mother to the fetus together with a reduced ability of the fetus to eliminate toxic bile acids synthesised by its own liver (bile acids are synthesised by the fetal liver from around 12 weeks).
- Bile acid levels above 40 μmol/l are associated with an increased incidence of meconium-stained liquor. Geenes *et al*. (2013) identified a significant correlation between maternal serum bile acid levels and adverse fetal outcomes.
- Bile acids have a dose-related effect on myometrial contractility which may explain the increased incidence of spontaneous pre-term labour.
- Ursodeoxycholic acid (UDCA) improves pruritus and liver function in women with IPC.

ESSENTIALS OF MIDWIFERY CARE The RCOG Green-top Guideline (RCOG 2011b) offers evidence-based recommendations for care, a summary of which is offered below to aid revision:

- Intrahepatic cholestasis of pregnancy requires referral to obstetric lead care although midwifery care and reassurance are essential.
- A thorough history of current and previous pregnancies should be obtained. Other indicators of IPC include pale stool, dark urine and jaundice.
- Midwives should have a high index of suspicion when women present with pruritus.
- Pruritus may occur for days or weeks before the development of abnormal liver function. Persistent, unexplained pruritus and normal biochemistry (LFTs) should be measured every 1–2 weeks.
- Some temporary relief from pruritus may be gained from topical emollients.
- Psychological support and advice regarding the relief of pruritus should be given.

- Discussion should take place with the woman regarding the use of vitamin K, ursodeoxycholic acid, elective early delivery and the increased risk of caesarean section (Gurung *et al*. 2013).
- Ultrasound and cardiotocography are not reliable methods for preventing fetal death in ICP (RCOG 2011b). Increased maternal vigilance of fetal movement patterns should be encouraged (Robson and Waugh 2013).

ADDITIONAL EVIDENCE POINTS

- Geenes *et al*. (2013) identified a significant relationship between maternal serum bile acid levels and pre-term delivery, spontaneous pre-term birth, stillbirth and meconium-stained liquor.
- Chappell *et al*. (2012) suggested that a large-scale trial is needed to test whether ursodeoxycholic acid reduces adverse perinatal outcomes.

PROFESSIONAL ACCOUNTABILITY

- Midwives should be aware of current best evidence and their local trust guidelines.
- Midwives need to be competent in their clinical and technical knowledge base in order to deliver effective care.
- A plan of care for pregnancy and birth should be made in partnership with the woman.
- All care and plans of care should be accurately documented in the notes.
- Psychological support and advice regarding the condition should be given and any reassurance should be realistic.

Minor Disorders of Pregnancy

Minor disorders of pregnancy are rarely life threatening but can be the cause of discomfort and distress for many women. Causes fall into four main categories and are in response to the growing fetus: hormonal changes, accommodation changes, metabolic changes and postural changes (Blackburn 2013). Some minor disorders are more troublesome in the early weeks of pregnancy and may disappear as pregnancy progresses. Others can be problematic for the woman throughout pregnancy. Most body systems are affected by the demands of the growing fetus; however, many common disorders are linked to pregnancy adaptations to the digestive system and these are the primary focus below.

KEY POINTS

- **Nausea and vomiting** (N and V) affect 50–80% of pregnant women and are usually a self-limiting disorder caused by rising levels of human chorionic gonadotrophin, oestrogens and possibly thyroxine. N and V can begin as early as 2–3 weeks and usually resolve by 10–12 weeks. A few women will develop severe vomiting (hyperemesis gravidarum), which causes dehydration, electrolyte imbalance and significant weight loss (Blackburn 2013).
- **Heartburn** affects up to 80% of pregnant women and is caused by reflux of gastric acid into the lower oesophagus. Increasing levels of progesterone relax the lower oesophageal sphincter and pressure from the growing uterus increases intragastric pressure. It usually begins in the second trimester, intensifying as pregnancy progresses, and is exacerbated by multiple pregnancy, hydramnios, obesity and bending over (Blackburn 2013).
- **Constipation** affects many pregnant women and has a tendency to be worse in the first and third trimesters. Increased levels of progesterone cause relaxation of smooth muscle and reduced peristalsis. This decrease of motility and therefore a prolonged transit time increase electrolyte and water absorption in the large intestine, resulting in a dryer, bulkier stool (Yerby 2010b).
- **Haemorrhoids** in pregnancy are caused by the relaxing effect of progesterone on the veins of the anus and a reduction in venous return due to pressure from the growing uterus. This results in stasis of blood flow, venous congestion and engorgement of the haemorrhoidal veins. Haemorrhoids are usually mild but can cause pain and intermittent bleeding from the anus (Yerby 2010b).
- **Varicose veins** may occur in the legs and vulva and are a consequence of the effect of progesterone on the smooth muscle of blood vessels walls. Pressure from the gravid uterus also causes pelvic congestion and poor venous return, resulting in vulval varicosities (Bharj and Henshaw 2011).
- **Vaginal discharge** in pregnancy is common and may contribute to the inhibition of pathogenic colonisation of the vagina. However, other vaginal discharge may be the result of infection, including:
  - *bacterial vaginosis*, which is a white–grey, fishy smelling discharge, caused by an overgrowth of bacteria;
  - *trichomoniasis*, which is a common sexually transmitted infection that manifests as a green–yellow, frothy discharge with an unpleasant smell and is associated with dysuria;
  - *Candida albicans*, which is a fungus that can cause a thick or watery discharge that may smell of yeast (Bharj and Henshaw 2011).
- **Back and pelvic** pain affects up to 70% of women. The cause is usually attributed to the effect of relaxin and progesterone on the symphysis pubis ligaments and lumbosacral joints. As pregnancy progresses, postural changes occur to counterbalance the exaggerated curvature of the lower spine caused by the increasing weight of the gravid uterus (Bharj and Henshaw, 2011).

