Clinical Practice Guidelines

Antenatal care — Module II

DRAFT FOR CONSULTATION ON DIABETES CHAPTER
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Summary

Antenatal care is a routine part of pregnancy for most of the 280,000 women who give birth in Australia each year. Women receive antenatal care in community and hospital-based settings and see a range of health professionals. Effective models of antenatal care have a focus on the individual woman's needs and preferences, collaboration and continuity of care. These national Clinical Practice Guidelines on Antenatal Care provide evidence-based recommendations to support high quality, safe antenatal care in all settings. This document is Module II of the Guidelines. Module I was published in March 2013.

As outlined in Module I, effective antenatal care focuses on the individual woman's needs and preferences, collaboration and continuity of care. Taking a woman-centred approach also ensures that a woman's social, emotional, physical, psychological, spiritual and cultural needs and expectations are considered and respected. Throughout the pregnancy, women should be given information in an appropriate form to support them to make choices about their care.

Within the diversity of women that make up the Australian population, some face greater disadvantage in terms of access to health services and may experience poorer outcomes. The broader context of a woman's life should be taken into account in planning and providing antenatal care. Module I highlights specific approaches to antenatal care for a range of groups, with a focus on improving the experience of antenatal care for Aboriginal and Torres Strait Islander women. This Module outlines additional considerations for antenatal care for migrant and refugee women and for women with mental health disorders.

Module I largely focuses on antenatal care in the first trimester. This Module provides guidance on core practices, clinical assessments, common conditions, maternal health tests and lifestyle considerations that are relevant throughout antenatal care for healthy pregnant women. This includes:

- providing information to support parents to prepare for the rest of pregnancy, childbirth and parenthood;
- promoting breastfeeding;
- assessing fetal wellbeing (eg offering a 18–20 week ultrasound scan, discussing fetal movements and assessing fetal growth);
- assessing the health of the woman, in particular factors indicating that additional care may be required (eg risk of preterm birth or pre-eclampsia);
- providing advice on symptoms that are common during pregnancy (eg reflux and haemorrhoids);
- assessing for any conditions that may affect the health of the woman or the unborn baby (eg anaemia, diabetes, sexually transmitted infection);
- discussing health and wellbeing during pregnancy (eg nutrition, physical activity); and
- providing opportunities for women to raise any issues they wish to discuss.

A planned schedule of antenatal visits should be agreed early in pregnancy, based on the individual woman's needs. Assessment of a woman's risk and any requirement for additional care continues throughout pregnancy.

These Guidelines are not intended as a textbook of antenatal care. A process of prioritisation was used to decide which topics were relevant to the Australian context. While many of these topics involve clinical assessment and maternal health screening, the management of any conditions identified is not discussed. Health professionals are directed to appropriate resources where available.

The Guidelines provide a reliable and standard reference for health professionals providing antenatal care. By providing a summary of the currently available evidence on many aspects of antenatal care, they aim to promote consistency of care and improve the experience and outcomes of antenatal care for all families.

Summary of recommendations

The recommendations in these Guidelines were developed by the Expert Advisory Committee (EAC) (see Appendices A and B) based on systematic reviews of the available evidence. Where sufficient evidence was available, this was graded according to the National Health and Medical Research Council (NHMRC) *Levels of Evidence and Grades for Recommendations for Developers of Guidelines* (2009) (see below) and formulated as recommendations. For areas of clinical practice included in the systematic reviews but where evidence was limited or lacking, the EAC developed consensus-based recommendations (CBRs). Some recommendations and CBRs from other national guidelines were included, where these were based on systematic review of the evidence. For areas beyond the scope of the systematic reviews, practice points (PPs) were developed by the EAC, the Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care or the Working Group for Migrant and Refugee Women's Antenatal Care (see Appendices A and B).

The evidence-based recommendations and practice points focus on core practices in antenatal care, lifestyle considerations, and clinical and physical aspects of care. This care is provided following principles that endorse the protection, promotion and support necessary for effective antenatal care outlined in Chapter 1. These include taking a holistic approach that is woman-centred, culturally appropriate and enables women to participate in informed decision-making at all stages of their care.

Definition of grades of recommendations and practice points

Grade A:	Body of evidence can be trusted to guide practice
Grade B:	Body of evidence can be trusted to guide practice in most situations
Grade C:	Body of evidence provides some support for recommendation(s) but care should be taken in its application
Grade D:	Body of evidence is weak and recommendation must be applied with caution
CBR:	Recommendation formulated in the absence of quality evidence (where a systematic review of the evidence was conducted as part of the search strategy)
PP:	Area is beyond the scope of the systematic literature review and advice was developed by the EAC and/or the Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care

Source: Adapted from *NHMRC* (2009) *Levels of Evidence and Grades for Recommendations for Developers of Guidelines* and NHMRC (2011) *Procedures and Requirements for Meeting the 2011 NHMRC Standard for Clinical Practice Guidelines*.

Recommendations and practice points[1]

Recommendation/practice point — Module II		Grade	Section
Optimising antenatal care			
Antenatal care for migrant and refugee women			
a	The care needs of migrant and refugee women can be complex. The first point of contact (eg first antenatal visit) is important and care should always be should be undertaken with an accredited health interpreter. Wherever possible, antenatal care should involve a multicultural health worker.	PP	2.2.1
b	Health professionals should take the initiative in organising for an accredited health interpreter wherever necessary, and reassure the woman of the benefits if she is reluctant.	PP	2.2.1

[1] Recommendations are numbered using Arabic numerals (eg 1, 2, 3), consensus-based recommendations using Roman numerals (eg i, ii, iii) and practice points using letters (eg a, b, c).

Recommendation/practice point — Module II		Grade	Section
Antenatal care for women with mental health disorders			
c	To match the needs, preferences and expectations of women with mental health disorders, maternity services need to work within collaborative and consultative frameworks. This includes clearly defining roles and responsibilities for everyone involved in a woman's care and working within established clinical networks and systems to facilitate timely referral and transfer to relevant services when appropriate. Continuity of care and carer also contribute to improved experiences for women.	PP	3
d	Women should be asked about symptoms and history of mental health disorders early in pregnancy and complete the EPDS at least once, preferably twice, during pregnancy (see Module I).	PP	3.1
Core practices in antenatal care			
Preparing for pregnancy, childbirth and parenthood			
1	Advise parents that antenatal education programs are effective in providing information about pregnancy, childbirth and parenting but do not influence mode of birth.	**B**	4.2
2	Include psychological preparation for parenthood as part of antenatal care as this has a positive effect on women's mental health postnatally.	**B**	4.2
e	Assisting parents to find an antenatal education program that is suitable to their learning style, language and literacy level may improve uptake of information.	PP	4.2
Preparing for breastfeeding			
3	Routinely offer education about breastfeeding as part of antenatal care.	**C**	4.3
Lifestyle considerations			
Nutrition			
f	Eating the recommended number of daily serves of the five food groups and drinking plenty of water is important during pregnancy.	PP	5.1.2
4	Reassure women that small to moderate amounts of caffeine are unlikely to harm the pregnancy.	**C**	5.1.2
g	For women who are underweight, additional serves of the five food groups may contribute to healthy weight gain.	PP	5.1.2
h	For women who are overweight or obese, limiting additional serves and avoiding energy-dense foods may limit excessive weight gain. Weight loss diets are not recommended during pregnancy	PP	5.1.2
i	Women at high risk of iron deficiency due to limited access to dietary iron may benefit from practical advice on increasing intake of iron-rich foods.	PP	5.1.3
5	Advise women with low dietary iron intake that intermittent supplementation is as effective as daily supplementation in preventing iron-deficiency anaemia, with fewer side effects.	**B**	5.1.3
Physical activity			
6	Advise women that low to moderate-intensity physical activity during pregnancy is associated with a range of health benefits and is not associated with adverse outcomes.	**B**	5.2
Sexual activity			
7	Advise pregnant women without complications that safe sexual activity in pregnancy is not known to be associated with any adverse outcomes.	**B**	5.3

Recommendation/practice point — Module II		Grade	Section
Travel			
8	Inform pregnant women about the correct use of seat belts — that is, three-point seat belts 'above and below the bump, not over it'.	**B**	5.4
9	Inform pregnant women that long-distance air travel is associated with an increased risk of venous thrombosis, although it is unclear whether or not there is additional risk during pregnancy.	**C**	5.4
j	Pregnant women should be advised to discuss considerations such as air travel, vaccinations and travel insurance with their midwife or doctor if they are planning to travel overseas.	PP	5.4
10	If pregnant women cannot defer travel to malaria-endemic areas, advise them to use insecticide-treated bed nets.	**B**	5.4
k	Beyond the first trimester, mefloquine is approved for use to prevent malaria. Neither malarone or doxycycline are recommended for prophylaxis at any time during pregnancy. Chloroquine (or hydroxychloroquine) plus proguanil is safe but less effective so seldom used. For areas where only vivax is endemic, chloroquine or hydroxychloroquine alone is appropriate.	PP	5.4
Clinical assessments			
Fetal development and anatomy			
11	Offer pregnant women ultrasound screening to assess fetal development and anatomy between 18 and 20 weeks gestation.	**B**	6.1
l	Timing of the ultrasound will be guided by the individual situation (eg for women who are obese, visualisation may improve with gestational age).	PP	6.1
m	Repeated ultrasound assessment may be appropriate for specific indications but should not be used for routine monitoring.	PP	6.1
n	Ultrasound assessment should only be performed by healthcare professionals with appropriate training and qualifications, within the appropriate scope (eg diagnostic or point of care).	PP	6.1
Fetal growth and wellbeing			
i	Offer women assessment of fetal growth (abdominal palpation and/or symphysis-fundal height measurement) at each antenatal visit to detect small- or large-for-gestational-age infants.	CBR	6.2.1
o	Further investigations, such as ultrasound, are a consideration when there is any doubt about fetal growth. This includes ultrasound for women with a BMI ≥30 as clinical assessments of fetal growth have been shown to be less reliable in this group.	PP	6.2.1
ii	Advise women to be aware of the normal pattern of movement for their baby and to contact their health care professional promptly if they have any concerns about decreased or absent movements.	CBR	6.2.2
iii	If auscultation of the fetal heart rate is performed, a Doppler may be used from 12 weeks and a Pinard stethoscope from 28 weeks.	CBR	6.2.3
iv	Routine use of antenatal electronic fetal heart rate monitoring (cardiotocography) for fetal assessment in women with an uncomplicated pregnancy is not supported by evidence.	CBR	6.2.3
Risk of pre-eclampsia			
v	Routinely measure blood pressure to identify new onset hypertension.	CBR	6.3
12	Advise women at high risk of developing pre-eclampsia that calcium supplementation is beneficial if dietary intake is low.	**A**	6.3
p	If a woman has a low dietary calcium intake, advise her to increase her intake of calcium-rich foods.	PP	6.3
13	Advise women at moderate–high risk of pre-eclampsia that low-dose aspirin from early pregnancy (preferably before 20 weeks) may be of benefit in its prevention.	**B**	6.3

Recommendation/practice point — Module II		Grade	Section
14	Advise women that vitamins are not of benefit in preventing pre-eclampsia.	**B**	6.3
15	Offer testing for proteinuria if a woman has risk factors for, or clinical indications of, pre-eclampsia; in particular raised blood pressure.	**C**	6.3
q	Women should be given information about the urgency of seeking advice from a health professional if they experience: • headache; • visual disturbance, such as blurring or flashing before the eyes; • epigastric pain (just below the ribs); • vomiting; or • rapid swelling of the face, hands or feet.	PP	6.3
Risk of preterm birth			
16	Advise women at risk of giving birth preterm about risk and protective factors.	**B**	6.4
Common conditions during pregnancy			
Reflux (heartburn)			
vi	Offer women experiencing mild symptoms of heartburn advice on lifestyle modifications and avoiding foods that cause symptoms on repeated occasions.	CBR	7.1
17	Give women who have persistent reflux information about treatments.	**C**	7.1
Haemorrhoids			
vii	Offer women who have haemorrhoids information about increasing dietary fibre and fluid intake. If clinical symptoms remain, advise women that they can consider using standard haemorrhoid creams.	CBR	7.2
Varicose veins			
viii	Advise women that varicose veins are common during pregnancy, vary in severity, will not generally cause harm and usually improve after the birth. Correctly fitted compression stockings may be helpful.	CBR	7.3
Pelvic girdle pain			
18	Advise women experiencing pelvic girdle pain that pregnancy-specific exercises, physiotherapy, acupuncture or using a support garment may provide some pain relief.	**C**	7.4
Carpal tunnel syndrome			
ix	Advise women who are experiencing symptoms of carpal tunnel syndrome that the evidence to support either splinting or steroid injections is limited and symptoms may resolve after the birth.	CBR	7.5
Maternal health screening			
Anaemia			
x	Routinely offer testing for haemoglobin concentration to pregnant women early in pregnancy (at the first visit) and at 28 weeks gestation.	CBR	8.1.2
r	In areas where prevalence of iron-deficiency anaemia is high consider testing ferritin at the first antenatal visit.	PP	8.1.2
s	Further investigation is required for women with a low haemoglobin concentration for their gestational stage. Repeat screening at 36 weeks may also be required for women who have symptoms or risk factors for anaemia or who live in or have come from an area of high prevalence.	PP	8.1.2
19	Advise iron supplementation for women identified as having iron-deficiency anaemia.	**B**	8.1.3
20	Advise women with iron-deficiency anaemia that low-dose iron supplementation is as effective as high dose, with fewer side effects.	**B**	8.1.3

Recommendation/practice point — Module II		Grade	Section
Diabetes			
21	At the first antenatal visit, assess a woman's risk of hyperglycaemia — including her age, BMI, previous gestational diabetes, previous high birth weight baby, family history of diabetes, and family origin.	**B**	8.2.2
22	Advise women at risk of hyperglycaemia that physical activity and healthy eating help to prevent excessive weight gain.	**A**	8.2.2
xi	Offer early testing for hyperglycaemia to women with risk factors for type 2 diabetes.	CBR	8.2.3
xii	Offer testing for hyperglycaemia to all women between 24 and 28 weeks gestation.	CBR	8.2.3
Haemoglobin disorders			
xiii	As early as possible in pregnancy, routinely provide information about haemoglobin disorders and offer screening (full blood count).	CBR	8.3.2
t	Consider offering ferritin testing and haemoglobin electrophoresis as part of initial screening to women from high-risk population groups.	PP	8.3.2
Gonorrhoea			
xiv	Do not routinely offer gonorrhoea testing to all women as part of antenatal care. Offer gonorrhoea testing to pregnant women who have known risk factors or live in or come from areas where prevalence is high.	CBR	8.4
Trichomoniasis			
23	Offer testing to women who have symptoms of trichomoniasis, but not to asymptomatic women, during pregnancy.	**B**	8.5
Group B streptococcus			
24	Offer either routine antenatal screening for Group B streptococcus colonisation or a risk factor-based approach to prevention, depending on organisational policy.	**C**	8.6
25	If offering antenatal screening, arrange for testing to take place at 35–37 weeks gestation.	**B**	8.6
26	Encourage women to self-collect vaginal-rectal specimens for culture testing for Group B streptococcus and offer information about how to do this.	**C**	8.6
Toxoplasmosis			
27	Do not routinely offer screening for toxoplasmosis to pregnant women.	**C**	8.7
28	Advise pregnant women about measures to avoid toxoplasmosis infection such as: • washing hands before handling food; • thoroughly washing all fruit and vegetables, including ready-prepared salads, before eating; • thoroughly cooking raw meat and ready-prepared chilled meals; • wearing gloves and thoroughly washing hands after handling soil and gardening; and • avoiding cat faeces in cat litter or in soil.	**C**	8.7
Cytomegalovirus			
xv	Only offer screening for cytomegalovirus to pregnant women if they come into frequent contact with large numbers of very young children (eg child care workers).	CBR	8.8
xvi	Advise pregnant women about hygiene measures to prevent cytomegalovirus infection such as frequent hand washing, particularly after exposure to a child's saliva or urine.	CBR	8.8
Cervical abnormalities			
xvii	Offer women cervical screening as specified by the National Cervical Screening Program.	CBR	8.9

Recommendation/practice point — Module II		Grade	Section
Thyroid dysfunction			
29	Do not routinely offer pregnant women thyroid function screening	**B**	8.10
30	Offer screening to pregnant women who have symptoms of, or are at high risk of, thyroid dysfunction.	**B**	8.10
Clinical assessments in late pregnancy			
Fetal presentation			
31	Assess fetal presentation by abdominal palpation at 36 weeks or later, when presentation is likely to influence the plans for the birth.	**C**	9.1.2
u	Suspected non-cephalic presentation should be confirmed by an ultrasound assessment.	PP	9.1.2
32	Offer external cephalic version to women with uncomplicated singleton breech pregnancy after 37 weeks of gestation.	**B**	9.1.3
xviii	Relative contraindications for external cephalic version include a previous caesarean section, uterine anomaly, vaginal bleeding, ruptured membranes or labour, oligohydramnios, placenta praevia and fetal anomalies or compromise.	CBR	9.1.3
v	External cephalic version should be performed by a health professional with appropriate expertise.	PP	9.1.3
Prolonged pregnancy			
33	Consider offering membrane sweeping to women scheduled for formal induction of labour.	**C**	9.2

Summary of recommendations and practice points from Module I

Recommendation/practice point — Module I	Grade	Section
Antenatal visits		
Determine the schedule of antenatal visits based on the individual woman's needs. For a woman's first pregnancy without complications, a schedule of ten visits should be adequate. For subsequent uncomplicated pregnancies, a schedule of seven visits should be adequate.	**B**	6.1
At the first contact with a woman during pregnancy, make arrangements for the first antenatal visit, which requires a long appointment and should occur within the first 10 weeks.	CBR	6.1
Early in pregnancy, provide women with information in an appropriate format about the likely number, timing and content of antenatal visits associated with different options of care and the opportunity to discuss this schedule.	CBR	6.2
Antenatal care should be woman-focused, with each antenatal visit structured around specific content based on the woman's needs. Longer visits are needed early in pregnancy to allow comprehensive assessment, discussion and support. Assessments and tests should be incorporated into visits in a way that minimises inconvenience to the woman.	PP	6.3
Clinical assessments		
Gestational age		
Provide information and offer pregnant women who are unsure of their conception date an ultrasound scan between 8 weeks 0 days and 13 weeks 6 days to determine gestational age, detect multiple pregnancies and accurately time fetal anomaly screening. Use crown–rump length (CRL) measurement to determine gestational age. If the CRL is above 84 mm, estimate the gestational age using head circumference.	**B**	7.1.1
The timeframe for ultrasound assessment of gestational age overlaps with that for assessment of nuchal translucency thickness as part of screening for fetal chromosomal abnormalities (11 weeks to 13 weeks 6 days), which may enable some women to have both tests in a single scan. This should only occur if women have been provided with an explanation of both tests and have given their consent to them both.	PP	7.1.1
The agreed due date should not be changed without advice from a health professional with considerable experience in antenatal care.	PP	7.1.1
Ultrasound assessment of gestational age should only be performed by a person who has had specific training.	PP	7.1.1
Repeated ultrasound assessments should only be used when clinically indicated.	PP	7.1.1
Weight and body mass index in the first trimester		
Measure women's weight and height at the first antenatal visit and calculate their body mass index (BMI).	**B**	7.2.2
Repeated weighing during pregnancy should be confined to circumstances that are likely to influence clinical management.	PP	7.2.2
Give women advice about appropriate weight gain during pregnancy in relation to their BMI.	**B**	7.2.2
Taking a respectful, positive and supportive approach and providing information about healthy eating and physical activity in an appropriate format may assist discussion of weight management.	PP	7.2.2
Blood pressure		
Measure blood pressure at a woman's first antenatal visit to identify existing high blood pressure.	**B**	7.3.2