- Other physiological changes within the body systems predispose to a range of minor disorders, including gingivitis, pica, ptyalism, leg cramps, carpel tunnel syndrome, pelvic girdle pain, fatigue, fainting and frequency of micturition (Yerby 2010b; Bharj and Henshaw 2011).

ESSENTIALS OF MIDWIFERY CARE NICE (2014b) offers a number of recommendations for the management of common symptoms of pregnancy that include the following advice and guidance for midwives and other healthcare professionals:

- **Nausea and vomiting**: The midwife can give some reassurance that N and V are not usually associated with poor pregnancy outcomes. It is possible that some degree of food aversion occurs naturally to minimise fetal exposure to toxins. Effective interventions include ginger, P6 (wrist) acupressure and/or antihistamines. A history of persistent vomiting, feeling unwell and ketonuria is indicative of hyperemesis gravidarum. Hospital admission is required for intravenous fluid therapy to correct fluid and electrolyte imbalance.
- **Heartburn**: Advice regarding lifestyle and diet modifications can be given by the midwife. This includes sleeping propped up and assuming an upright position after meals, reducing food with a high fat content and avoiding other gastric irritant foods. When lifestyle and diet modifications fail to relieve symptoms, antacids may be considered.
- **Constipation**: Lifestyle and diet modifications form the greater part of midwifery advice. Adequate intake of fluids, inclusion of bran or wheat fibre supplementation and a diet rich in fruits and vegetables together with regular exercise may preclude the need for aperients.
- **Haemorrhoids:** These occur frequently in pregnancy and can be aggravated by constipation. Measures taken for the avoidance of constipation apply to those women with haemorrhoids. Standard haemorrhoid creams can be advised but corrective treatment is usually deferred until after the birth of the baby.
- **Varicose veins**: Women are advised to avoid standing for long periods, to exercise leg muscles, to elevate the legs and to wear compression stockings to improve symptoms. Vulval varicosities are rare but very painful. Women may gain some relief from the counter pressure of a substantial sanitary pad. Care must be taken during the birth as the distended veins can haemorrhage or be cut during episiotomy.
- **Vaginal discharge**: An increase in vaginal discharge is common, so it is essential to determine the cause by taking vaginal or cervical swabs and refer to genito-urinary medicine clinics where indicated. If vaginal candidiasis is identified, topical treatment with imidazole can be effective; however, oral treatment for vaginal candidiasis is not recommended.
- **Backache:** Women should be advised to stand tall, with their weight evenly distributed on both legs. Lifting should be kept to a minimum and when lying down a lateral position is recommended. Exercise in water and massage are also recommended.

PROFESSIONAL ACCOUNTABILITY

- When women present with seemingly minor disorders of pregnancy it is essential that the midwife makes a differential diagnosis to exclude pathology.
- If pathology is suspected, then prompt referral to an appropriate member of the multidisciplinary team should be made and clearly documented.
- Midwives need to have an empathetic approach to care and when women choose not to make lifestyle changes, the midwife is still required to treat them with respect, dignity and compassion.

Pre-conceptual Health

Pre-conceptual care involves the provision of advice and support for women and their partners about the health strategies that maximise the likelihood of experiencing a healthy pregnancy and giving birth to a healthy baby. Of course, many women do not plan their pregnancies and therefore do not access formalised pre-conceptual services, or such services may not exist. Opportunistic health promotion that sits broadly within the *Making Every Contact Count* framework (MECC 2012) should therefore be utilised wherever possible by healthcare professionals who have regular contact with women of childbearing age, for example, in contraception and sexual health services.