Recommendation/practice point — Module I	Grade	Section
Proteinuria		
Routinely offer testing for proteinuria at the first antenatal visit, regardless of stage of pregnancy.	CBR	7.4.2
For point-of-care testing, use an automated analyser if available, as visual inspection of a urinary dipstick is the least accurate method to detect true proteinuria.	**B**	7.4.2
Psychosocial factors affecting mental health		
As early as practical in pregnancy, ask all women questions about psychosocial factors, including previous or current mental health disorders. If a woman affirms their presence, ask whether she would like help with any of these issues.	CBR	7.5.2
Depression and anxiety		
Use the Edinburgh Postnatal Depression Scale (EPDS) as a component of the assessment of all women for symptoms of depression in the antenatal period.	**B**	7.6.2
Be aware that women who score 13 or more on the EPDS may be experiencing anxiety, either alone or with depression. Base decisions about further assessment on the woman's answers to questions 3, 4 and 5 of the EPDS and her response to enquiry about 'worrying'.	CBR	7.6.2
If a woman scores 1, 2 or 3 on EPDS question 10, assess her current safety and the safety of other children in her care and, acting according to clinical judgement, seek advice and/or refer immediately for mental health assessment.	PP	7.6.2
Domestic violence		
At the first antenatal visit, explain to all women that asking about domestic violence is a routine part of antenatal care and enquire about each woman's exposure to domestic violence.	**B**	7.7.2
Ask about domestic violence when alone with the woman, tailoring the approach to her individual situation and your own skills and experience (eg use open-ended questions about her perception of safety at home or use an assessment tool).	CBR	7.7.2
Be aware that training programs improve the confidence and competency of health professionals in identifying and caring for women experiencing domestic violence.	CBR	7.7.2
Responses to assisting Aboriginal and Torres Strait Islander women who are experiencing domestic violence need to be appropriate to the woman and her community. Health professionals should be aware of family and community structures and support.	PP	7.7.2
Health professionals should be aware of resources for domestic violence services in their community that can be called for urgent assistance. This may include local safe houses or the Strong Women Workers in their community.	PP	7.7.2
Nausea and vomiting		
Women who experience nausea and vomiting in pregnancy can be advised that, while it may be distressing, it usually resolves spontaneously by 16 to 20 weeks pregnancy and is not generally associated with a poor pregnancy outcome.	PP	7.8.2
Discontinuing iron-containing multivitamins for the period that women have symptoms of nausea and vomiting may improve symptoms.	PP	7.8.2
Constipation		
Offer women who are experiencing constipation information about increasing dietary fibre intake and taking bran or wheat fibre supplementation.	**C**	7.9.2
Advise women who choose to take laxatives that preparations that stimulate the bowel are more effective than those that add bulk but may cause more adverse effects such as diarrhoea and abdominal pain.	**C**	7.9.2

Recommendation/practice point — Module I	Grade	Section
Maternal health screening		
Human immunodeficiency virus		
Routinely offer and recommend HIV testing at the first antenatal visit as effective interventions are available to reduce the risk of mother-to-child transmission.	**B**	8.1.2
A system of clear referral paths ensures that pregnant women who are diagnosed with an HIV infection are managed and treated by the appropriate specialist teams.	PP	8.1.2
Hepatitis B		
Routinely offer and recommend hepatitis B virus testing at the first antenatal visit as effective postnatal intervention can reduce the risk of mother-to-child transmission.	**A**	8.2.2
Hepatitis C		
Do not routinely offer pregnant women hepatitis C testing.	**C**	8.3.2
Hepatitis C testing may be offered to women with identifiable risk factors: — intravenous drug use or needle sharing; — tattooing or body piercing; — incarceration; — receipt of blood products or invasive procedures overseas or before 1990 in Australia; or — country of origin has a high prevalence of hepatitis C.	PP	8.3.2
Women who are having an invasive procedure (eg chorionic villus sampling, amniocentesis) should be offered screening for hepatitis C before the procedure.	PP	8.3.2
Rubella		
Routinely offer and recommend testing for rubella immunity at the first antenatal visit to identify women at risk of contracting rubella and enable postnatal vaccination to protect future pregnancies.	**B**	8.4.2
Inform women who have been vaccinated against rubella before they were aware of the pregnancy that the baby is highly unlikely to have been affected by the vaccine.	**A**	8.4.2
Women identified as non-immune to rubella antenatally should be advised to avoid contact with people experiencing possible symptoms of rubella.	PP	8.4.2
Chlamydia		
Do not routinely offer chlamydia testing to all women as part of antenatal care. Routinely offer chlamydia testing at the first antenatal visit to pregnant women younger than 25 years.	**C**	8.5.2
Testing for chlamydia and other sexually transmitted infections regardless of age should be considered for women who live in areas where their prevalence is high. An understanding of local prevalence will inform planning for population screening when this is indicated.	PP	8.5.2
Syphilis		
Routinely offer and recommend syphilis testing at the first antenatal visit as treating syphilis benefits both mother and baby.	**B**	8.6.2
Because syphilis is a rare condition in most parts of Australia and a positive result does not necessarily mean that a woman has syphilis, expert advice regarding the care of women who test positive and their partners should be sought. Assessment/testing for other sexually transmitted infections in women with positive serology is advisable.	PP	8.6.2
Asymptomatic bacteriuria		
Routinely offer and recommend testing for asymptomatic bacteriuria early in pregnancy as treatment is effective and reduces the risk of pyelonephritis.	**A**	8.7.2
Use urine culture testing wherever possible as it is the most accurate means of detecting asymptomatic bacteriuria.	**A**	8.7.2

Recommendation/practice point — Module I	Grade	Section
Where access to pathology services is limited, dipstick tests may be used to exclude infection, with positive results confirmed by urine culture. Appropriate storage of dipsticks is essential to the accuracy of these tests.	PP	8.7.2
Asymptomatic bacterial vaginosis		
Do not routinely offer pregnant women testing for bacterial vaginosis.	**B**	8.8.2
Early treatment (before 20 weeks pregnancy) of proven bacterial vaginosis may be beneficial for women with a previous preterm birth.	PP	8.8.2
Vitamin D deficiency		
Offer vitamin D screening to women with limited exposure to sunlight (eg because they are predominantly indoors or usually protected from the sun when outdoors), or who have dark skin or a pre-pregnancy BMI of >30, as they may be at increased risk of vitamin D deficiency and benefit from supplementation for their long-term health. Base decisions about whether to offer screening on these factors, season and climate.	CBR	8.9.2
Screening for fetal chromosomal abnormalities		
Discussing screening tests		
At the first antenatal visit, give women information about the purpose and implications of testing for chromosomal abnormalities to enable them to make informed choices about whether or not to have the tests.	CBR	9.2
Information about testing for chromosomal abnormalities should be provided in a way that is appropriate and accessible to the individual woman, with particular regard given to language and literacy.	PP	9.2
Screening tests in the first trimester		
If a woman chooses to have the combined test (nuchal translucency thickness, free beta-human chorionic gonadotrophin, pregnancy-associated plasma protein-A), make arrangements so that blood for biochemical analysis is collected between 9 weeks to 13 weeks 6 days and ultrasound assessment takes place between 11 weeks 0 days and 13 weeks 6 days.	**B**	9.3.1
For women with a risk of 1 in 300 or greater, referral to a genetic counsellor should be considered.	PP	9.3.2
If a woman chooses to have a diagnostic test for chromosomal abnormalities, base the choice of test on the gestation of pregnancy and the woman's preferences. Chorionic villus sampling is safer before 14 weeks pregnancy. Amniocentesis is safe after 15 weeks.	**B**	9.3.2
Offer rapid access to appropriate counselling and ongoing support by trained health professionals to women who receive a diagnosis of fetal chromosomal abnormality.	CBR	9.3.2
Women with an high-risk first trimester screening test result but negative diagnostic test should be referred for further specialist assessment because of an increased risk of other fetal abnormalities.	PP	9.3.2
Other considerations in screening for fetal chromosomal abnormalities		
There is inadequate access to screening for chromosomal abnormalities in many rural and remote areas. Every effort should be made to support women in these areas to access screening.	PP	9.4
Lifestyle considerations		
Tobacco smoking		
At the first antenatal visit: – assess the woman's smoking status and exposure to passive smoking; – give the woman and her partner information about the risks to the unborn baby associated with maternal and passive smoking; and – if the woman smokes, emphasise the benefits of quitting as early as possible in the pregnancy and discuss any concerns she or her family may have about stopping smoking.	**A**	10.1.2

Recommendation/practice point — Module I	Grade	Section
Offer women who smoke referral for smoking cessation interventions such as cognitive behavioural therapy.	**B**	10.1.3
At each antenatal visit, offer women who smoke personalised advice on how to stop smoking and provide information about available services to support quitting, including details on when, where and how to access them.	PP	10.1.3
If, after other options have been explored, a woman expresses a clear wish to use nicotine replacement therapy, discuss the risks and benefits with her.	**B**	10.1.3
If nicotine replacement therapy is used during pregnancy, intermittent–use formulations (gum, lozenge, inhaler and tablet) are preferred to continuous-use formulations (nicotine patches).	PP	10.1.3
Smoking status should be monitored and smoking cessation advice, encouragement and support offered throughout pregnancy.	PP	10.1.3
Health care professionals involved in the care of Aboriginal and Torres Strait Islander women should be aware of the high prevalence of smoking in some communities, and take account of this social norm when discussing smoking and supporting women to quit.	PP	10.1.4
Culturally appropriate smoking cessation services should be offered.	PP	10.1.4
In discussing smoking and supporting Aboriginal and Torres Strait Islander women to quit smoking, health professionals should draw on the expertise of anti-tobacco workers where available.	PP	10.1.4
Alcohol		
Advise women who are pregnant or planning a pregnancy that not drinking is the safest option as maternal alcohol consumption may adversely affect the developing fetus.	CBR	10.2.2
Medicines		
Advise women that use of prescription and over-the-counter medicines should be limited to circumstances where the benefit outweighs the risk as few medicines have been established as safe to use in pregnancy.	CBR	10.3.1
Therapeutic Goods Administration Category A medicines have been established to be safe in pregnancy.	CBR	10.3.1
Health professionals should seek advice from a tertiary referral centre for women who have been exposed to Category D or X medicines during pregnancy.	PP	10.3.1
Few herbal preparations have been established as being safe and effective during pregnancy. Herbal medicines should be avoided in the first trimester.	PP	10.3.3
Nutritional supplements		
Inform women that dietary supplementation with folic acid, from 12 weeks before conception and throughout the first 12 weeks of pregnancy, reduces the risk of having a baby with a neural tube defect and recommend a dose of 500 micrograms per day.	**A**	10.4.1
Specific attention needs to be given to promoting folic acid supplementation to Aboriginal and Torres Strait Islander women of childbearing age and providing information to individual women at the first antenatal visit.	PP	10.4.1
Advise women that taking vitamins A, C or E supplements is not of benefit in pregnancy and may cause harm.	**B**	10.4.2
Advise women who are pregnant to take an iodine supplement of 150 micrograms each day. Women with pre-existing thyroid conditions should seek advice from their medical practitioner before taking a supplement.	CBR	10.4.3
Do not routinely offer iron supplementation to women during pregnancy.	**B**	10.4.4
Oral health		
At the first antenatal visit, advise women to have oral health checks and treatment, if required, as good oral health protects a woman's health and treatment can be safely provided during pregnancy.	**B**	10.5.2

Introduction

These Guidelines provide evidence-based recommendations to support high quality, safe antenatal care and contribute to improved outcomes for all mothers and babies. The Guidelines have been developed in collaboration with State and Territory governments, funded by the Australian Health Ministers' Advisory Council (AHMAC) and co-sponsored by the Child Health and Wellbeing Subcommittee (CHWS) of the Australian Population Health Development Principal Committee (APHDPC) and the Maternity Services Inter-Jurisdictional Committee (MSIJC) under the Health Policy Priorities Principal Committee.

The lengthy process of reviewing the evidence on the numerous aspects of antenatal care necessitated completion of the project in two modules, which are intended to be used together. *Clinical Practice Guidelines on Antenatal Care — Module I* was released in March 2013.

The development of Module II has followed the key principles and processes outlined in the document *Procedures and Requirements for Meeting the 2011 NHMRC Standard for Clinical Practice Guidelines*. This involved convening multidisciplinary committees in key areas relevant to antenatal care, with oversight by an Expert Advisory Committee with expertise in provision of, development of, research into and experience of antenatal care. Input was also sought from a Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care and a Working Group for Migrant and Refugee Women's Antenatal Care. More detail on the guideline development process is included in the appendices.

Application of the Guidelines

Objective of the Guidelines

The Guidelines take a woman-centred approach, which includes considering the woman's context, ensuring cultural safety and enabling the woman to make informed decisions and choices about assessments and tests. They aim to improve the health of women and babies by promoting consistency of care and providing a summary of the currently available evidence on aspects of antenatal care.

Scope

The two modules of the Guidelines cover the antenatal care of healthy pregnant women (ie those who do not have identified pre-existing conditions or complications, such as multiple pregnancy). They are intended for use in all settings where antenatal care is provided, including primary care, obstetric and midwifery practice and public and private hospitals.

Module I of the Guidelines includes principles for providing woman-centred care and discusses optimising antenatal care for a range of groups of women, including Aboriginal and Torres Strait Islander women, migrant and refugee women, adolescent women, women in rural and remote areas and women with serious mental health disorders. Clinical topics included are largely specific to the first trimester, although the timing of a woman's first antenatal contact and the availability of services may mean that some of the clinical assessments or screening tests discussed are carried out later in pregnancy. As well, some assessments are repeated throughout pregnancy (eg blood pressure measurement) and social and lifestyle advice (eg smoking) is beneficial at all stages of pregnancy.

Module II of the Guidelines presents the evidence for core practices in antenatal care, lifestyle considerations, specific clinical assessments, common conditions during pregnancy, maternal health screening tests and clinical assessments in late pregnancy. While clinical topics discussed in Module I are generally specific to the first trimester, Module II covers some topics that are relevant to the first trimester (eg anaemia), later stages of pregnancy (eg 18–20 week ultrasound, pre-eclampsia) or throughout pregnancy (eg nutrition, physical activity). Revised advice on optimising care for migrant and refugee women and women with mental health disorders is also included.

The Guidelines do *not* include:

- information on the additional care that some women will require (eg while they discuss tests to identify clinical signs of pre-eclampsia, they do not give information about its management). Resources providing guidance in these areas are listed where relevant;
- discussion of models of antenatal care, as the Australian Institute of Health and Welfare is in the process of developing standardised definitions that will enable future evaluation of different models of care; or
- discussion of specific topics where a practice is established (eg testing of blood group and rhesus D status) or where the topic was not considered a priority for inclusion in these Guidelines and advice is given by other organisations (eg vaginal discharge, backache).

Intended audience

The Guidelines are intended for all health professionals who contribute to antenatal care, including midwives, general practitioners (GPs), obstetricians, maternal and child health nurses,[2] Aboriginal and Torres Strait Islander Health Practitioners; Aboriginal and Torres Strait Islander Health Workers, multicultural health workers, practice nurses, allied health professionals, childbirth and parenting educators and sonographers.

The way in which different professionals use these Guidelines will vary depending on their knowledge, skills and role, as well as the setting in which care is provided.

These Guidelines will be of interest and relevance to pregnant women in Australia. In addition, it is expected that policy makers will be able to draw on the Guidelines in the development of policy and health services.

How to use the Guidelines

Part A of the Guidelines includes information on optimising antenatal care for specific groups of women — migrant and refugee women and women with mental health disorders. It is intended to be used in conjunction with Part A of Module I, which outlines the basics of providing woman-centred care and includes information on optimising antenatal care for Aboriginal and Torres Strait Islander women, adolescent women and women in rural and remote settings.

Part B of the Guidelines discusses aspects of clinical care during pregnancy. Each section provides background information about the topic, discusses the available evidence and highlights points to include when discussing the topic with women. A practice summary is included for each topic. These provide information on when during pregnancy a topic is relevant and who may be involved in a providing care and/or information. The role of the health professionals involved will depend on their expertise, a woman's needs and the setting where care is provided.

Implementation and review

It is anticipated that a web-based approach be taken to dissemination, with the Guidelines being published on the Department of Health and Ageing website. Key messages from the Guidelines may also be implemented through a number of existing initiatives.

A multidisciplinary team has been convened to contribute to the design and execution of strategies aiming to increase the uptake of the Guidelines through liaison with professional groups and promotion of the recommendations. The team includes representation from midwifery, general practice, obstetrics, rural and remote health, Aboriginal and Torres Strait Islander health, and consumers. A range of implementation strategies will be employed, informed in some cases by an assessment of the likely barriers to uptake of the recommendations. Potential implementation strategies include: education through meetings, conferences and presentations; outreach education; and opinion leaders.

Implementation of the Guidelines is discussed in greater detail in Appendix C.

[2] Also referred to as child and family health nurses in some jurisdictions.

PART A — OPTIMISING ANTENATAL CARE

1 Principles of care

In 1998 the World Health Organization (WHO) proposed a set of principles of perinatal care (WHO 1998) that endorse the protection, promotion and support necessary for effective antenatal and postnatal care (Chalmers et al 2001). These principles are embedded in the approach to care outlined in these Guidelines and are included in Table 1.1.

Table 1.1: WHO principles of perinatal care

Care for women with a normal pregnancy and birth should be demedicalised
Pregnancy and birth should be viewed as a natural process in life and essential care should be provided to women with the minimum set of interventions necessary.
Care should be based on the use of appropriate technology
Sophisticated or complex technology should not be applied when simpler procedures may suffice or be superior.
Care should be evidence-based
Care should be supported by the best available research, and by randomised controlled trials where possible and appropriate.
Care should be local
Care should be available as close to the woman's home as possible and based on an efficient system of referral from primary care to tertiary levels of care.
Care should be multidisciplinary
Effective care may involve contributions from a wide range of health professionals, including midwives, general practitioners, obstetricians, neonatologists, nurses, childbirth and parenthood educators.
Care should be holistic
Care should include consideration of the intellectual, emotional, social and cultural needs of women, their babies and families, and not only their physical care.
Care should be woman-centred
The focus of care should be meeting the needs of the woman and her baby. Each woman should negotiate the way that her partner and significant family or friends are involved. Care should be tailored to any special needs a woman may have.
Care should be culturally appropriate and culturally safe
Care should consider and allow for cultural variations in meeting these expectations.
Care should provide women with information and support so they can make decisions
Women should be given evidence-based information that enables them to make decisions about care. This should be provided in a format that the woman finds acceptable and can understand.
Care should respect the privacy, dignity and confidentiality of women
All women have the right to be treated with respect and dignity, have their privacy respected, and be assured that all their health information is confidential.

1.1.1 References

Chalmers B, Mangiaterra V, Porter R (2001) WHO principles of perinatal care: the essential antenatal, perinatal, and postpartum care course. *Birth* 28: 202–07.

WHO (1998) *Workshop on Perinatal Care. Report on a WHO Expert Meeting.* Venice 16–18 April 1998. Copenhagen: World Health Organization Regional Office for Europe.

2 Antenatal care for migrant and refugee women[3]

While many migrant and refugee women experience healthy pregnancies, issues associated with resettlement can contribute to poorer perinatal outcomes than those experienced by women in general. While the diversity of circumstances and experiences is acknowledged, this chapter highlights general considerations in improving the experience of antenatal care for migrant and refugee women.

The term 'migrant and refugee' is used in these Guidelines to refer both to women who are voluntary migrants and women who come to Australia as refugees, humanitarian entrants or asylum seekers. Migrants and refugees are also often referred to as people of *culturally and linguistically diverse background*, people from *non-English–speaking background* or people who speak a *language other than English*.

2.1 Background to culturally safe antenatal care

"Caring for individuals from diverse backgrounds is a daily reality for nurses and midwives, who are expected to provide care which is both clinically safe and culturally sensitive." (Williamson & Harrison 2010)

Although more than a quarter of women who gave birth in Australia in 2010 were not born in Australia (Li et al 2012), there is little information on the pregnancy outcomes of migrant and refugee women. National data suggest similar rates of perinatal death among babies of women born in Australia and those born overseas (Li et al 2012). However, retrospective studies suggest that outcomes vary with country of birth (Drysdale et al 2012) and use of interpreters, but not refugee status (Thomas et al 2010).

There is significant heterogeneity among migrant and refugee women and their experience of antenatal care. Women bring with them the knowledge and practices from their home countries. Expectations of early antenatal attendance vary between countries. For example, more than half (57%) of women giving birth in NSW in 2004 who were originally from a developing country first attended for antenatal care later than 12 weeks in the pregnancy (Trinh & Rubin 2006). In NSW in 2006, 64.9% of mothers born in Melanesia, Micronesia and Polynesia and 72.8% of mothers born in the Middle East and Africa commenced antenatal care before 20 weeks gestation, compared with 89.6% of mothers born in English-speaking countries (CER 2007). Expectations of the birth experience are also strongly influenced by cultural views and practices (Hoang et al 2009).

Over the past 10 years, an increasing proportion of refugee and humanitarian entrants to Australia has come from Africa, the Middle East and Southeast Asia; about 30% are women aged 12–44 years (Correa-Velez & Ryan 2012). Refugee women are more likely than other women to have complex medical and psychosocial problems and may face additional barriers in accessing antenatal care (Correa-Velez & Ryan 2012).

2.1.1 Factors affecting uptake of antenatal care

Migrant and refugee women are diverse, and have differing issues and outcomes. As well as cultural background, women's experiences differ with migration status, educational level and prior experience of pregnancy and birth. However, there are some common issues that can affect uptake of antenatal care by migrant and refugee women. These include (McCarthy & Barnett 1996; Carolan & Cassart 2010; Phiri et al 2010; Murray et al 2011; Boerleider et al 2013):

- *migration factors*: lack of knowledge of or information about the Western healthcare system (including rights in relation to tests and treatments), arriving in the new country late in pregnancy; history of grief, loss and/or trauma in addition to migration;
- *cultural factors*: adherence to cultural and religious practices, poor language proficiency, lack of assertiveness, partner/family perception of antenatal care, perceiving pregnancy as not requiring health professional involvement, belief that antenatal care is more a burden than a benefit, belief that antenatal classes are not necessary;

[3] This section is a revised version of material included in Module I of the Guidelines.

- *position in host country*: financial problems, unemployment, low or intermediate educational level, social inequality (education, economic resources and residence [rural or urban]), lack of time, lack of childcare, no medical leave from work;
- *social network*: lack of usual female family and community support systems, isolated community;
- *accessibility*: inappropriate timing and incompatible opening hours, transport and mobility problems, indirect discrimination, lack of suitable resources (eg female interpreters);
- *expertise*: health professional lacking knowledge of cultural practices; and
- *personal treatment and communication*: poor communication, perception of having been badly treated by a health professional.

Health care costs and access to health services can be an issue for some women. Women who are asylum seekers may be ineligible for either Medicare or Centrelink Health Care Cards. Women who are skilled migrants and international students may also have restricted health care access because they don't have Medicare entitlements. While overseas students are required to maintain Overseas Student Health Cover for the duration of their time in Australia, pregnancy-related services may not be covered in the first 12 months of membership.

Even when care can be accessed, women who have no previous experience with a western health care system may have limited understanding of reasons for antenatal visits, medical procedures and use of technology. They may not feel confident to ask questions or participate in discussions about their care plan or birth options. Different cultural beliefs may also influence aspects of antenatal care such as involvement of the father in pregnancy and childbirth, acceptance of tests and interventions, willingness to be cared for by a midwife rather than a doctor or a woman rather than a man, understanding of dates and times of appointments, and knowledge about medical aspects of pregnancy.

2.1.2 Issues affecting women from particular groups

Different groups of migrant and refugee women face specific issues that may affect their experience of pregnancy and birth. Increased awareness of such issues and the differences between groups will help to promote better antenatal care of women from migrant and refugee backgrounds.

- *Women who arrive in Australia as refugees:* Prior to migration, many refugees experience poor health (including oral health, co-existing health issues and inadequate nutrition) and experience poverty, discrimination, trauma and violence in their countries of origin and in countries of displacement. These experiences cause significant psychological distress, manifesting in symptoms of anxiety, depression, post-traumatic stress, poor sleep and concentration. These symptoms can continue to affect women's lives as they face further emotional challenges in the resettlement period. Early intervention and referral to appropriate counselling services should always be offered and assistance in accessing services provided. Refugee women may fear authority figures, including health professionals, due to past experiences and may also have financial, employment and housing issues. Women in this situation will require reassurance and explanation of the care offered to them, including tests, procedures and pregnancy risks. More time may be needed, and specific strategies used (often in collaboration with other services and migrant agencies) to build necessary confidence and trust.
- *Women affected by Female Genital Mutilation (FGM)*: FGM is the collective term used to describe the cultural practice of cutting or removal of either a part, or the whole external female genitalia. Some of these procedures are minor, while others involve significant change and have an impact during the antenatal period. Depending on the degree of FGM, women may require referral to services offering specialised care and support. Some women may need to be deinfibulated to enable ongoing clinical assessment and avoid complications; this is usually performed in the second trimester but the first trimester is the optimum time to discuss the procedure.

- *Women in higher risk groups:* Some migrant and refugee groups have higher rates of risk factors such as gestational diabetes, smoking in pregnancy and vitamin D deficiency. Lifestyle advice may need to take cultural issues into account (eg giving culturally relevant nutritional advice on managing gestational diabetes and educating both women and men about passive smoking as it may be men rather than women who smoke). Domestic violence is high among some communities, and may be hidden within the family structure and or the community. Screening for conditions endemic in the woman's country of origin may also be a consideration.

Health professionals are encouraged to develop an understanding of the issues facing families from the migrant and refugee groups that they regularly work with and to use this information to improve the appropriateness of their care.

2.2 Providing woman-centred care

"Establishing effective communication between a woman and her midwife [or other health professional] is essential for determining how culturally safe care can be instituted."
(Carolan & Cassar 2008)

The fundamentals of providing care discussed in Chapter 1 apply to all women. This section discusses issues specific to providing appropriate antenatal care for migrant and refugee women.

2.2.1 Improving women's experience of antenatal care

Taking an individualised approach

Factors that may improve the experience of antenatal care for migrant and refugee women include:

- taking the time to establish rapport and trust with each woman;
- being conscious of the need to avoid making assumptions based on a woman's culture, ethnic origin or religious beliefs;
- explaining the woman's entitlement to antenatal care and options for accessing it (eg community clinic or hospital-based setting);
- considering issues that may influence attendance at appointments, such as transport, cost considerations (access to Medicare rebates, need to attend a service that offers bulk billing, cost of procedures such as ultrasounds);
- considering a woman's support network (eg support from partner, family and friends, and family dynamics);
- consulting the woman about whom she would like to involve in her care and, if necessary, advocating on her behalf so that she receives appropriate care throughout pregnancy;
- respectfully exploring cultural and personal understanding and experience of pregnancy and appropriate self-care in pregnancy, and encouraging the woman to discuss anything she is worried or unsure about;
- explaining frequently used terms that the woman is likely to hear at antenatal appointments with different health professionals;
- explaining confidentiality and that the woman's privacy will be respected; and
- checking the woman's understanding of what has been discussed.

Practice point a

The care needs of migrant and refugee women can be complex. The first point of contact (eg first antenatal visit) is important and care should always be should be undertaken with an accredited health interpreter. Wherever possible, antenatal care should involve a multicultural health worker.

Multicultural health workers

In many states and territories, roles such as multicultural health workers have been developed. Multicultural health workers (also known as bicultural health workers) assist people from migrant and refugee communities to access health services. For example, a multicultural health worker might support a woman to attend antenatal appointments by booking or confirming appointments, helping

to fill out forms and questionnaires, assisting with transport and finding clinic locations. They may also provide direct services that are appropriate to women's culture and language, such as referral, group work, health education and community development. While the multicultural health worker may communicate with the woman in her preferred language, the role differs from that of an interpreter in that a wider range of services is provided, and a continuing relationship is generally formed between the health worker and the woman and her family. While there is little evidence specific to antenatal care, a systematic review of the literature on culturally appropriate interventions to manage or prevent chronic disease in migrant and refugee communities found that the use of multicultural health workers can promote greater uptake of disease prevention strategies by migrant and refugee communities and also translate into greater knowledge and awareness about services (Henderson et al 2011).

Providing information and support so that women can make decisions

It may be necessary to use a variety of means to communicate effectively with women from migrant and refugee backgrounds. Information should be explained carefully and clearly, with the assistance of an accredited health interpreter.

Some words cannot be interpreted easily, and the health professional may need to explain the concept or give examples. It is important to agree on a set of terms that are mutually understood and if necessary use pictures. For example, using charts and models to demonstrate particular body parts can reduce misinterpretation. Acronyms and abbreviations should be avoided, as these can be confusing.

Written information should also be provided; this can serve as a prompt or can be shown to other health professionals who can then remind the woman or explain the information again. Literacy levels in the woman's own language should not be assumed. Video or audio resources may also be appropriate.

Interpreters

It is the responsibility of the health professional to make sure that communication is clear. Accredited health care interpreters assist by translating the discussion between the health professional and the woman, communicating with the woman in her preferred language either in person or through a telephone service. Involving an accredited interpreter, preferably with training in medical terminology, is recommended for all antenatal appointments if the health professional and the woman have difficulty communicating.

Interpreters accredited by NAATI (National Association of Accreditation for Translators and Interpreters) have been assessed as having a high level of technical competence in both English and one or more other languages and are bound by a code of ethics including strict confidentiality. However, there is a shortage of accredited interpreters, particularly for languages of new and emerging communities. While involvement of female interpreters is preferable in antenatal care, their availability may also be limited.

Non-accredited interpreters, including partners, family and friends, should not be used as they are less able to convey complex medical information in an accurate and non-emotive way. Their involvement may also discourage the woman from disclosing information fully, out of embarrassment or fear of breach of confidentiality. In emergency situations where the timing of decision-making is crucial, it may be necessary for non-accredited interpreters to assist with communication but it is not appropriate to involve people under 18 years of age in this role. Staff members who speak the relevant language may provide language assistance but should not be asked to act as interpreters. Organisational policy should be followed at all times and an accredited interpreter (in person or through a telephone service) sought as quickly as possible. The decision to involve a non-accredited interpreter should be documented in the woman's antenatal record.

Women may not request an interpreter as they believe there is a cost involved or be unaware that such a service exists. Women may also be sensitive about their level of English proficiency and may have concerns about confidentiality. However, it is important that the onus for using an interpreter is not on the woman.

Practice point b

Health professionals should take the initiative in organising for an accredited health interpreter wherever necessary, and reassure the woman of the benefits if she is reluctant.

The use of interpreters can be promoted by (CEH 2009):

- having translated information in community languages in the reception area, stating that accredited interpreters are available and free of charge;
- advising individual women verbally that interpreters are available and free of charge; and
- including information about the code of ethics of accredited interpreters regarding confidentiality, accuracy and the procedure for working with interpreters.

Table 2.1: Involving an interpreter

Suggest the use of an interpreter and, if the woman wants an interpreter, provide a female interpreter where possible
Do not use the woman's partner, friends or relatives to act as interpreters unless absolutely necessary
Ask the woman simple questions about her personal details to assess her ability to communicate in English
A telephone interpreter could be introduced at this point if communication is difficult
Ask the woman what main language she speaks at home
Check if a dialect is spoken or if the woman is of a particular ethnicity
Explain that the use of an interpreter is just as important for your understanding as for her own
Decide which type of interpreter is going to be most suitable (eg telephone or onsite)
Consider confidentiality (eg in small communities, the woman may know the interpreter)
Consider ethnicity of the interpreter (eg when the woman and interpreter come from countries where there has been political or civil unrest)

Source: Adapted from CEH (2009).

2.3 Service delivery issues for migrant and refugee women

"Pregnant women who are recent migrants, asylum seekers or refugees, or who have difficulty reading or speaking English, may not make full use of antenatal care services. This may be because of unfamiliarity with the health service or because they find it hard to communicate with healthcare staff." (National Collaborating Centre for Women's and Children's Health 2010)

Experiences of antenatal care among migrant and refugee women may be improved through (State Perinatal Reference Group 2008):

- social support, for example through ethnic-specific cultural liaison officers and women's groups, to maintain cultural connections with the traditions, birthing ceremonies and rituals of women's countries of origin;
- individualised care, informed by cultural awareness and understanding among health professionals, including knowledge of cultural traditions and practices relevant to pregnancy and birth and associated expectations of women, especially of groups in the local community;
- a cross-cultural approach to communication based on recognition of the culture of the woman and the health professional;
- cultural brokerage, for example through maternity liaison officers/multicultural health workers who can help women understand and navigate the health system, provide education and resources in relation to maternity care, act as a patient advocate and liaise between women and maternity staff, or through partnerships between English-speaking health professionals and multicultural resource centres;
- education, including linguistically appropriate information, parenting education workshops, education about accessing the health system, the different models of care available, and education for fathers/partners on antenatal issues; and
- culturally appropriate resources, including materials available in the woman's own language, resources in spoken format for women who lack literacy in their own languages, visual resources specifically designed to support antenatal care and access to accredited interpreter services during appointments or important events.

At a local level, individual services can assist health professionals by (National Collaborating Centre for Women's and Children's Health 2010):

- monitoring changing local needs and adjusting services accordingly;
- maintaining accurate information about each woman's current address and contact details during her pregnancy;
- offering flexible services in the number and length of antenatal appointments when interpreting services are used;
- assisting women to book in for their first antenatal appointment, particularly in areas where they are required to telephone a central service and be allocated an appointment at a specific hospital;
- ensuring continuity of care wherever possible; and
- disseminating information about pregnancy and antenatal services, including how to find and use services, in a variety of formats, settings and languages.

2.4 Resources

Consumer resources

Multicultural Health (Queensland Health) — Pregnancy and postnatal topics
http://www.health.qld.gov.au/multicultural/public/pregnancy.asp

Network of Immigrant and Refugee Women Australia Inc — http://www.nirwa.org.au

NSW Multicultural Health Communication Service — Pregnancy and postnatal topics
http://www.mhcs.health.nsw.gov.au/topics/Pregnancy_and_Post_Natal.html

Health professional resources

beyondblue (undated) *Perinatal Mental Health of Women from Culturally and Linguistically Diverse (CALD) Backgrounds. A Guide for Primary Care Health Professionals.* Melbourne: *beyondblue: the national depression initiative*.

Hach M (2012) *Common Threads: The Sexual and Reproductive Health Experiences of Immigrant and Refugee Women in Australia*. MCWH: Melbourne.

Mental Health in Multicultural Australia (MHiMA) — www.mhima.org.au

Royal Women's Hospital (2010) *Female Genital Mutilation – Maternity*.
www.thewomens.org.au/FemaleGenitalMutilationMaternity

Victorian Transcultural Psychiatry Unit (VTPU) — www.vtpu.org.au

Interpreters

- *Telephone Interpreting Service*: Free interpreting services for non-English speaking Australian citizens and permanent residents communicating with general practitioners and medical specialists in private practice and their reception staff.
  131 450
  www.immi.gov.au/living-in-australia/help-with-english/help_with_translating/free-services.htm#b
- *Doctors Priority Line*: A free telephone interpreting service for general practitioners and specialists providing services that are claimable under Medicare, delivered in private practices and provided to non-English speakers who are Australian citizens or permanent residents. The Doctors Priority Line is available 24 hours a day, seven days a week.
- NSW Health Standards Procedures for Working with Health Care Interpreters PD2006_053.
  www.health.nsw.gov.au/policies/pd/2006/PD2006_053.html

Overseas Student Health Cover

http://www.health.gov.au/internet/main/Publishing.nsf/Content/Overseas+Student+Health+Cover+FAQ-1

2.5 References

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Henderson S, Kendall E, See L (2011) The effectiveness of culturally appropriate interventions to manage or prevent chronic disease in culturally and linguistically diverse communities: a systematic literature review. *Health Social Care Comm* 19(3): 225–49.

Hoang HT, Le Q, Kilpatrick S (2009) Having a baby in the new land: a qualitative exploration of the experiences of Asian migrants in rural Tasmania, Australia. *Rural Remote Health* 9: 1084. http://www.rrh.org.au.

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Murray L, Windsor C, Parker E et al (2011) The experience of African women giving birth in Brisbane, Australia. *Health Care Women Int* 31(5): 458–72.

National Collaborating Centre for Women's and Children's Health (2010) *Pregnancy and Complex Social Factors: A Model for Service Provision for Pregnant Women with Complex Social Factors*. NICE Clinical Guidelines No. 110. London: RCOG Press.