KEY POINTS NICE (2012) suggests that effective pre-conception care can have a significant impact on subsequent pregnancy and birth by:

- Early recognition and prompt management of pre or coexisting maternal health problems that are associated with increased risk, for example, mental health problems, hypertension, epilepsy or sickle cell disease.
- Identifying women at increased risk. The NHS Quality Outcome Framework has previously specified that women of childbearing age should receive annual, disease-specific advice relevant to childbearing. In the 2014 MBRRACE report, Knight *et al*. (2014) recommend that women with pre-existing medical conditions should have pre-pregnancy counselling by healthcare professionals with experience of managing their disorder in pregnancy.
- Offering lifestyle advice to reduce or avoid hazardous behaviours, such as smoking, drinking excessive alcohol or substance use.
- Identifying couples who are at increased risk of having a baby with a genetic condition or chromosomal abnormality and providing them with sufficient knowledge to make informed decisions.

ESSENTIALS OF MIDWIFERY CARE NICE (2012) suggests that healthcare professionals, including midwives, offer pre-conception advice based on the following:

- The time it may take to become pregnant. If 100 couples have regular (every 2–3 days), unprotected sexual intercourse:
  - 84 will conceive within 1 year.
  - 92 will conceive within 2 years (HFEA 2010).
- Folic acid.
- **Smoking:**
  - In the 2014 MBRRACE report (Knight *et al*. 2014), almost one-quarter of the women who died had smoked during pregnancy.
  - The impact of smoke-free legislation in England is associated with a significant reduction in perinatal and infant mortality (Been *et al*. 2015).
- Illicit drug use.
- Hazardous substances or radiation.
- Vitamin A and over-the-counter medicines.
- Cervical screening.
- Immunisations.
- Previous miscarriage(s).
- Chromosome abnormalities.

- **Being overweight or obese:**
  - Midwives and other health professionals should utilise any appropriate opportunity to provide women with a BMI of 30 or more with information about the health benefits of losing weight before conceiving. This should include information on the increased health risks of obesity to themselves and their unborn child.
  - Midwives should share this information with tact and sensitivity – obesity is often stigmatised within Western society.
  - Women with a BMI of 30 or more should be encouraged and receive committed support to reduce weight before becoming pregnant. A weight loss of 5–10% would have significant health benefits and may increase the likelihood of conceiving.
  - Women should be offered specific dietary advice in preparation for pregnancy, including the need to take daily folic acid supplements (NICE 2010).
- **Alcohol consumption:**
  - When planning a pregnancy, women should be advised that it is probably the safest choice not to drink alcohol at all. Either partner consuming over six units per day reduces the chance of conception.
  - There is currently a lack of robust evidence around what constitutes a 'safe' amount of alcohol to consume during pregnancy, making it difficult for midwives to advise women accordingly.
  - Drinking alcohol during the first trimester is not advisable because of the risk of miscarriage (RCOG 2015a).

Further Resources

Family Planning Association leaflet *Planning a Pregnancy*, http://www.fpa.org.uk/help-and-advice/planning-pregnancy.

An Implementation Guide and Toolkit for Making Every Contact Count, https://www.england.nhs.uk/wp-content/uploads/2014/06/mecc-guid-booklet.pdf.

Pre-eclampsia

Pre-eclampsia is a pregnancy-specific condition defined as new hypertension presenting after 20 weeks' gestation with significant proteinuria (NICE 2011). Although Knight *et al*. (2014) reported a significant decrease in the number of deaths from pre-eclampsia and eclampsia, the condition remains a major cause of maternal and fetal mortality and morbidity (Robson and Waugh 2013).

Many of the improvements in maternal and neonatal outcomes are due to differential diagnosis of pre-eclampsia from other hypertensive disorders and therefore appropriate management and care:

- Pre-eclampsia may be superimposed on chronic hypertension. Chronic hypertension is present at booking or before 20 weeks, for which women may already be taking antihypertensive medication.
- Pregnancy-induced/gestational hypertension is new hypertension occurring in the second half of pregnancy but without significant proteinuria.