Phiri J, Dietsch E, Bonner A (2010) Cultural safety and its importance for Australian midwifery practice. *Collegian* 17(3): 105–11.

Thomas P, Beckman M, Gibbons K (2010) The effect of cultural and linguistic diversity on pregnancy outcome. *Aust NZ J Obstet Gynecol* 50(5): 419–22.

Trinh LT & Rubin G (2006) Late entry to antenatal care in New South Wales, Australia. *Reprod Health* 18(3): 8.

3 Antenatal care for women with mental health disorders[4]

Mental health disorders have been identified as a leading cause of maternal morbidity and mortality in the UK (Lewis 2007) and as one of the top three causes of indirect maternal mortality in Australia (Austin et al 2007). There is increasing evidence that untreated maternal depression (Davalos et al 2012), stress and anxiety (Zelkowitz & Papageorgiou 2012) also adversely affect the developing fetus, with implications extending into childhood. Use of antidepressants in pregnancy has also been associated with adverse effects in the fetus and newborn. Assessment of the risks and benefits for the individual woman is appropriate when use of antidepressants is being considered (see Section 3.3).

Australian research indicates a high prevalence of depression and anxiety during pregnancy, with up to one in ten (9%) women experiencing depression (Buist & Bilszta 2006) and anxiety disorders likely to be as, or more, common (*beyondblue* 2011). Refugee women with a history of torture or trauma are at increased risk of mental health disorders, including anxiety and depression (Costa 2007).

While specific data on low prevalence mental health disorders (eg schizophrenia, bipolar disorder, severe personality disorders) in pregnant women in Australia are not available, recent studies suggest that schizophrenia is present in 1% of the population world wide, lifetime prevalence of bipolar disorder in Australia is estimated as 1.2% (University NSW 2002) and personality disorders are present in 6.5% of Australian adults, with borderline personality disorder in approximately 1% (Jackson & Burgess 2000).

Practice point c

To match the needs, preferences and expectations of women with mental health disorders, maternity services need to work within collaborative and consultative frameworks. This includes clearly defining roles and responsibilities for everyone involved in a woman's care and working within established clinical networks and systems to facilitate timely referral and transfer to relevant services when appropriate. Continuity of care and carer also contribute to improved experiences for women.

3.1 Identifying and managing mental health disorders during pregnancy

"Depression and related disorders affect the wellbeing of the woman, her baby and her significant other(s) (eg partner), and have an impact on relationships within the family, during a time that is critical to the future health and wellbeing of children." (beyondblue 2011)

Early identification and management of mental health disorders can minimise their detrimental effects during pregnancy and early parenthood.

- *Depression and anxiety* during pregnancy are assessed using the Edinburgh Postnatal Depression Scale (EPDS)[5] and clinical judgement, as outlined in Part B of Module I of the Guidelines.
- *Bipolar disorder* is characterised by episodes of hypomania or mania and depression (APA 2000). Women who have already experienced bipolar disorder have a significant risk of relapse in the early postnatal period. Relapse may also occur during pregnancy, especially if a woman ceases medication when planning to become pregnant or on confirmation of pregnancy.
- *Puerperal psychosis* is a relatively rare but severe psychotic illness with risks of potential serious self or infant harm. While puerperal psychosis is rare in the general population (1–2 women per 1,000 live births), women who have had bipolar disorder or a previous episode of puerperal psychosis have a one in two chance of puerperal psychosis recurring in the early postpartum period. Preventive medication from immediately after the birth is usually indicated (Bergink et al 2012). Psychiatric referral antenatally is essential.

4 This section is a revised version of material included in Module I of the Guidelines.

5 While the Edinburgh Postnatal Depression Scale was developed for use postnatally, antenatal evaluation is generally associated with an adequate sensitivity and specificity to detect depressive symptoms antenatally. There is also evidence to support its use in detecting symptoms of anxiety.

- *Borderline personality disorder* typically emerges in adolescence or young adulthood (Chanen et al 2007) and has a higher prevalence (Moran et al 2006) and number of symptoms (Cohen et al 2005) at this time (eg in childbearing years). It is characterised by a pattern of instability of interpersonal relationships, self-image and affects, and marked impulsivity (APA 2000) and is associated with severe impairment of psychosocial function and a high risk of self-harm or suicide (Leichsenring et al 2011). Recognising borderline personality disorder allows health professionals to better tailor treatment goals and expectations, manage personal reactions, set effective boundaries and avoid potential confrontations (Ricke et al 2012).
- *Schizophrenia* is characterised by delusions, hallucinations, disorganised speech, grossly disorganised or catatonic behavior and negative symptoms (ie low levels of emotion, loss of motivation), with one or more major areas of functioning such as work, interpersonal relations or self-care markedly below the level achieved prior to the onset (APA 2000).

Practice point d

Women should be asked about symptoms and history of mental health disorders early in pregnancy and complete the EPDS at least once, preferably twice, during pregnancy (see Module I).

It is appropriate for health professionals in primary care to have an understanding of the basic issues facing women with mental health disorders. Involvement in management will depend on the health professional involved and the available local pathways to care. For example, a GP may access the relevant Medicare items to develop a mental health care plan with the woman, while a midwife may provide ongoing care and support to the family, seeking the advice of a mental health nurse or GP if required. Clinical practice guidelines developed for the general population may be useful (see Section 3.3). Overall, collaboration with the woman and her family and providing compassionate and non-judgemental care are the cornerstones of management.

For more severe mental health issues, such as bipolar disorder and schizophrenia, working collaboratively with trained mental health professionals is recommended where possible. When risk of suicide is identified (eg through question 10 of the EPDS; see Section 7.6, Module I) immediate referral to a psychiatrist or other mental health professional is required.

Sources of information about mental health disorders in perinatal practice and mental health referral and advice are included in Section 3.3.

Table 3.1: Components of care for minimising the detrimental effects of mental health disorders

Women are assessed during pregnancy for symptoms of high prevalence mental health disorders (depression and anxiety) and asked about their personal and family history of mental health disorders
Women with symptoms of a mental health disorder are linked with appropriate services
Women are given appropriate information about the purpose, process and voluntary nature of proposed clinical assessments and screening tests
Care for women who have experienced, received treatment for, or are currently experiencing low prevalence mental health disorders, is provided in collaboration with relevant mental health professionals, with continuing care provided by a health professional with whom the woman has established trust
Current psychotropic medicine use is discussed and women receive appropriate information on the risks/benefits of treatment, timing of onset of effect and risk of relapse if medicines are discontinued
Preventive treatment is considered for women at risk of bipolar disorder or puerperal psychosis
When risk of suicide or harm to the baby is identified, immediate safety is assessed and referral made to a psychiatrist or other mental health professional
If there are concerns about a woman's attitude to the fetus or capacity to manage parenthood, relevant agencies (eg child protection services) are involved.

3.2 Understanding the woman's perspective

"Primary care health professionals who do not deliver treatments can still provide ongoing support for women experiencing depression and related disorders. This is likely to involve assisting the woman and her significant other(s) to understand the condition and available treatments and providing ongoing psychosocial support." (beyondblue 2011)

Mental health disorders can complicate a woman's experience of antenatal care. While levels of resilience and risk vary, a woman experiencing mental health disorders during pregnancy may benefit if health professionals have an understanding of how her situation affects her acceptance of and response to antenatal care.

- *Attending antenatal care*: Attending antenatal care visits may be difficult (eg due to lack of motivation in women experiencing depression, fears, perceptions of stigma).
- *Physical contact:* Women who have experienced physical or sexual abuse or complex traumas (eg in borderline personality disorder) may experience distress when touched, even by people who are close to them.
- *Clinical assessments and screening tests:* Women may be reluctant to accept the offer of assessments and tests for a range of reasons (eg anxiety about the results, risks associated with tests, belief in non-intervention, not wanting to reveal history of domestic violence).

The antenatal care of women with mental health disorders can also present challenges for the health professionals involved (eg requests or demands for early birth and repeated self harm among women with borderline personality disorder). Section 3.3 includes resources that discuss specific issues associated with mental health disorders during pregnancy (eg psychotropic medications, attitude to the baby, sleep difficulties).

3.3 Resources

Health professional resources

beyondblue (2011) *Clinical Practice Guidelines Depression and Related Disorders — Anxiety, Bipolar Disorder and Puerperal Psychosis — in the Perinatal Period. A Guideline for Primary Care Health Professionals*. Melbourne: *beyondblue: the national depression initiative*. http://www.beyondblue.org.au/index.aspx?link_id=6.1246

beyondblue (undated) *Perinatal Mental Health of Women from Culturally and Linguistically Diverse (CALD) Backgrounds. A Guide for Primary Care Health Professionals.* Melbourne: *beyondblue: the national depression initiative*.

beyondblue (undated) Perinatal Depression and Anxiety. Evidence Relating to Infant Cognitive and Emotional Development. Information for Health Professionals. Melbourne: *beyondblue: the national depression initiative*.

beyondblue (undated) Puerperal (Postpartum) Psychosis. A Guide for Primary Health Care Professionals. Melbourne: *beyondblue: the national depression initiative*.

beyondblue (undated) Bipolar Disorder During Pregnancy and Early Parenthood. A Guide for Primary Care Health Professionals. Melbourne: *beyondblue: the national depression initiative*.

Galbally M, Roberts M, Buist A et al (2010) Mood stabilizers in pregnancy: a systematic review. *Aust NZ J Psychiatry* 44(11): 967–77.

Galbally M, Snellen M, Walker S et al (2010) Management of antipsychotic and mood stabilizer medication in pregnancy: recommendations for antenatal care. *Aust NZ J Psychiatry* 44(2): 99–108.

Nguyen TN, Faulkner D, Allen S et al (2010) Managing pregnant women with serious mental illness: using the Edinburgh Postnatal Depression Scale as a marker of anxiety and depressive symptoms. *Aust NZ J Psychiatr* 44(11): 1036–42.

Paris J (2005) Borderline personality disorder. *CMAJ* 172(12): 1579–83.

Solari H, Dickson KE, Miller L (2009) Understanding and treating women with schizophrenia during pregnancy and postpartum–Motherisk Update 2008. *Can J Clin Pharmacol* 16(1): e23–32.

SA Perinatal Practice Guidelines Workgroup (2009; reviewed 2010) Chapter 143 Psychosis in pregnancy and postpartum. In: *South Australian Perinatal Practice Guidelines*. Adelaide: SA Health. http://www.health.sa.gov.au/ppg/Default.aspx?tabid=91

SA Perinatal Practice Guidelines Workgroup (2010) Chapter 144 Eating disorders in pregnancy. In: *South Australian Perinatal Practice Guidelines*. Adelaide: SA Health. http://www.health.sa.gov.au/ppg/Default.aspx?tabid=91

SA Perinatal Practice Guidelines Workgroup (2011) Chapter 146 Personality disorders. In: *South Australian Perinatal Practice Guidelines*. Adelaide: SA Health. http://www.health.sa.gov.au/ppg/Default.aspx?tabid=91

WA Dept Health (2008) *Healthy Babies for Mothers with Serious Mental Illness: A Case Management Framework for Mental Health Clinicians.* http://www.nmahsmh.health.wa.gov.au/projects/docs/Healthy_babies_clinicians_manual.pdf

Health professional websites

http://thinkgp.com.au/beyondblue (online training in assessing and managing mental health disorders)

http://www.adelaide.edu.au/library/guide/med/menthealth/guidelines.html#personality (personality disorders)

http://www.thewomens.org.au (drug information)

Consumer resources

The Beyond Babyblues Guide to Emotional Health and Wellbeing During Pregnancy and Early Parenthood. http://www.beyondblue.org.au/resources/for-me/pregnancy-and-early-parenthood

Hey Dad — First 12 Months Booklet. http://www.beyondblue.org.au/resources/for-me/pregnancy-and-early-parenthood

Managing Mental Health Conditions during Pregnancy and Early Parenthood. A Guide for Women and their Families. http://www.beyondblue.org.au/resources/for-me/pregnancy-and-early-parenthood

Consumer websites

beyondblue — 1300 22 4636, http://www.beyondblue.org.au

Black Dog institute — http://www.blackdoginstitute.org.au/public/depression/inpregnancypostnatal/babyblues.cfm

Children of Parents with a Mental Illness (COPMI) — http://www.copmi.net.au

Mindhealth*connect* — http://www.mindhealthconnect.org.au/

Post and Antenatal Depression Association Inc (PANDA) — 1300 726 306, http://www.panda.org.au

Mental health referral and advice

- The *beyondblue* website (www.beyondblue.org.au) includes a directory of health professionals in mental health, including psychologists, social workers and mental health nurses.
- The headspace Knowledge Centre provides information about treatment interventions and models of care for young people with mental health and substance use issues. http://www.headspace.org.au/knowledge-centre/
- The Black Dog Institute offers education and training programs, resources and online learning for health professionals with a focus on depression and bipolar disorder. http://www.blackdoginstitute.org.au/healthprofessionals/index.cfm
- square — Suicide, Questions, Answers and Resources — is an integrated suicide prevention resource that is part of the National Suicide Prevention Strategy. http://square.org.au/
- The Living Is For Everyone (LIFE) website is a suicide and self-harm prevention resource designed for people across the community who are involved in suicide and self-harm prevention activities. http://www.livingisforeveryone.com.au/
- The GP Psych Support service provides GPs with patient management advice from psychiatrists within 24 hours. Phone: 1800 200 588; Fax: 1800 012 422; Email: http://www.psychsupport.com.au.

Government funding to receive treatment from psychiatrists, psychologists, appropriately trained GPs, social workers, occupational therapists and mental health nurses can be accessed through initiatives including:

- Access to Allied Psychological Services (ATAPS) http://www.health.gov.au/internet/main/publishing.nsf/content/mental-boimhc-ataps
- Better Access initiative (Medicare items) http://www.health.gov.au/internet/main/publishing.nsf/Content/mental-ba
- Better Outcomes in Mental Health Care http://www.health.gov.au/internet/main/publishing.nsf/content/mental-boimhc
- Mental Health Nurse Incentive Program http://www.medicareaustralia.gov.au/provider/incentives/mental-health.jsp

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Austin M-P, Kildea S, Sullivan E (2007) Maternal mortality and psychiatric morbidity in the perinatal period: challenges and opportunities for prevention in the Australian setting. *Med J Aust* 186: 364–67.

Bergink V, Bouvy PF, Vervoort JS et al (2012) Prevention of postpartum psychosis and mania in women at high risk. *Am J Psychiatry* 169(6): 609–15.

beyondblue (2011) *Clinical Practice Guidelines Depression and Related Disorders — Anxiety, Bipolar Disorder and Puerperal Psychosis — in the Perinatal Period. A Guideline for Primary Care Health Professionals*. Melbourne: *beyondblue: the national depression initiative*. http://www.beyondblue.org.au/index.aspx?link_id=6.1246

Buist A & Bilszta J (2006) *The beyondblue National Postnatal Screening Program, Prevention and Early Intervention 2001–2005, Final Report.* Vol 1: National Screening Program. Melbourne: *beyondblue.*

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Davalos DB, Yadon CA, Tregellas HC (2012) Untreated prenatal maternal depression and the potential risks to offspring: a review. *Arch Womens Ment Health* 15: 1–14.

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Lewis G (ed) 2007 *The Confidential Enquiry into Maternal and Child Health (CEMACH). Saving Mothers' Lives: Reviewing Maternal Deaths to Make Motherhood Safer – 2003-2005.* The Seventh Report on Confidential Enquiries into Maternal Deaths in the United Kingdom. London: CEMACH.

Moran P, Coffey C, Mann A et al (2006) Personality and substance use disorders in young adults. *Br J Psychiatry* 188: 374–79.

Ricke AK, Lee MJ, Chambers JE (2012) The difficult patient: borderline personality disorder in the obstetrical and gynecological patient. *Obstet Gynecol Surv* 67(8): 495–502.

Udechuku A, Nguyen T, Hill R et al (2010) Antidepressants in pregnancy: a systematic review. *Aust N Z J Psychiatry* 44(11): 978–96.

University NSW (2002) New treatment for manic depression. *Media, News & Events* 22 April. http://www.unsw.edu.au/news/pad/articles/2002/apr/treatmentmanicdepression.html

Zelkowitz P & Papageorgiou A (2012) Easing maternal anxiety: an update. *Womens Health (Lond Engl)* 8(2): 205-13.

PART B — CLINICAL CARE DURING PREGNANCY

4 Core practices in antenatal care

4.1 Antenatal visits

Each antenatal visit should be structured around specific content that is based on the woman's needs. Incorporating assessments and tests into visits minimises inconvenience to the woman.

4.1.1 Content of the first antenatal visit[6]

The first contact with a woman in the antenatal period may be when she attends primary care to confirm the pregnancy. Women will either start antenatal care at that point or be referred to a maternity care provider or service; for example, the local hospital, midwife, obstetrician, GP or Aboriginal health service. Women intending to give birth in hospital will attend a booking visit. This may be their first visit at the hospital if they are receiving care through this service or later in pregnancy if they are receiving care through a private provider.

The first antenatal visit should be longer than most later visits because of the volume of information that needs to be exchanged in early pregnancy. If there is insufficient time in the first antenatal visit, another appointment can be arranged to cover "first visit" activities or these can be incorporated into care as the pregnancy progresses.

Women should be seen alone at least once during pregnancy, particularly during the first antenatal visit, as the presence of the woman's partner may be a barrier to disclosure of domestic violence or other aspects of the woman's personal history.

The need to discuss the many assessments and screening tests that are offered to women in the first trimester contributes to the length of the first visit. It is important to explain that no assessment or screening test is compulsory and that women have the right to make informed decisions. Considerations in discussing specific tests and available resources to assist with explanation are included in Chapter 7.

Additional time may be required for the first antenatal visit for women who have:

- limited experience of the health system or a limited understanding of health care processes — clear explanation of the reasons for antenatal visits, the need for tests and screening and the use of technology is needed;
- limited understanding of English — accredited interpreters should be involved and time for interpretation taken into consideration (see Section 2.2.1);
- hearing impairment — use of Auslan (Australian Sign Language) should be used to facilitate communication;
- past experiences that affect their trust in authorities or health professionals — reassurance and explanation of the care being offered and collaboration with other services may be required to build necessary confidence and trust;
- psychosocial circumstances that may mean they need more intensive psychosocial support (eg young women, women with vulnerabilities); or
- other conditions that usually require additional care (see Table 4.2).

[6] This section is a revised version of material included in Section 6.3 of Module I of the Guidelines.

Table 4.1: Content of first antenatal visit

Woman-centred care
• Seek woman's thoughts, views and opinions
• Ask open-ended questions and provide an opportunity to discuss issues and ask questions
• Offer verbal information supported by written or other appropriate form of information (on topics such as diet and lifestyle, available pregnancy care services, maternity benefits, screening tests, breastfeeding)
• Discuss involvement of the woman's partner/family in antenatal care, using gender neutral language until the gender of the partner is established
• Provide emotional support and empathy
• Discuss any costs that may be involved in a woman's antenatal care
General assessment
• Undertake a **comprehensive history** including:
– current pregnancy (planned, unplanned, wishes to proceed with or terminate the pregnancy)
– medical (past history, medicines, family history [high blood pressure, diabetes, genetic conditions], cervical smears, immunisation, breast surgery)
– obstetric (previous experience of pregnancy and birth)
– infant feeding experiences
– nutrition and physical activity (see Section 4.1.3)
– smoking, alcohol and other substance misuse (see Section 4.1.3)
– expectations, partner/family involvement, cultural and spiritual issues, concerns, knowledge, pregnancy, birth, breastfeeding and infant feeding options
– factors that may affect the pregnancy or birth (eg female genital mutilation)
– social factors affecting the woman's emotional health and wellbeing (including domestic violence; see Section 7.7, Module I)
– the woman's support networks and information needs
• **Clinical assessment** (see Chapter 6 and Module I, Chapter 7):
– discuss conception and date of last menstrual period and offer ultrasound scan for gestational age assessment (carried out between 8 and 14 weeks of pregnancy)
– measure height and weight and calculate body mass index
– measure blood pressure
– test for proteinuria
– delay auscultation of fetal heart until after 12 weeks gestation if using a Doppler and 28 weeks gestation if using Pinard stethoscope
– assess risk of pre-eclampsia and advise women at risk that low-dose aspirin from early pregnancy (preferably before 16 weeks) may be help to prevent it
– assess risk of preterm birth and provide advice on risk and protective factors
– ask questions about psychosocial factors that affect mental health
– administer the EPDS at this visit or as early as practical in pregnancy
• **Maternal health screening** (see Chapter 8 and Module I, Chapter 8):
– check blood group and antibodies, full blood count and haemoglobin concentration and consider testing ferritin in areas where prevalence of iron-deficiency anaemia is high
– offer testing for hyperglycaemia to women with risk factors for type 2 diabetes
– consider additional testing for haemoglobin disorders (iron studies, haemoglobin electrophoresis) for women at high risk
– offer testing for HIV, hepatitis B, rubella non-immunity, syphilis, and asymptomatic bacteriuria
– offer testing for hepatitis C and gonorrhoea to women with identified risk factors
– offer chlamydia testing to all women who are younger than 25 years
– in areas with a high prevalence of sexually transmitted infections, consider offering chlamydia and gonorrhoea testing to all pregnant women
– offer testing for trichomoniasis to women who have symptoms

- **Maternal health screening** (continued):
  - offer cytomegalovirus testing to women who have frequent contact with large numbers of very young children
  - offer thyroid function testing to women who have symptoms or high risk of thyroid dysfunction
  - offer testing for vitamin D deficiency to women who have limited exposure to sunlight, dark skin or a pre-pregnancy BMI of >30
  - offer screening for chromosomal abnormalities
  - offer cervical screening to women who have not had a Pap smear within the last 2 years, to be carried out before 24 weeks
  - advise women about measures to avoid toxoplasmosis or cytomegalovirus infection

Assessment

- Estimated date of birth/gestational age
- Risk factors — physical, social, emotional
- Need for referral
- Need for further investigation/ treatment/ preventive care

Actions

- Advice on options for antenatal care and place of birth
- Referral if required
- Further investigation as required
- General advice (also for the partner/family) — pregnancy symptoms, supplements, smoking, nutrition, alcohol, physical activity, substance use, dental visits
- If required, access to counselling and termination (where permitted under jurisdictional legislation)
- Preventive interventions — folate, iodine, immunisations,[7] others as needed (eg iron supplement)

These Guidelines include recommendations on baseline clinical care for women with low-risk pregnancies but do not include information on the additional care that some women will require. Pregnant women with the conditions listed in Table 4.2 usually require care additional to that detailed in these Guidelines. Some resources that may assist in providing appropriate care are listed in Section 4.1.3.

Table 4.2: Women who may require additional care

Existing conditions

- Cardiovascular disease (eg hypertension, rheumatic heart disease)
- Other conditions (eg kidney disease, diabetes; thyroid, haematological or autoimmune disorders; epilepsy, malignancy; severe asthma; HIV, hepatitis B or hepatitis C infection)
- Mental health disorders
- Disability
- Overweight or underweight
- Female genital mutilation

Experiences in previous pregnancies

- Termination of pregnancy
- More than two miscarriages
- Preterm birth
- Pre-eclampsia or eclampsia
- Rhesus isoimmunisation or other significant blood group antibodies
- Uterine surgery (eg caesarean section, myomectomy or cone biopsy)
- Antenatal or postpartum haemorrhage
- Puerperal psychosis
- Four or more previous births

[7] See Part 3 of the NHMRC Immunisation Handbook for discussion of specific vaccinations, including Fluvax and vaccination against varicella zoster, during pregnancy.

- A stillbirth or neonatal death
- Gestational diabetes
- Small or large-for-gestational-age baby
- Baby with a congenital abnormality (structural or chromosomal)

Lifestyle considerations

- History of alcohol misuse
- Use of recreational drugs such as marijuana, heroin, cocaine (including crack cocaine), amphetamines (eg 'ice') and ecstasy

Psychosocial factors

- Psychosocial issues
- Developmental delay or other disabilities
- Vulnerability or lack of social support
- Previous experience of violence or social dislocation

Source: Adapted from NICE (2008).

4.1.2 Planning for subsequent antenatal visits

Determining the pattern of visits and the activities that are undertaken at each visit requires flexibility. Care should be collaboratively planned with the woman based on the needs identified through assessments, with a focus on continuity of care wherever possible. Planning should also take into account the involvement of the woman's partner/family. For women who start antenatal care late in pregnancy, arrangements will be needed to 'catch up' on information and assessments that are usually offered earlier in pregnancy.

At all visits, opportunities should be provided for the woman to share her expectations and experiences as well as discuss any issues and/or concerns that may have arisen since her last visit, including psychosocial support and mental health issues. Women should also be offered information on aspects of health in pregnancy and early parenthood (eg nutrition, alcohol, smoking, symptom relief if conditions common in pregnancy are being experienced, breastfeeding, reducing the risk of sudden and unexpected death in infancy [SIDU]). A woman's confidence in her ability to labour, give birth and look after her new baby should be supported throughout antenatal care and antenatal education should also support her in preparing for changes to her life and her relationship with her partner and understanding the physical and emotional needs of the baby. The woman's needs should dictate the type of information and support provided (eg while many women will benefit from written information, other forms of information such as audio or video are sometimes more suitable). The woman should also direct the type of issues and questions discussed.

Table 4.3 indicates appropriate stages of gestation for screening tests and clinical assessments, although flexibility is needed. Different women will need different aspects of care at different times. If any assessments or tests identify a need for follow-up, additional visits may be required.

Table 4.3: Additional specific activities at subsequent antenatal visits[8]

16–19 weeks
Review, discuss and record the results of all screening tests undertaken
Reassess planned pattern of care for the pregnancy and identify whether additional care or referral is needed
Assess fetal growth
Offer fetal anatomy scan to be carried out at 18–20 weeks gestation
Measure weight if this is likely to influence clinical management
20–27 weeks
Assess fetal growth
Discuss fetal movements — timing, normal patterns etc
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Measure weight if this is likely to influence clinical management
Test for hyperglycaemia between 24 and 28 weeks gestation
Repeat ferritin testing if levels were identified as low in the first trimester
28 weeks
Assess fetal growth
Discuss fetal movements
Screen for anaemia, blood group and antibodies
Offer Anti-D to rhesus-negative women
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Measure weight if this is likely to influence clinical management
Test for hyperglycaemia if this has not already been tested
Enquire about mental health and administer the EPDS at 28–30 weeks
29–34 weeks
Assess fetal growth
Discuss fetal movements
Review, discuss and record the results of tests undertaken at 28 weeks
Reassess planned pattern of care for the pregnancy and identify women who need additional care, arranging referral if required
Give information, with an opportunity to discuss issues and ask questions on preparation for labour and birth, including the birth plan, recognising active labour and positively managing the pain of normal labour (this may need to take place earlier in remote areas)
Discuss breastfeeding (eg skin-to-skin contact at birth, early feeding, rooming-in, attachment, exclusive breastfeeding, feeding on demand, partner support). Discuss safe infant formula feeding if a woman chooses to formula feed.
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Measure weight if this is likely to influence clinical management
Offer repeat ultrasound at 32 weeks to women whose placenta extended over the internal cervical os in the 18–20 week scan.
Offer a second dose of Anti-D to rhesus-negative women at 34 weeks

[8] Screening for gestational diabetes is not included in this table, as approaches to screening, diagnosis and treatment are currently being reviewed by a number of relevant organisations including the World Health Organization, Australasian Diabetes in Pregnancy Society, Royal Australian and New Zealand College of Obstetricians and Gynaecologists, the Royal Australian College of Pathologists and the New Zealand Ministry of Health.

35–37 weeks

Assess fetal growth
Discuss fetal movements
Give information, including care of the new baby, reducing risk of SUDI, newborn screening tests and vitamin K prophylaxis, psychosocial support available in the postnatal period including maternal and child health services and psychosocial supports, with an opportunity to discuss issues and ask questions
Assess fetal presentation by abdominal palpation from 36 weeks and confirm suspected malpresentation by ultrasound
For women whose babies are not a cephalic presentation, discuss a range of options, including external cephalic version for breech presentation
Screen for Group B streptococcus if organisational policy is to routinely screen all women
Measure blood pressure
Test for proteinuria in women who have clinical indications of or risk factors for pre-eclampsia (eg high blood pressure)
Measure weight if this is likely to influence clinical management

38–40 weeks

Assess fetal growth
Give information, including normal length of pregnancy, onset of labour, with an opportunity to discuss any fears and worries and ask questions
Discuss fetal movements
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Measure weight if this is likely to influence clinical management

Women who have not given birth by 41 weeks

Give information, including discussion about options for prolonged pregnancy (eg membrane sweeping), with an opportunity to discuss issues and ask questions
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Measure weight if this is likely to influence clinical management

Source: Adapted from NICE (2008).

4.1.3 Resources

AHMAC (2013) National Women Held Pregnancy Record. Canberra: Department of Health and Ageing.

AHMC (2010) National Maternity Services Plan. http://www.health.gov.au/internet/main/publishing.nsf/Content/maternityservicesplan.

Antenatal Care In: *Minymaku Kutju Tjukurpa Women's Business Manual, 4th edition*. Congress Alukura, Nganampa Health Council Inc and Centre for Remote Health. http://www.remotephcmanuals.com.au

Bouverie Centre (2012) *Guidelines for Healthcare Providers Working with Same-sex Parented Families.* Melbourne: Bouverie Centre, LaTrobe University, Vic Health.

Kruske S (2011) *Characteristics of Culturally Competent Maternity Care for Aboriginal and Torres Strait Islander Women.* Maternity Services Inter-jurisdictional Committee for the Australian Health Ministers' Advisory Council.

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RANZCOG (2005) *Termination of Pregnancy. A Resource for Health Professionals.* Melbourne: Royal Australian and New Zealand College of Obstetricians and Gynaecologists. http://www.ranzcog.edu.au/womenshealth/pdfs/Termination-of-pregnancy.pdf

Lifestyle considerations

DoHA (1998) *An Active Way to Better Health. National Physical Activity Guidelines for Adults.* Canberra: Australian Government Department of Health and Ageing. http://www.health.gov.au/internet/main/publishing.nsf/content/BC3101B1FF200CA4CA256F9700154958/$File/adults_phys.pdf

DoHA (1998) *Australian Guide to Healthy Eating. Background Information for Consumers.* Canberra: Australian Government Department of Health and Ageing. [under review] http://www.health.gov.au/internet/main/publishing.nsf/Content/health-pubhlth-publicat-document-fdcons-cnt.htm

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NHMRC (2005) *Nutrient Reference Values for Australia and New Zealand*. Canberra: National Health and Medical Research Council. http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/n35.pdf

NHMRC (2013) *Dietary Guidelines for Australian Adults*. Canberra: National Health and Medical Research Council. http://www.nhmrc.gov.au/guidelines/publications/n55.

Prevention

DoHA (2013) *Australian Immunisation Handbook*. 10th edition. Canberra: Department of Health and Ageing. http://www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/EE1905BC65D40BCFCA257B26007FC8CA/$File/handbook10.pdf

NHMRC (2005) *Screening to Prevent Cervical Cancer: Guidelines for the Management of Asymptomatic Women with Screen Detected Abnormalities*. Canberra: National Health and Medical Research Council. http://www.nhmrc.gov.au/guidelines/publications/wh39

SIDS & Kids Information Statements. http://www.sidsandkids.org/safe-sleeping/information-statements/

Domestic violence

NSW Domestic Violence Screening Form http://www0.health.nsw.gov.au/resources/nswkids/pdf/FINAL_DV_Snapshot8_2010.PDF (see Appendix 2)

Robinson E & Moloney L (2010) *Family Violence. Towards a Holistic Approach to Screening and Risk Assessment in Family Support Services*. Australian Family Relationships Clearinghouse. Canberra: Australian Institute of Family Studies.

Sexually transmitted infections

NSW STI Programs Unit (2013) *General Practice Resources.* Sydney: NSW STI Programs Unit. http://www.stipu.nsw.gov.au/page/General_Practice_Resources/

Western Australia Silver book, http://silverbook.health.wa.gov.au/

Queensland Sexual Health Clinical Management Guidelines, http://www.health.qld.gov.au/sexhealth/documents/cm_guidelines.asp,

Sexual Health Society of Victoria national STI guidelines, http://www.mshc.org.au/Guidelines/NationalManagementGuidelinesForSTIs/tabid/278/Default.aspx

4.1.4 References

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4.2 Preparing for pregnancy, childbirth and parenthood

Structured antenatal education that is suited to the individual can help women to be informed about pregnancy, birth and parenting. Psychological preparation for parenthood may have benefits for parents' mental health, parenting and infant development.

4.2.1 Background

Structured education in preparation for childbirth and parenthood has come about as traditional methods of information sharing have declined (Gagnon & Sandall 2007). Many maternity health care providers, including public health departments, hospitals, private agencies and charities, and obstetricians' and midwives' practices, provide antenatal education for expectant parents. Antenatal education may be delivered one-on-one or in groups (eg in a women's group, couples' workshop or a class situation).

Antenatal education programs have a range of aims including (Gagnon & Sandall 2007):

- influencing health behaviours;
- building women's confidence in their ability to labour and give birth;
- preparing women for the pain of labour and supporting their ability to give birth without pain relief (Leap et al 2010);
- preparing women and their partners for childbirth;
- discussing breastfeeding;
- preparing for parenthood (eg changes in relationships, physical and emotional needs of the baby, balancing the needs of the newborn and other children);
- developing social support networks;
- promoting confident parenting; and
- contributing to reducing perinatal morbidity and mortality.

Antenatal education programs generally cover a range of topics and may include:

- physical wellbeing (nutrition, physical activity, smoking, alcohol, oral health);
- emotional wellbeing and mental health during pregnancy and after the baby is born (adapting to change, expectations, coping skills, knowing when to get help);
- labour (stages of labour, positions, breathing and relaxation, support, pain relief);
- birth (normal birth, assisted births, caesarean section, perineal tears);
- options for women with previous pregnancy or birth complications;
- breastfeeding (skin-to-skin contact, benefits of early breastfeeding, attachment, breastfeeding as the physiological norm);
- early parenthood (normal newborn behaviour, settling, sleep safety, immunisation, infant attachment); and
- ways to find support and build community networks after the baby is born.

Antenatal couple education programs, which aim to enhance the couple relationship and the parent-child relationship are also available.

4.2.2 Discussing antenatal education

Summary of the evidence

The evidence on antenatal education is heterogeneous, with outcomes measured including experience of birth and parenting, postnatal mental health and experience of antenatal education.

Knowledge and health behaviours

A Cochrane review found that women gain knowledge from antenatal education but that the effect of this knowledge on childbirth or parenthood remains largely unknown (Gagnon & Sandall 2007). A prospective cohort study found that 74% of first-time mothers considered that antenatal education

helped them to prepare for childbirth but only 40% considered that the education helped them prepare for parenthood (Fabian et al 2005).

Low level evidence suggests that antenatal education may improve some health behaviours during pregnancy (eg nutrition, physical activity)(Mirmolaei et al 2010) and in early parenthood (eg SIDS prevention) (Hesselink et al 2012).

Birth experience and outcomes

Studies have found no statistically significant difference in the overall birth experience between women who participate in antenatal education programs and those who do not (Fabian et al 2005; Bergstrom et al 2009; Maimburg et al 2010). Studies into specific outcomes have found the following.

- *Mode of birth*: There is mixed evidence on the effect of antenatal education on mode of birth (Ferguson et al 2013). Antenatal education does not appear to significantly affect mode of birth among women in general (Fabian et al 2005; Gagnon & Sandall 2007) or among women with a previous caesarean section (Gagnon & Sandall 2007). Specific education on bearing down technique in labour did not affect mode of birth (Phipps et al 2009). Including a component on the risks of induction in antenatal education decreased rates of non-medically indicated elective induction of labour (Simpson et al 2010).
- *Pain*: Some studies have found that women who participated in antenatal education experienced lower levels of pain during birth (Ip et al 2009). Other studies have reported that participating women had lower epidural analgesia use (Maimburg et al 2010), higher analgesia use (Fabian et al 2005) or that there was no difference in epidural analgesia use (Bergstrom et al 2009) or overall pain relief (Maimburg et al 2010).
- *Self-diagnosis of labour*: Women given education about self-diagnosis of labour pains had a higher rate of correct self-diagnosis than women who did not (Lumluk & Kovavisarach 2011). However, a small systematic review found no evidence of criteria for identifying labour (Lauzon & Hodnett 2009).

While the overall experience and outcomes of birth do not appear to be affected by antenatal education, there is some evidence that it reduces anxiety about the birth (Maestas 2003; Ahmadian heris et al 2009; Ip et al 2009; Artieta-Pinedo et al 2010; Ferguson et al 2013), increases use of coping strategies (Escott et al 2005) and partner involvement (Ferguson et al 2013) and that participants experience greater childbirth self-efficacy (Ip et al 2009).

Recommendation 1 **Grade B**

Advise parents that antenatal education programs are effective in providing information about pregnancy, childbirth and parenting but do not influence mode of birth.