KEY POINTS

- Pre-eclampsia is a multisystem disorder characterised by hypertension and proteinuria. It can progress to severe pre-eclampsia and eclampsia (see Section 2.7) or a variant known as HELLP[4] syndrome, which involves abnormal liver function and thrombocytopenia (RCOG 2010; Blackburn 2013).
- The exact aetiology is complex, although altered physiology explains the pathophysiology and many causative theories. These include:
  - abnormal implantation;
  - ischaemia;
  - endothelial cell damage;
  - platelet, immunological and genetic theories.
- Placental and maternal factors interact in the development of pre-eclampsia. The underlying mechanism for the development of pre-eclampsia is thought to be impaired trophoblastic invasion and adaptation of spiral arteries, resulting in a limited supply of blood to the placenta (Blackburn 2013).
- Conditions where oxygen demand is increased (e.g. multiple pregnancy) or when oxygen transfer is decreased (e.g. diabetes) predispose to pre-eclampsia.
- As demand increases during fetal growth, blood supply is insufficient. The placenta becomes ischaemic, releasing more substances that are toxic to the maternal body, in particular the circulatory system (Blackburn 2013).
- Impaired placental perfusion is also thought to result in the ischaemic placenta releasing inflammatory factors that cause platelet activation and endothelial dysfunction (Poon *et al*. 2010). Endothelial cell injury is a common feature of pre-eclampsia.
- Increased systemic vascular resistance occurs, which causes an increase in blood pressure, resulting in decreased perfusion of most organs.
- These characteristics can culminate in maternal renal and liver failure, liver rupture, intracerebral bleeds, disseminated intravascular coagulation (DIC) and death.
- An immunological basis for pre-eclampsia is supported by the increased frequency of pre-eclampsia in first pregnancies where the mother's system responds to paternal antigens expressed on fetal tissues. This can also occur in the multigravida woman who has a new partner (Williams and Broughton Pipkin 2011; Blackburn 2013).

[4] Haemolysis (H), elevated liver enzymes (EL) and low platelet count (LP).

- Fetal complications include growth restriction, prematurity, placental abruption, hypoxia and intrauterine death (Blackburn 2013; Robson and Waugh, 2013).

ESSENTIALS OF MIDWIFERY CARE NICE (2011, 2014b) makes the following recommendations for the care and support of women:

- At booking, the following risk factors for pre-eclampsia should be determined:
  - age 40 years or older;
  - nulliparity;
  - pregnancy interval of more than 10 years;
  - family history of pre-eclampsia (including paternal family history);
  - previous history of pre-eclampsia;
  - body mass index 30 kg/m^2 or more;
  - pre-existing vascular disease such as hypertension;
  - pre-existing renal disease;
  - multiple pregnancy.
- Women who have more than one moderate risk factor for pre-eclampsia should be advised to take 75 mg of aspirin daily from 12 weeks until the birth of the baby.
- All pregnant women should be made aware of the need to seek immediate advice from a healthcare professional if they experience symptoms of pre-eclampsia. These include:
  - severe headache;
  - problems with vision, such as blurring or flashing before the eyes;
  - severe pain just below the ribs;
  - vomiting;
  - sudden swelling of the face, hands or feet.
- Midwives should ensure that the woman is aware of symptoms which need immediate clinical review.
- Blood pressure measurements and urinalysis for protein should be carried out at each antenatal visit to screen for pre-eclampsia.
- The degree of hypertension will determine care management:
  - mild hypertension = 140/90 to 149/99 mmHg;
  - moderate hypertension = 150/100 to 159/109 mmHg;
  - severe hypertension = 160/110 mmHg or higher.
- Hypertension where there is a single diastolic blood pressure of 110 mmHg or two consecutive readings of 90 mmHg at least 4 hours apart and/or significant proteinuria (1+) should prompt consultant referral and increased surveillance.
- If the systolic blood pressure is above 160 mmHg on two consecutive readings at least 4 hours apart, treatment should be considered.
- Korotkoff phase 5 is the appropriate measurement of diastolic pressure. The method used should be consistent and documented. Automated methods should be used with caution.
- Significant proteinuria equates to more than 300 mg of protein in a 24-hour urine collection or more that 30 mg/mmol in a spot urinary protein/creatinine sample.
- Blood samples should be taken for analysis and include urea and electrolytes, LFTs, full blood count and serum creatinine. These should be measured against a reference range specific to pregnancy:

  - urea and electrolytes and serum creatinine indicate kidney function;
  - a full blood count indicates platelet consumption, haemolysis and haemoconcentration;
  - liver enzymes such as transaminases and bilirubin indicate liver function.
- Women diagnosed with severe gestational hypertension or pre-eclampsia require fetal monitoring. This should include cardiotocography, ultrasound fetal growth and amniotic volume assessment and umbilical artery Doppler velocimetry.
- Assessment should be performed by a healthcare professional trained in the management of hypertensive disorders of pregnancy. Consultant care is therefore indicated as antihypertensive medication, fetal surveillance (as above), admission or early delivery may be indicated. Corticosteroids should be given if delivery is anticipated at <34 weeks' gestation.