Psychological preparation for parenthood

Studies into the inclusion of psychological preparation for parenthood in antenatal care vary in content. Studies have found that at 6 weeks after the birth:

- women with depression antenatally who participated in antenatal group education focusing on coping skills, recognising distress and seeking help had a reduced risk of subsequent postnatal depression (OR: 0.83; 95%CI: 0.65–0.98) (n=1,719) (Kozinszky et al 2012);
- women who participated in antenatal sessions focusing on coping skills, cognitive restructuring, problem-solving and decision-making skills had an overall reduction in depressive symptoms compared with women in the control group (mean Chinese EPDS score 6.5 versus 8.9) and the effect persisted at 6 months (5.8 versus 7.6) (n=184) (Ngai et al 2009);
- women who participated in antenatal interpersonal psychotherapy had fewer depressive symptoms (changes in EPDS score: –1.56 versus 0.94) and greater satisfaction with interpersonal relationships than women who received only antenatal education (n=194) (Gao et al 2010); and
- antenatal education on psychosocial issues associated with parenthood had a positive effect on mood (mean EPDS score 4.5 compared with 11.4 at baseline) in women who reported low self-esteem antenatally (but not those with medium or high self-esteem antenatally) and partners were significantly more aware of the woman's experience of parenthood (n=268) (Matthey et al 2004).

Recommendation 2 **Grade B**

Include psychological preparation for parenthood as part of antenatal care as this has a positive effect on women's mental health postnatally.

Small RCTs have reported benefits from antenatal couple education programs that aim to enhance the couple relationship and the parent-child relationship (Shapiro & Gottman 2005; Feinberg et al 2010; Shapiro et al 2011; Petch et al 2012).

Parents' experience of antenatal education

Parents have expressed satisfaction with antenatal education as preparation for childbirth (Fabian et al 2005; Bergstrom et al 2011). Mothers who were young, single, with a low level of education, living in a small city or who smoked were less likely to find the classes helpful (Fabian et al 2005). Male participants valued the inclusion of an all-male session (Friedewald et al 2005).

Studies into parents' preferences for antenatal education have found that the following factors are valued:

- *style of education*: information provided by a health professional in person rather than sole use of other impersonal media (Nolan 2009) and using a range of learning strategies (Svensson et al 2008);
- *discussion*: parents value being encouraged to ask questions, seek clarification, and relate information to their own circumstances (Svensson et al 2006; Nolan 2009);
- *social networking:* one of the core aims of antenatal education is to assist women to develop social support networks (Fabian et al 2005; Svensson et al 2006; Svensson et al 2008);
- *group size*: small peer groups encourage participants to get to know and support each other, while larger groups make it harder for women to ask questions (Nolan 2009);
- *practising skills*: parents value experiential learning with plenty of opportunity to practise hands-on skills (Svensson et al 2006; Svensson et al 2008);
- *content*: parents have expressed a preference for antenatal education to include more information on psychoprophylaxis during labour (Bergstrom et al 2011), psychological care (Holroyd et al 2011), preparation for parenthood (Svensson et al 2006; Bergstrom et al 2011; Holroyd et al 2011) and breastfeeding (Svensson et al 2006); and
- *timing of education*: education is helpful early in pregnancy when information needs are high (Svensson et al 2006), with a component offered postnatally (Nolan 2009; Svensson et al 2009).

Practice point e

Assisting parents to find an antenatal education program that is suitable to their learning style, language and literacy level may improve uptake of information.

4.2.3 Practice summary: antenatal education

When: At an early antenatal visit.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.

- **Discuss the benefits of antenatal education**: Explain that, while antenatal education is unlikely to change the mode of birth, it may help women to prepare for the birth. It is also a good opportunity to establish a network of peers and to develop skills for adapting to parenthood.
- **Involve partner and/or family**: Discuss the benefits of partners and/or other family members attending antenatal education with the woman.
- **Provide information**: Support antenatal education by asking women about any topics on which they would like additional information and suggesting or providing appropriate resources (eg written materials suitable to the woman's level of literacy, audio or video, web sources).
- **Take a holistic approach**: Give information about locally available antenatal education programs and assist women to select a program that is suitable for them. Give expectant parents booklets/ handouts relating to emotional health and wellbeing during pregnancy and early parenthood.

4.2.4 Resources

Antenatal education and planning for the birth. In: *Minymaku Kutju Tjukurpa Women's Business Manual, 4th edition*. Congress Alukura, Nganampa Health Council Inc and Centre for Remote Health. http://www.remotephcmanuals.com.au

The CARPA Standard Treatment Manual. 5th edition. Central Australian Rural Practitioners Association. http://www.remotephcmanuals.com.au/html/home

Consumer resources

- Pregnancy, birth and baby — http://www.pregnancybirthbaby.org.au/
- National Prescribing Service: http://www.nps.org.au/
- Better health Channel — www.betterhealth.vic.gov.au/
- Smart Eating for You — http://daa.asn.au/for-the-public/smart-eating-for-you/
- Early parenthood — http://www.becomingus.com.au/
- Raising children — http://raisingchildren.net.au/
- Australian Breastfeeding Association — www.breastfeeding.asn.au/
- Health*insite* — http://www.healthinsite.gov.au/
- Eat for Health — http://www.eatforhealth.gov.au/
- Healthy Active Australia — http://www.healthyactive.gov.au/
- Health for Women — http://www.healthforwomen.org.au/
- Sexually transmitted infections — http://www.sti.health.gov.au
- Pregnancy, Birth and Baby Helpline — 1800 882 436
- Safe infant sleeping — http://www.sidsandkids.org/safe-sleeping/

Multicultural resources

- Multicultural Health (Queensland Health) — Pregnancy and postnatal topics http://www.health.qld.gov.au/multicultural/public/pregnancy.asp
- NSW Multicultural Health Communication Service — Pregnancy and postnatal topics http://www.mhcs.health.nsw.gov.au/topics/Pregnancy_and_Post_Natal.html

Mental health resources, referral and advice

See Section 3.3

Sources of reliable online health information

- Health on the Net Foundation http://www.hon.ch

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Escott D, Slade P, Spiby H et al (2005) Preliminary evaluation of a coping strategy enhancement method of preparation for labour. *Midwifery* 21(3): 278–91.

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Feinberg ME, Jones DE, Kan ML et al (2010) Effects of family foundations on parents and children: 3.5 years after baseline. *J Fam Psychol* 24(5): 532-42.

Ferguson S, Davis D, Browne J (2013) Does antenatal education affect labour and birth? A structured review of the literature. *Women Birth*: e5–8.

Friedewald M, Fletcher R, Fairbairn H (2005) All-male discussion forums for expectant fathers: evaluation of a model. *J Perinat Educ* 14(2): 8–18.

Gagnon AJ & Sandall J (2007) Individual or group antenatal education for childbirth or parenthood, or both. *Cochrane Database Syst Rev*(3): CD002869.

Gao LL, Chan SW, Li X et al (2010) Evaluation of an interpersonal-psychotherapy-oriented childbirth education programme for Chinese first-time childbearing women: a randomised controlled trial. *Int J Nurs Stud* 47(10): 1208–16.

Hesselink AE, van Poppel MN, van Eijsden M et al (2012) The effectiveness of a perinatal education programme on smoking, infant care, and psychosocial health for ethnic Turkish women. *Midwifery* 28(3): 306–13.

Holroyd E, Twinn S, Ip WY (2011) Chinese women's perception of effectiveness of antenatal education. *Brit J Midwifery* 19(2): 92–98.

Ip WY, Tang CS, Goggins WB (2009) An educational intervention to improve women's ability to cope with childbirth. *J Clin Nurs* 18(15): 2125–35.

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4.3 Preparing for breastfeeding

Assisting women to plan for breastfeeding by providing information and support may increase initiation and duration of breastfeeding, with health benefits for mother and infant.

4.3.1 Background

In Australia, the *Australian National Breastfeeding Strategy 2010–2015* (AHMC 2009) and the *Infant Feeding Guidelines* (NHMRC 2012) provide guidance on supporting breastfeeding at primary care, hospital and government levels.

Health benefits of breastfeeding

A large body of Australian and international evidence shows that breastfeeding is of significant benefit to babies and mothers (AHMC 2009).

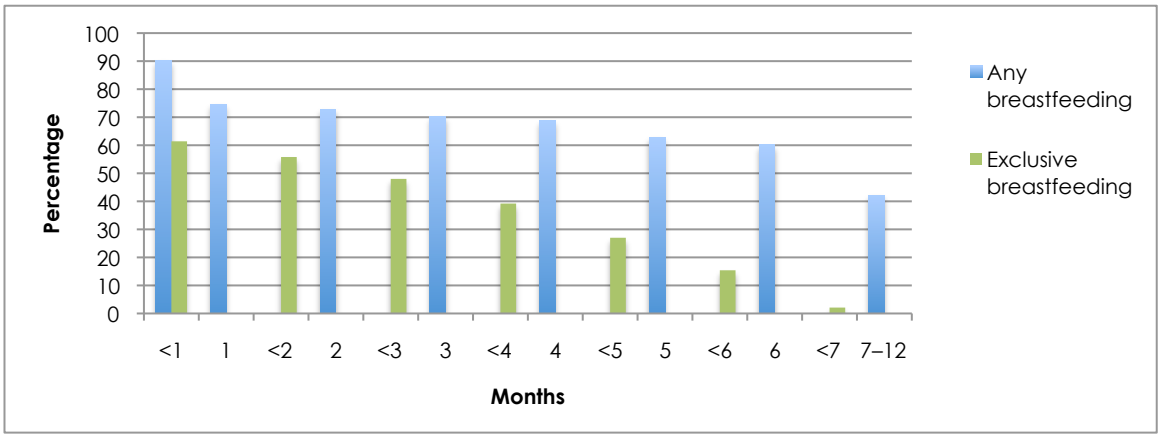
- *Babies*: Breastfeeding has a range of benefits for the developing baby, including improved visual acuity, psychomotor development (Horta et al 2007) and cognitive development (Kramer et al 2008). Breastfed babies have a reduced risk of a range of serious illnesses and conditions such as gastroenteritis, respiratory illness, otitis media, allergy and sudden infant death syndrome (SIDS) (Ip et al 2007). They are also less likely to develop chronic disease later in life (Horta et al 2007; Ip et al 2007);
- *Mothers*: Breastfeeding promotes faster maternal recovery from childbirth and return to pre-pregnancy weight and delays return of menstrual periods. Women who have breastfed have reduced risk of breast and ovarian cancer in later life (NHMRC 2011); and
- *Mother-infant attachment:* Breastfeeding may assist bonding and attachment between mothers and babies (NHMRC 2011).

Exclusive breastfeeding (no solids or liquids besides human milk, other than vitamins and medications) for 6 months has several advantages over exclusive breastfeeding for 3 to 4 months, including reduced risk of gastrointestinal and respiratory infection (Kramer & Kakuma 2007). No adverse effects on growth have been documented with exclusive breastfeeding for 6 months, but a reduced level of iron has been observed in developing-country settings (Kramer & Kakuma 2007).

Initiation and duration of breastfeeding in Australia

The Australian Infant Feeding Guidelines recommend exclusive breastfeeding for 6 months and continuing breastfeeding for one year or for a long as mother and child desire (NHMRC 2012). The 2010 Australian National Infant Feeding Survey found that breastfeeding was initiated for around 96% of infants and that around 90% of infants received breast milk as their first feed (AIHW 2011). Figure 4.1 shows rates of exclusive and any breastfeeding over the first year of life from the survey.

Figure 4.1: Duration of exclusive and any breastfeeding among babies aged 0–12 months, 2010



Note: Rates of exclusive breastfeeding were reported up to each month of age (eg an infant who received fluids other than breast milk at 5 months of age was exclusively breastfed for <6 months). Any breastfeeding was reported at <1 month (age 0) and then in completed months.
Source: AIHW 2011.

There are regional and jurisdictional variations in rates of breastfeeding (AHMC 2009). Rates of breastfeeding are also influenced by other demographic factors (AIHW 2011).

- *Aboriginal and Torres Strait Islander mothers*: The 2010 National Infant Feeding Survey found that 59% of Aboriginal and Torres Strait Islander infants were exclusively breastfed at less than 1 month, 33% at less than 3 months and 7% at less than 6 months (DoHA 2012). Rates of 'any breastfeeding' were higher in advantaged areas than disadvantaged areas (99% versus 93%) (DoHA 2012). Recent studies in Aboriginal health services in Darwin (Josif et al 2012) and Brisbane (Stapleton et al 2011) have found rates of exclusive breastfeeding on discharge from hospital of 88% and 69%, respectively. A survey conducted in Western Australia in 2000–2002 found that breastfeeding duration increased with remoteness (Cromie et al 2012).
- *Country of origin*: Evidence is mixed as to whether breastfeeding rates among migrant and refugee women are comparable to the general Australian population rates, with studies finding no difference in rates of exclusive breastfeeding on discharge from hospital (Dahlen & Homer 2009) but lower rates of breastfeeding at 3 months among migrant and refugee women (Stephens 2001). It has been reported that breastfeeding practices vary between different cultural groups in Australia, reflecting trends in their countries of origin (AHMC 2009).
- *Age:* In 2010, breastfeeding at 6 months was reported by 64.1% of women aged more than 35 years, 63.5% of women aged 30–35 years, 56.7% of women aged 25–29 years and 39.1% of women aged 24 years or younger (AIHW 2011).
- *Socioeconomic status*: In 2010, breastfeeding at 6 months was reported by 68.7% of women in the least disadvantaged quintile and 52.4% in the most disadvantaged quintile (AIHW 2011).
- *Education:* In 2010, breastfeeding at 6 months was reported by 73.1% of women with a Bachelor degree or higher, 52.0% of women with Year 12 or equivalent and 40.3% of women who did not complete Year 12 (AIHW 2011).

Factors affecting establishment of breastfeeding

The *Infant Feeding Guidelines* identify a range of factors that affect establishment of breastfeeding (NHMRC 2012):

- caesarean section;
- separation of mother and baby (eg not 'rooming in');
- early use of bottles or pacifiers (dummies);
- offering supplementary feeds (water, glucose or formula milk) when there is no medical reason;

The Baby Friendly Hospital Initiative, which aims to support successful initiation and maintenance of breastfeeding, recommends that women be assisted to initiate breastfeeding within 1 hour of birth and given advice on maintaining lactation.

Factors affecting decision-making about breastfeeding

Environmental factors and societal considerations have an impact on a mother's commitment to and ability to continue breastfeeding (AHMC 2009). Factors that negatively influence initiation and continuation of breastfeeding include (Qld Health 2003):

- *physical*: maternal obesity, maternal diabetes, low birth weight or prematurity, multiple birth, congenital abnormalities, cracked nipples, separation of mother and baby after birth leading to a delay in onset of milk (eg following caesarean section);
- *psychological*: lack of confidence in breastfeeding, personal image, depression and anxiety;
- *social*: maternal attitude (eg lack of intention to breastfeed), knowledge and attitude of partner and family, community customs and traditions, cultural attitudes to breastfeeding, isolation from family or community, relationship problems, public perceptions, return to work; and
- *environmental*: overcrowding in the home environment, lack of facilities to breastfeed in public areas, employment and work environments that do not support breastfeeding.

Some women (eg adolescent women, young Aboriginal and Torres Strait islander women) experience a cluster of these factors, which can influence their decisions about continuing breastfeeding.

A planned approach and continuity of care and support during pregnancy, birth and early parenthood can ensure that women receive opportunities for education, consistent advice, and appropriate support to continue breastfeeding that takes into account their individual situation.

Maternal conditions and breastfeeding

The *Infant Feeding Guidelines* (NHMRC 2012) advise that:

- women with HIV should avoid breastfeeding if replacement feeding is acceptable, feasible, affordable, sustainable and safe; and
- women with hepatitis B or hepatitis C can breastfeed without risk of transmission to the baby.

Tobacco, alcohol and illicit drugs

The *Infant Feeding Guidelines* (NHMRC 2012) advise that:

- breastfeeding remains the best choice, even if the mother continues to smoke;
- not drinking alcohol is the safest option for women who are breastfeeding; and
- illicit drugs should be avoided while breastfeeding (specialist advice is needed for each individual).

4.3.2 Antenatal breastfeeding promotion

The objectives of antenatal breastfeeding promotion are to (AHMC 2009):

- provide opportunities for pregnant women and their families to learn about the benefits of breastfeeding;
- encourage and enable pregnant women to make informed decisions about breastfeeding; and
- encourage families and support networks to appreciate the benefits of breastfeeding.

Health professionals have a responsibility to promote breastfeeding first but to educate parents individually about formula feeding where it is needed. This responsibility is outlined in the WHO *International Code of Marketing of Breast-milk Substitutes* and the Australian *Infant Feeding Guidelines* (NHMRC 2012).

Summary of the evidence

Effect on initiation and duration of breastfeeding

Systematic reviews have shown that antenatal breastfeeding promotion can be effective in increasing initiation rates and duration of breastfeeding, especially among groups of women with low breastfeeding rates (Dyson et al 2005; Renfrew et al 2005; Chung et al 2008; Lumbiganon et al 2011). Evidence from small randomised controlled trials (RCTs) (Bonuck et al 2005; Kupratakul et al 2010; Rasmussen et al 2011) and lower level studies (Reeve et al 2004; Gill et al 2007; Lin et al 2008; Spiby et al 2009; Ingram et al 2010) is inconsistent.

A combination of antenatal and postnatal interventions increases the initiation and duration of breastfeeding (Chung et al 2008).

Recommendation 3 **Grade C**

Routinely offer education about breastfeeding as part of antenatal care.

Models of care

Studies evaluating breastfeeding promotion interventions have found that:

- initiation rates were significantly improved by antenatal interventions, including health professional support (Dyson et al 2005), peer support/counselling (Dyson et al 2005; Chung et al 2008; Lumbiganon et al 2011) and education sessions for fathers (Wolfberg et al 2004);
- duration of exclusive breastfeeding was improved by antenatal group education about breastfeeding (Lumbiganon et al 2011), health professional support provided antenatally (Lumbiganon et al 2011) and home visits both antenatally and postnatally (Anderson et al 2005);
- duration of 'any breastfeeding' was improved by antenatal group education about breastfeeding (Rosen et al 2008) health professional support provided antenatally (Lumbiganon et al 2011; Pannu et al

2011), peer support (Kaunonen et al 2012) and home visits provided both antenatally and postnatally (Kemp et al 2011); and

- combined antenatal and postnatal group education about breastfeeding and peer counselling for adolescent women positively influenced duration of breastfeeding (Wambach et al 2011).

Although peer support interventions increase breastfeeding continuation in low- or middle-income countries, especially exclusive breastfeeding, the effect does not seem to be as strong in high income countries (Jolly et al 2012).

Educational materials provided antenatally were effective when combined with counselling but not as a stand-alone intervention (Mattar et al 2007).

A combination of methods of education and support is more effective than a single method (Hannula et al 2008). A collaborative approach to breastfeeding promotion that involves local health professionals may be more effective than a breastfeeding expert approach (Hoddinott et al 2007).

There is no evidence to support antenatal breast examinations as a means of promoting breastfeeding (Lee & Thomas 2008).

4.3.3 Discussing breastfeeding

Discussing breastfeeding is an important part of antenatal care. As the preparatory stage for breastfeeding, the goal is to enable women to develop knowledge and commitment and establish or consolidate support networks (AHMC 2009). A commitment to breastfeeding includes viewing it as the biological and social norm for infant and young child feeding. The extent to which a mother commits to breastfeeding can influence the duration of breastfeeding (Shealy et al 2005).

Discussion of breastfeeding should involve partners and cover:

- the health benefits of breastfeeding for the infant (eg lower risk of infection) and the mother (eg improved recovery from childbirth and return to pre-pregnancy weight, reduced risk of pre-menopausal breast cancer);
- a woman's previous experiences of breastfeeding and any concerns related to these;
- how partners can support the mother to breastfeed and also be involved in other aspects of baby care (eg bathing, nappy changing);
- the importance of uninterrupted skin-to-skin contact at birth and early feeding, including the benefits of colostrum for the infant;
- that it is recommended that babies be exclusively breastfed for 6 months and that breastfeeding continue for one year or for as long as mother and child desire;
- the importance of good positioning and attachment, rooming in and feeding on demand;
- indications that the baby is ready for a feed and is receiving enough milk;
- the need to avoid bottles, teats and dummies while breastfeeding is being established;
- that water is not necessary for the baby — breast milk is sufficient food and drink for the first 6 months;
- the importance of healthy eating when breastfeeding;
- when to seek advice (eg while some discomfort is not unusual at initiation, advice on attachment should be sought if pain continues); and
- the availability of breastfeeding support locally (eg peer support, lactation consultant).

Women may choose not to breastfeed for a range of reasons (eg anxiety, medication use) and the discussion should be approached with sensitivity to these issues. A mother's informed decision not to breastfeed should be respected and support and information from a health worker and/or other members of the multidisciplinary team provided (NHMRC 2012).

Some centres encourage women to express and store colostrum before the birth so that it can be provided to the baby if needed (eg if the mother has diabetes). While the benefits of early colostrum are well documented (NHMRC 2012), the benefits of antenatal breast expression are yet to be substantiated (Chapman et al 2012) and its safety is yet to be determined (Forster et al 2011).

4.3.4 Practice summary: breastfeeding

When: At all antenatal visits.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker, lactation consultant, peer breastfeeding counsellor, childbirth educator, dietitian.

- **Discuss why breastfeeding from birth is important:** It is important to provide consistent information on the health benefits to baby and mother. Explain that exclusive breastfeeding is biologically and nutritionally appropriate to support growth for 6 months and means that the baby receives only breast milk (ie no other liquids or solids except vitamins or medications if indicated).
- **Provide practical advice**: Give information about local support for timely assistance with breastfeeding difficulties (eg postnatal home visits, lactation consultants, Australian Breastfeeding Association, peer support).
- **Involve partner or family**: Discuss the importance of support for the mother to enable breastfeeding.
- **Provide information:** Give booklets/ handouts relating to breastfeeding that are appropriate for the woman. Information should be available in a language that is understood. All information should be free of marketing for formula, bottles and teats.
- **Take a holistic approach:** In discussing breastfeeding, do not assume that a woman knows how to breastfeed. Reinforce positive attitudes to breastfeeding and tailor advice and support to a woman's individual circumstances, including cultural background. Be aware of different beliefs and cultural practices and explore these with women during pregnancy. Discuss solutions for potential difficulties (eg need to return to work).
- **Document discussions**: Note a woman's intentions about breastfeeding in her antenatal record. The use of a checklist may provide a prompt for health professionals to ensure discussion regarding feeding intentions has taken place.

4.3.5 Resources

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5 Lifestyle considerations

This chapter discusses lifestyle factors that contribute to the health and wellbeing of a woman and her baby during pregnancy. Recommendations are based on evidence about the health risks and benefits associated with a range of lifestyle factors.

Table 5.1 provides a summary of advice on lifestyle considerations during pregnancy considered a priority for inclusion in these Guidelines. Advice on marijuana use during pregnancy is included in the NICE Guidelines (NICE 2008). Advice on immunisation during pregnancy is included in the *Australian Immunisation Handbook* (DoHA 2013).

Table 5.1: Summary of advice for women about lifestyle considerations during pregnancy

Health behaviours		**Section**
Nutrition	Eating the recommended number of daily serves of the five food groups and drinking plenty of water is important during pregnancy.	5.1.2
	Additional serves of the five food groups may contribute to healthy weight gain in women who are underweight but these should be limited by women who are overweight or obese.	
	Small to moderate amounts of caffeine are unlikely to harm the pregnancy.	
Physical activity	Low to moderate-intensity physical activity during pregnancy has a range of benefits and is not associated with negative effects on the pregnancy or baby.	5.2
Tobacco smoking	Smoking and passive smoking can have negative effects on the pregnancy and the baby.	Module I 10.1
Alcohol	Not drinking alcohol is the safest option for women who are pregnant.	Module I 10.2
Preventive health interventions		**Section**
Folic acid	Folic acid taken preconception and in the first trimester reduces the risk of a baby having neural tube defects and a supplement of 500mg a day is recommended.	Module I 10.4
Other vitamins	Supplements of vitamins A, C and E are not of benefit during pregnancy and may cause harm.	Module I 10.4
Iron	Unnecessary iron supplementation offers no benefit and has side effects at higher doses.	Module I 10.4
	Increasing intake of iron-rich foods reduces the risk of iron deficiency.	5.1.3
	For women with low dietary intake, intermittent supplementation is as effective as daily supplementation in preventing iron-deficiency anaemia, with fewer side effects.	5.1.3
	For women with identified iron-deficiency anaemia, low-dose supplementation is as effective as high dose, with fewer side effects.	8.1
Calcium	For women with low dietary intake and high risk of pre-eclampsia, increased intake of calcium-rich foods or supplements may be beneficial.	6.3
Iodine	Iodine requirements increase during pregnancy and a supplement of 150 micrograms a day is recommended.	Module I 10.4
Medicines		**Section**
Medicines	Use of medicines should be limited to circumstances where the benefit outweighs the risk.	Module I 10.3
Herbal medicines	Herbal medicines should be avoided during pregnancy.	Module I 10.3

General advice		Section
Sexual activity	Sexual intercourse in pregnancy is not known to be associated with any adverse outcomes.	5.3
Travel	Correct use of three-point seatbelts during pregnancy is to have the belt 'above and below the bump, not over it'.	5.4
	Long-distance air travel is associated with an increased risk of venous thrombosis.	
	Pregnant women should discuss considerations such as air travel, vaccinations and travel insurance with their midwife or doctor if they are planning to travel overseas	
	If a pregnant woman cannot defer travel to malaria-endemic areas, she should use an insecticide-treated bed net.	
	Some medications to prevent malaria can be safely used in pregnancy.	
Oral health	Good oral health protects a woman's health and treatment can be safely provided during pregnancy.	Module I 10.5

5.1 Nutrition

Consuming a wide variety of nutritious foods during pregnancy is important to ensure that the nutritional requirements of both mother and baby are met. In some situations, supplementation of particular vitamins or minerals may be advisable.

5.1.1 Background

The nutritional status of a woman before and during pregnancy plays a vital role in fetal growth and development. While requirements for some nutrients (eg iron, folic acid) increase, the basic principles of healthy eating remain the same.

Risks associated with nutrition during pregnancy

- *Over and under-nutrition*: Too little weight gain during pregnancy increases the risk of a low birth weight infant. Excess weight gain during pregnancy increases the risk of gestational diabetes and of the baby being large for gestational age. It is also associated with increased risk of obesity and metabolic syndrome in infants later in life.
- *Dietary patterns:* Small studies have suggested associations between:
  - high maternal intake of carbohydrates and unsaturated fats and higher blood pressure in infants (Aaltonen et al 2008);
  - high maternal fat intake and infant metabolic morbidity and increased waist circumference (Aaltonen et al 2011); and
  - high intake of "junk" food and small-for-gestational-age babies (Thompson et al 2010).
- *Food safety*: As the immune system in pregnancy is suppressed, pregnant women are more susceptible to foodborne illnesses, such as listeriosis, which can be transmitted to the unborn child and may cause miscarriage, premature birth or stillbirth (Pezdirc et al 2012). Fetal exposure to high levels of mercury (eg from maternal consumption of some fish species) may cause developmental delays (FSANZ 2011).

Access to healthy food

- *Geographical location:* The decreased availability of nutritious foods (such as fresh fruit and vegetables, wholegrain bread and low fat milk products) in remote and regional areas in Australia has been described frequently. The cost of nutritious foods in these areas is also over 30% higher than in major cities and may affect food choices (NHMRC 2000; NT DHCS 2007; Harrison et al 2010; Landrigan & Pollard 2011).
- *Socioeconomic status*: In some urban centres, people in lower socioeconomic groups have less access to supermarkets and greater access to fast food outlets than more advantaged groups (Burns & Inglis 2007; Ball et al 2009). Supermarkets generally offer a wider variety of food products, as well as fresh raw food.
- *Migrant and refugee women:* Following migration, food habits may change out of choice, because of the limited availability of traditional and familiar foods, or because of change in economic circumstances in Australia. Similarly, financial and language difficulties may affect access to education and employment opportunities which then affects income, health and nutrition literacy, and access to nutritious foods. Some migrants experience disadvantages such as social isolation and poor housing, which can affect access to safe food and safe preparation of food, and are generally in a relatively vulnerable position in their new environments, regardless of the type of migration (WHO 2010).

5.1.2 Discussing nutrition[9]

Healthy eating during pregnancy and breastfeeding

Consuming a variety of nutritious foods is particularly important during pregnancy and breastfeeding.

- *Vegetables, legumes/beans and fruit:* Vegetable and fruit consumption before and during pregnancy makes an important contribution to health outcomes for women and their children.
- *Grain (cereal) foods*: Wholegrain foods are a valuable source of iron and zinc and fibre. Bread in Australia is fortified with folic acid and made with iodised salt.
- *Lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans*: Lean red meat and chicken is a good source of protein, iron and zinc. Maternal consumption of fish during pregnancy is likely to have a number of health benefits for women and their children but the fish should be low in mercury. Nuts and seeds and legumes/beans are important foods for people who choose vegetarian or vegan dietary patterns and meals without meat as they can provide an alternative source of nutrients. For several nutrients, including iron, calcium and vitamin B_{12}, animal foods are highly bioavailable sources and care needs to be taken to ensure a variety of alternatives if these foods are excluded.
- *Milk, yoghurt and cheese and/or their alternatives*: Milk, yoghurt and cheese or their alternatives are good sources of calcium. Reduced fat milk, yoghurt and cheese products are recommended during pregnancy.
- *Water*: Pregnant women have an increased water requirement because of expanding extracellular fluid space and the needs of the baby and the amniotic fluid.

Practice point f

Eating the recommended number of daily serves of the five food groups and drinking plenty of water is important during pregnancy.

Table 5.2: Recommended number of daily serves during pregnancy

Food group	Sample serve	Age	
		<19	19–50
Vegetables of different types and colours, and legumes/ beans	½ cup cooked green or orange vegetables; ½ cup legumes; 1 cup raw green leafy vegetables; 1 small potato; ½ cup sweet corn, 1 medium tomato	5	5
Fruit	1 apple; 1 banana; 2 plums; 4 dried apricot halves	2	2
Grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties, such as breads, cereals, rice, pasta, noodles, polenta, couscous, oats, quinoa and barley	1 slice bread; ½ cup cooked rice, pasta or noodles; ½ cup porridge; 2/3 cup wheat cereal flakes; ¼ cup muesli; 3 crispbreads; 1 crumpet or English muffin or plain scone	8	8 ½
Lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans	65 g cooked lean red meat; 80 g cooked chicken; 100 g cooked fish fillet; 2 large eggs; 1 cup cooked lentils; 170 g tofu; 30 g nuts, seeds, peanut or almond butter or tahini or other nut or seed paste	3 ½	3 ½
Milk, yoghurt, cheese and/or their alternatives (mostly reduced fat)	1 cup milk; 200 g yoghurt; 40 g hard cheese; 1 cup soy/ other cereal drink with added calcium	3 ½	2 ½
Approximate number of additional serves from the five food groups or discretionary choices		0–3	0–2 ½

Source: (NHMRC 2013).

[9] Other than the recommendation on caffeine and the practice points, this section is a summary of information provided in the *Australian Dietary Guidelines* (NHMRC 2013).

Table 5.3: Practical advice on nutritious foods during pregnancy

Food group	Considerations
Vegetables, legumes/ beans and fruit	• Many women need to increase their consumption of vegetables, legumes/beans and fruit • Due to the risk of listeriosis, pre-prepared or pre-packaged cut fruit or vegetables should be cooked. Pre-prepared salad vegetables (eg from salad bars) should be avoided
Grain (cereal) foods	• While bread in Australia contains iodine and folate, supplementary folate is recommended preconception and in the first trimester and iodine should be supplemented preconception and throughout pregnancy and breastfeeding
Lean meats and poultry, fish, eggs, tofu, nuts and seeds, legumes/beans	• Raw or undercooked meat, chilled pre-cooked meats, and pâté and meat spreads should be avoided during pregnancy due to risk of listeriosis • Care needs to be taken with consumption of some fish species (eg shark/flake, marlin or broadbill/swordfish, orange roughy and catfish) due to the potentially higher mercury content • Foods containing raw eggs should be avoided due to the risk of salmonella • Nuts need only be avoided if the woman has an allergy to them
Milk, yoghurt, cheese and/or alternatives	• Unpasteurised dairy products and soft, semi-soft and surface-ripened cheese should be avoided due to the risk of listeriosis • Women who avoid milk products should consume alternative calcium-fortified products
Water	• Fluid need is 750–1,000 mL a day above basic needs

Source: (NHMRC 2013).

Foods that should be limited

- *Foods containing saturated fat, added salt, added sugars*: As with the general population, pregnant women should limit intake of these foods, meeting the additional energy requirements in pregnancy through extra foods from the five food groups rather than energy-dense foods.
- *Alcohol*: Not drinking alcohol is the safest option during pregnancy (see Module I; Section 10.2).

Maternal diet and infant allergy

Maternal diet during pregnancy and while breastfeeding does not appear to affect the risk of asthma, eczema or other allergy symptoms in infants (Hattevig et al 1989; Chatzi et al 2008; De Batlle et al 2008; Shaheen et al 2009; Lange et al 2010).

Caffeine

There is insufficient evidence to confirm or refute the effectiveness of caffeine avoidance on birth weight or other pregnancy outcomes (Jahanfar & Sharifah 2009; Peck et al 2010; Milne et al 2011). The Australian Department of Health and Ageing suggests limiting intake during pregnancy to around three cups of coffee or six cups of tea a day (DoHA 2009). Other caffeinated beverages (eg colas, energy drinks, green tea) should also be limited.

Recommendation 4 **Grade C**

Reassure women that small to moderate amounts of caffeine are unlikely to harm the pregnancy.

Appropriate weight gain

Calculation of body mass index at the first antenatal visit (see Module I, Section 7.2) allows appropriate advice about nutrition to be given early in pregnancy as the optimal amount of weight gained depends on the woman's pre-pregnancy BMI.

Appropriate, steady weight gain during pregnancy is important to optimise the health outcomes (short and long term) for the infant and mother (NHMRC 2013).

The evidence on dietary interventions to prevent excessive weight gain during pregnancy is inconsistent. Systematic reviews have found:

- insufficient evidence to recommend any intervention for preventing excessive weight gain during pregnancy (Muktabhant et al 2012); and
- that diet-based interventions were more effective in reducing excessive gestational weight gain than physical activity or a combined intervention (Thangaratinam et al 2012).

Practice point g

For women who are underweight, additional serves of the five food groups may contribute to healthy weight gain.

Practice point h

For women who are overweight or obese, limiting additional serves and avoiding energy-dense foods may limit excessive weight gain. Weight loss diets are not recommended during pregnancy.

5.1.3 Discussing nutritional supplements

There is evidence to support routine supplementation with folic acid preconception and in the first trimester (see Module I, Section 10.4) and to support iodine supplementation preconception and during pregnancy and breastfeeding (see Module I, Section 10.4.3). Iron supplementation may prevent iron deficiency in women with limited dietary iron intake. Vitamin B_{12} supplementation may be needed if a woman has a vegetarian or vegan diet. Vitamin D supplementation may be a consideration for women at high risk of deficiency (see Module I, Section 8.9). Other nutritional supplements do not appear to be of benefit unless there is an identified deficiency.

Summary of the evidence

Iron

Demand for iron is increased during pregnancy and insufficient iron intake or absorption (eg diet poor in iron-rich foods and/or rich in foods that diminish iron absorption) or blood loss (eg due to gastrointestinal parasites) can result in deficiency or anaemia.

Iron-rich staple foods can help women reach dietary targets for iron (Bokhari et al 2012). However, these foods may not be available (eg due to geographical location or socioeconomic factors). In these situations, women may be at high risk of iron deficiency. Ferritin concentrations should be checked and supplementation considered if iron stores are low or if they are normal but dietary intake is likely to remain low.

Practice point i

Women at risk of iron deficiency due to limited access to dietary iron may benefit from practical advice on increasing intake of iron-rich foods.

Daily supplementation with iron during pregnancy is effective in reducing the risk of maternal iron deficiency and anaemia and low birth weight (Pena-Rosas et al 2012b; Haider et al 2013) but is associated with side effects (constipation and other gastrointestinal effects including nausea, vomiting and diarrhoea and an increased risk of high haemoglobin concentration at term) (Pena-Rosas et al 2012b). These effects need to be weighed against the risks of iron deficiency (Pena-Rosas et al 2012b). Intermittent iron+folic acid regimens produce similar maternal and infant outcomes at birth and are associated with fewer side effects (Pena-Rosas et al 2012a).

Recommendation 5 **Grade B**

Advise women with low dietary iron intake that intermittent supplementation is as effective as daily supplementation in preventing iron-deficiency anaemia, with fewer side effects.

Identifying and treating iron-deficiency anaemia is discussed in Section 8.1.

Other minerals

- *Calcium*: While calcium supplements are useful in decreasing pre-eclampsia risk (see Section 6.3), they do not appear to be of benefit in preventing preterm birth or low infant birth weight (Buppasiri et al 2011).
- *Magnesium*: There is insufficient evidence to show whether dietary magnesium supplementation during pregnancy is beneficial (Makrides & Crowther 2001).
- *Zinc*: While some studies have found benefits from zinc supplementation among women in areas of high perinatal mortality (Wieringa et al 2010; Mori et al 2012), these results may not be generalisable to the Australian context.