ADDITIONAL EVIDENCE POINTS

- Although pre-eclampsia commonly manifests at around 20 weeks, there is evidence that biophysical and biochemical markers are evident at 11–13 weeks' gestation (Poon *et al*. 2010).
- Familial clustering of pre-eclampsia suggests a genetic component. Higher rates of pre-eclampsia have been noted in pregnancies fathered by men whose mothers had pre-eclampsia (Williams and Broughton Pipkin 2011).

PROFESSIONAL ACCOUNTABILITY

- Midwives need to be competent in their clinical and technical knowledge base to deliver effective care.
- Midwives must ensure that care is timely and evidence based and that they are familiar with national and local guidelines.
- A plan of care for birth should be made in partnership with the woman and accurately documented in the notes.
- Psychological support and advice regarding the condition should be given and any reassurance should be realistic.

Further Resources

Action on Pre-eclampsia (APEC). *Midwives E-Learning Presentation*, http://action-on-pre-eclampsia.org.uk/midwives-e-learning-presentation/.

Preparation for Parenthood

Traditionally known as 'parentcraft' classes, preparation for parenthood today usually takes the form of antenatal education sessions run by midwives or organisations such as the National Childbirth Trust (NCT). Despite a significant number of women attending antenatal classes, the evidence base about their impact in helping women and their partners prepare for childbirth and parenthood is currently weak; however, programmes may confer other benefits that require further exploration.

KEY POINTS

- Structured programmes that often reflect the information that maternity care staff wish to share, rather than seek what information women actually want, have generally replaced traditional forms of sharing childbirth knowledge.
- Classic approaches to antenatal education include Dick-Read's natural childbirth approach based on inhibiting the fear/tension/pain cycle (Dick-Read 1933) and Lamaze's psychoprophylaxis model (Lamaze 1958).
- More contemporary approaches include 'active birth' (Balaskas 1992) and hypnobirthing (Mongan 2005). All of these approaches aim to utilise a woman's natural coping mechanisms driven chiefly by the synergy of labour hormones.
- Most of the current research has focused on well-educated women who occupy the middle to upper socio-economic groups, generally viewed as 'typical' attendees (Gagnon and Sandall 2007). The impact of antenatal education on other groups may be of more interest from a public health perspective, as would the perspectives of men who report feeling excluded (Smith 1996).
- There is a lack of robust evidence that explores the value of antenatal education in building support networks for women. Nolan *et al*. (2012) suggested that they may be helpful in establishing friendships amongst women during pregnancy.

ESSENTIALS OF MIDWIFERY CARE The Department of Health, in partnership with key stakeholders, has developed the *Preparation for Birth and Beyond* resource pack to help midwives deliver contemporary and effective antenatal education. The chief aim of this initiative is to reduce inequalities by supporting disadvantaged parents to give their children an optimal start to life. Some key advice for midwives delivering antenatal education includes the following:

- Thinking about antenatal education in its broadest sense, then tailoring services for local communities based on local knowledge and expertise.
- Remembering that new parents are keen for information but need time to reflect on it and therefore do not want it delivered to them all at once.
- Tailoring sessions that offer consistent information and advice.
- Involving fathers and including information specific to their needs.
- Considering the needs of women from different groups; for example, young parents often prefer to participate in peer groups.
- Offering broad-based content that does not focus just on labour and birth.
- Recognising that midwives will be at their most effective when drawing on the knowledge, experience and expertise of parents.

ADDITIONAL EVIDENCE POINTS Schrader McMillan *et al*. (2009):

- Antenatal education has a clear role to play in the education of new parents.
- Group-based antenatal programmes that cover a broad range of topics are associated with improved maternal well-being.

- Participation in group-based sessions can support women with symptoms of anxiety and depression.

PROFESSIONAL ACCOUNTABILITY

- Under Article 42 of the EU Midwifery Directive, midwives have a responsibility in the *provision of programmes of parenthood preparation and complete preparation for childbirth including advice on hygiene and nutrition*.
- Although many midwives may perceive that they lack the skills for the delivery of effective antenatal education, they have a clear responsibility under the NMC Code (NMC 2015) both to maintain their skills and to seek opportunities to develop them further. Working in partnership with women and their families to identify learning needs can be a significant factor in this regard.

Further Resources

Department of Health. *Preparation for Birth and Beyond: a Resource Pack for Leaders of Community Groups and Activities*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/215386/dh_134728.pdf.

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