Vitamins

There is insufficient evidence on supplementation during pregnancy of vitamin C (Rumbold & Crowther 2005b), vitamin E (Rumbold & Crowther 2005a), vitamin A (van den Broek et al 2010) or vitamin B6 (Thaver et al 2006) to show whether these are beneficial. However, supplementation has been associated with:

- preterm birth (500–1,000 mg vitamin C per day) (Rumbold & Crowther 2005b);
- perinatal death and preterm rupture of the membranes (1,000 mg vitamin C and 400 IU vitamin E per day) (Xu et al 2010); and
- congenital malformation (vitamin A) (Oakley & Erickson 1995; Rothman et al 1995; Dolk et al 1999).

Other nutritional supplements

- *Multiple micronutrients*: While multiple micronutrients improve nutrient status of pregnant women (Brough et al 2010) and reduced rates of small-for-gestational-age (Haider et al 2011) and low birthweight babies (Haider & Bhutta 2012), more evidence is needed to understand which groups of women may benefit from these supplements.
- *Omega-3 fatty acids*: While there is emerging evidence of benefits associated with supplementing omega-3 fatty acids during pregnancy (Makrides et al 2010; Leung et al 2011; Imhoff-Kunsch et al 2012; Larque et al 2012; Mozurkewich & Klemens 2012), the benefits of routine supplementation are not known.
- *Probiotics*: While there is also emerging evidence on the benefits of probiotics combined with dietary counselling during pregnancy (Laitinen et al 2009; Luoto et al 2010; Ilmonen et al 2011), again the benefits of routine supplementation are not known.
- *Multivitamins:* An observational study has shown an association with risk of preterm birth if multivitamins and minerals are taken daily in the third trimester by women who are unlikely to be deficient in these nutrients (Alwan et al 2010).

5.1.4 Practice summary: nutrition

When: All antenatal visits.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker, dietitian, nutritionist.

- **Assess levels of nutrition:** Ask women about their current eating patterns.
- **Provide advice**: Explain the benefits of healthy nutrition for the mother and baby. Give examples of foods in the five food groups, sample serves for each group and how many serves are recommended a day. Discuss foods that are rich in iron (eg meat, seafood and poultry) and supplementing iron if the woman has a low dietary intake.
- **Consider referral:** Referral to a dietitian may be a consideration if there is concern about the quality of nutritional intake, the woman would like information about nutrition for herself and her family, clinical assessment confirms underweight or overweight of the woman or there are other factors of concern (eg gestational or Type 1 diabetes, gastrointestinal disorders).
- **Take a holistic approach:** Consider the availability of foods appropriate to the woman's cultural practices and preferences and the affordability of supplements.

5.1.5 Resources

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5.2 Physical activity

Regular low to moderate-intensity physical activity is generally safe during pregnancy with likely benefits for mother and baby.

5.2.1 Background

Physical activity can be defined as any body movement that involves the use of one or more large muscle groups and raises the heart rate. This includes sport, exercise and recreational activities and incidental activity that accrues throughout the day (eg walking to the shops, climbing stairs).

The Australian *National Physical Activity Guidelines* recommend at least 30 minutes of moderate-intensity physical activity on most, preferably all, days, for all adults (DoHA 1999). Moderate-intensity activity is that which causes a slight, but noticeable, increase in breathing and heart rate (eg brisk walking, mowing the lawn, digging in the garden, or medium-paced swimming). The *National Physical Activity Guidelines* recommend against vigorous activity during pregnancy (DoHA 1999).

Levels of physical activity in Australia

Data specific to pregnant women are not available but results from national surveys give some indication of patterns of physical activity and sedentary behaviour.

- The 2007–08 National Health Survey showed that only 38% of adult women exercised sufficiently to obtain health benefits (AIHW 2011), 34% were sedentary (no exercise or very low levels) and physical activity decreased with age — 29% of women aged 15–24 years were sedentary (AIHW 2010).
- People living outside major cities and in more disadvantaged areas were more likely to be inactive (AIHW 2011).
- The proportion of people with no or low levels of exercise varied with region of birth — North Africa and the Middle East (91%), South-East Asia (79.1%), Southern and Eastern Europe (74.9%), Australia (71.3%) (AIHW 2010).
- In the 2004–05 National Aboriginal and Torres Strait Islander Health Survey, 75% of respondents aged 15 years and over living in non-remote areas had sedentary or low levels of physical activity, with women more likely to be sedentary than men (AIHW 2010).

Factors influencing levels of physical activity

Women may not be involved in physical activity for a range of reasons, including:

- perceptions that being physically active may harm the baby;
- limited facilities (eg pools, gymnasiums) or infrastructure (eg walking paths), particularly in some rural areas (NRHA 2011);
- limited access to group activities and/or facilities specifically for women;
- costs of attending activities;
- perceptions that being physically active for the sake of it is a waste of time and money;
- limited time for physical activity due to other commitments (eg looking after other children, working); and
- perception of personal safety in public places.

5.2.2 Discussing physical activity

Summary of the evidence

Guidelines in the United States (ACOG 2002), Canada (Davies et al 2003), the United Kingdom (RCOG 2006) recommend that women be encouraged to participate in physical activity during pregnancy.

Benefits of physical activity during pregnancy

Systematic reviews and RCTs have found that regular physical activity during pregnancy:

- appears to improve (or maintain) physical fitness (Kramer & McDonald 2006; Ramírez-Vélez et al 2011);
- improves health-related quality of life (Montoya Arizabaleta et al 2010) and maternal perception of health status (Barakat et al 2011); and
- may reduce depressive symptoms (Robledo-Colonia et al 2012); and
- pelvic floor muscle training during pregnancy can prevent urinary incontinence (Boyle et al 2012).

Calculation of body mass index at the first antenatal visit (see Module I, Section 7.2) allows appropriate advice about physical activity to be given early in pregnancy. However, the evidence on the effect of physical activity on weight gain during pregnancy is inconsistent:

- systematic reviews have found:
  - insufficient evidence to recommend any intervention for preventing excessive weight gain during pregnancy (Muktabhant et al 2012);
  - physical activity alone was only effective in reducing weight gain among women who were overweight or obese (Sui et al 2012); and
  - diet-based interventions were more effective in reducing gestational weight gain than physical activity or a combined intervention (Thangaratinam et al 2012).
- RCTs have found that physical activity alone may limit gestational weight gain among women who are overweight or obese (Nascimento et al 2011) and, combined with nutrition intervention, may limit weight gain in women with a pre-pregnancy BMI in the normal range (Ruchat et al 2012) and in the overweight or obese range (Vinter et al 2011).

There is insufficient evidence for reliable conclusions about the effect of physical activity on:

- maternal and fetal outcomes (Kramer & McDonald 2006);
- preventing gestational diabetes or glucose intolerance in pregnancy (Han et al 2012);
- improving glucose tolerance in women with gestational diabetes (Ceysens et al 2006); or
- preventing pre-eclampsia and its complications (Meher & Duley 2006).

RCTs into specific types of physical activity during pregnancy have found:

- specifically designed exercise programs prevented pelvic girdle pain (n=301)(Morkved et al 2007) and reduced severity of back pain (Kashanian et al 2009); and
- yoga reduced perceived stress (n=90)(Satyapriya et al 2009), improved quality of life and enhanced interpersonal relationships (n=102)(Rakhshani et al 2010) and women reported less pain during labour (n=74)(Chuntharapat et al 2008).

The safety of moderate physical activity during pregnancy is supported by a number of RCTs:

- walking, joint mobilisation and light resistance exercises (three 35-minute sessions a week in the second and third trimester) (n=160) did not affect fetal cardiovascular responses (Barakat et al 2010), maternal anaemia (Barakat et al 2009a), type of birth (Barakat 2009b), gestational age at birth (Barakat et al 2008) or the newborn's body size or overall health (Barakat et al 2009c);
- aerobic dance exercise was not associated with reduction in birth weight, preterm birth rate or neonatal wellbeing (Haakstad & Bø 2011);
- stationary cycling (up to five 40-minute sessions a week from 20 weeks gestation) (n=84) was associated with normalisation of birth weight (Hopkins et al 2010); and
- water aerobics (three 50-minute sessions a week from 16–20 weeks gestation) (n=71) was not associated with any alteration in maternal body composition, type of birth, preterm birth rate, neonatal wellbeing or weight (Cavalcante et al 2009).

Recommendation 6 **Grade B**

Advise women that low to moderate-intensity physical activity during pregnancy is associated with a range of health benefits and is not associated with adverse outcomes.

Pregnant women should avoid physical activity that involves the risk of abdominal trauma, falls or excessive joint stress, such as in high impact sports, contact sports and vigorous racquet sports (NICE 2008). They are also recommended not to scuba dive, because the risk of birth defects seems to be greater among those who do, and there is a serious risk of fetal decompression disease (Camporesi 1996).

5.2.3 Practice summary: physical activity

When: All antenatal visits.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker, physiotherapist.

- **Assess levels of activity:** Ask women about their current levels of physical activity, including the amount of time spent being active and the intensity of activity.
- **Provide advice**: Explain the benefits of regular physical activity. Give examples of activities that are of sufficient intensity to achieve health benefits (eg brisk walking, swimming, cycling). Advise women to discuss their plans with a health professional before starting or continuing a program of physical activity.
- **Provide information:** Give information about local supports for physical activity (eg women's walking groups, swimming clubs, yoga classes). Advise women to avoid exercising in the heat of the day and to drink plenty of water when active.
- **Take a holistic approach:** Assist women to identify ways of being physically active that are appropriate to their cultural beliefs and practices (eg activities they can do at home).

5.2.4 Resources

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5.3 Sexual activity

Women and their partners may ask about the safety of sexual activity during pregnancy. They can be reassured that there is little evidence of harm to low-risk pregnancies.

5.3.1 Background

The frequency of sexual activity in pregnancy varies widely, with a tendency to decrease with advancing pregnancy, particularly during the third trimester (Alder 1989; Barclay et al 1994; Aslan et al 2005; Gökyildiz & Beji 2005; Johnson 2011; Jones et al 2011). Factors contributing to decreased sexual activity include nausea, fear of miscarriage, fear of harming the baby, lack of interest, discomfort, physical awkwardness, fear of membrane rupture, fear of infection, and fatigue (Gökyildiz & Beji 2005; Brtnicka et al 2009; Jones et al 2011).

As well as concerns about the safety of sex during pregnancy, women may ask about sexual activity as a natural way to induce labour at term.

5.3.2 Discussing sexual activity

Summary of the evidence

Most available evidence comes from observational studies and relies on self-reported results. In addition, studies tend to examine any sexual activity in pregnancy, so the effects of different frequencies of intercourse cannot be known. The evidence is inconsistent on the effects of sexual activity on the length of gestation.

The limited available evidence suggests that in low risk pregnancies:

- there is a low risk of adverse outcomes from sexual activity during pregnancy (Tan et al 2009; Kontoyannis et al 2011); and
- sexual activity is unlikely to be associated with preterm birth (Sayle et al 2001; Yost et al 2006).

Nipple and genital stimulation have been advocated as a way of naturally promoting the release of endogenous oxytocin, and prostaglandins released in semen as a method of cervical ripening (Jones et al 2011). Overall, there is little evidence to support the theory that sexual activity has an effect in inducing labour at term. One prospective cohort study (n=200) found sexual activity at term was associated with earlier onset of labour and reduced requirement for labour induction at 41 weeks (Tan et al 2006); however, other similar studies have reported either no difference or a reduced rate of spontaneous labour prior to the date of scheduled labour induction (Schaffir 2006; Tan et al 2007).

While there is no evidence to suggest a clear benefit from restricted sexual activity in women who are at risk of preterm labour (eg previous spontaneous preterm birth) or antepartum hemorrhage because of placenta praevia, it may be advisable for them to abstain from sexual activity (Jones et al 2011).

Recommendation 7 **Grade B**

Advise pregnant women without complications that safe sexual activity in pregnancy is not known to be associated with any adverse outcomes.

5.3.3 Practice summary: sexual activity

When: A woman asks about sexual activity during pregnancy.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker, sexual health worker.

- **Discuss any concerns:** Explain that the desire for sex commonly decreases as the pregnancy progresses and after the birth, and in most women gradually returns over time.
- **Provide reassurance:** Reassure women that sex is not likely to harm the pregnancy or increase the risk of preterm birth.
- **Take a holistic approach:** Explain that it is a woman's choice whether she is sexually active and she has the right not to consent. Also explain that childbirth and parenting may have an effect on a couple's sex life.

5.3.4 Resources

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5.4 Travel

Discussing the risks associated with travel during pregnancy enables women to make informed decisions and take measures to improve their safety.

5.4.1 Background

Studies have identified limited knowledge among women of factors associated with travel during pregnancy, including the correct use of seat belts and risks associated with overseas travel.

Risks associated with travel in pregnancy

- *Car travel*: Severe and non-severe injuries from motor vehicle accidents are associated with adverse maternal and fetal outcomes (Schiff & Holt 2005; El Kady et al 2006; Hitosugi et al 2006; Wahabi et al 2007; Aboutanos et al 2008; Klinich et al 2008; Kvarnstrand et al 2008; Schiff et al 2008; Weiss et al 2008; Cheng et al 2012), with a higher risk of adverse outcomes if the birth takes place during an admission for a motor vehicle accident (Vivian-Taylor et al 2012). Adverse maternal and fetal outcomes are more likely following a motor vehicle accident if a seat belt is not worn (Hyde 2003; Klinich et al 2008; Motozawa et al 2010). Airbag deployment does not appear to adversely affect maternal or fetal outcomes (Metz & Abbott 2006; Schiff et al 2010).
- *Long-distance air travel:* Commercial flights are normally safe for pregnant women (Freeman et al 2004; RCOG 2008; ACOG 2009) and frequent air travel during pregnancy (eg by flight crew members) does not appear to increase the risk of adverse outcomes (Irgens et al 2003; dos Santos Silva et al 2009). However, air travel at 34–37 weeks gestation has been associated with an increased risk of preterm birth (Chibber et al 2006; Magann et al 2010). Venous thrombosis, which is associated with long-distance air travel in the general population (Belcaro et al 2001), is more likely in pregnancy.
- *Overseas travel:* Exposure to infection is increased with travel to certain regions. Pregnant women are more likely than non-pregnant women to become infected with malaria (Coll et al 2008). Malaria during pregnancy is associated with spontaneous abortion, preterm birth, low birth weight, stillbirth, congenital infection and maternal death (Lagerberg 2008).

5.4.2 Discussing travel during pregnancy

While the available evidence on travel in pregnancy is from low level studies and is heterogeneous, this evidence largely supports the NICE recommendations.

Car travel

High-level evidence from general populations supports the use of seat belts (Glassbrenner & Starnes 2009). However, studies examining pregnant women's knowledge and compliance of seat belt use and health professionals' counselling on the use of seat belts in pregnancy have found a lack of knowledge, compliance and advice given (McGwin et al 2004a; McGwin et al 2004b; Beck et al 2005; Jamjute et al 2005; Taylor et al 2005; Sirin et al 2007). Information provided to pregnant women can promote correct use of seat belts (McGwin et al 2004b).

The Confidential Enquiry into Maternal Deaths in the United Kingdom provides the following advice on the correct use of seatbelts in pregnancy (Lewis & Drife 2001):

- straps should be placed above and below the 'bump', not over it;
- use three-point seatbelts with the lap strap placed as low as possible beneath the 'bump', lying across the thighs with the diagonal shoulder strap above the bump lying between the breasts; and
- adjust the fit to be as snug as comfortably possible.

Recommendation 8 **Grade B**

Inform pregnant women about the correct use of seat belts — that is, three-point seat belts 'above and below the bump, not over it'.

Overseas travel

Overseas travel is increasingly common in pregnancy (McGovern et al 2007), and women are not always adequately prepared in terms of travel advice and insurance (Kingman & Economides 2003). Travel-related morbidity can be avoided by postponing the trip until after the birth, but this may not be feasible due to family desire or emergent situations. It is important to convey the risks associated with travel during pregnancy and to inform women of useful preventive interventions (McGovern et al 2007).

Long-distance air travel

The policies of commercial airlines regarding travel by pregnant women vary, with most limiting air travel beyond 36 weeks gestation due to associated risks (Breathnach et al 2004).

A survey of women's knowledge of air travel risks in pregnancy reported that only one-third of respondents sought travel advice and one-quarter were unaware of the risk of venous thrombosis (Kingman & Economides 2003). Advice on venous thrombosis provided by health professionals also varies (ranging from simple preventive measures to use of aspirin or heparin) (Voss et al 2004).

Preventive measures to minimise the risk of venous thrombosis include (ACOG 2009; Brenner 2009):

- using support stockings and periodic movement of the lower extremities;
- avoiding restrictive clothing;
- undertaking occasional ambulation; and
- maintaining hydration (eg drinking plenty of water, avoiding caffeine and not drinking alcohol).

Recommendation 9 **Grade C**

Inform pregnant women that long-distance air travel is associated with an increased risk of venous thrombosis, although it is unclear whether or not there is additional risk during pregnancy.

Vaccinations

Some vaccinations for travel overseas are contraindicated in pregnancy. The NICE Guidelines (NICE 2008) advise:

- in general, killed or inactivated vaccines, toxoids and polysaccharides can be given during pregnancy, as can oral polio vaccine;
- live vaccines are generally contraindicated because of largely theoretical risks to the baby; and
- measles, mumps, rubella, BCG and yellow fever vaccines should be avoided in pregnancy.

The risks and benefits of specific vaccines should be examined for each woman and the advice of a travel medicine doctor sought. Recommendations on vaccinations during pregnancy are included in the *Australian Immunisation Handbook* and the World Health Organization provides interactive maps on areas where the risk of specific infections is medium to high (see Section 5.4.4).

Travel insurance

Women should be advised to compare various policies and read the exclusion clauses carefully.

Practice point j

Pregnant women should be advised to discuss considerations such as air travel, vaccinations and travel insurance with their midwife or doctor if they are planning to travel overseas.

Travel to malaria-endemic areas

Due to the risks associated with maternal malaria and potential adverse effects associated with preventive medications, the safest option is for women to avoid travel to malaria-endemic areas during pregnancy. When travel cannot be deferred, women should be advised about preventive measures and any risks associated with them.

Taking precautions against mosquito bites is an important preventive measure. Insecticide-treated bed nets have been shown to reduce malarial levels in the general population (Jacquerioz & Croft 2009) and adverse outcomes among pregnant women (Gamble et al 2006). Other barrier measures include:

- wearing clothes that have been pretreated with insecticide;
- wearing long-sleeved treated clothing when outdoors in the evening and at night; and
- applying insect repellent regularly to exposed skin.

Barrier measures have the additional advantage of protecting against other mosquito-transmitted infections, such as dengue fever, Japanese encephalitis and yellow fever.

Recommendation 10 **Grade B**

If pregnant women cannot defer travel to malaria-endemic areas, advise them to use insecticide-treated bed nets.

Medications to prevent malaria infection reduce antenatal parasite prevalence and placental malaria among pregnant women, regardless of number of previous pregnancies (Garner & Gülmezoglu 2006). Among women having their first or second baby, they also have positive effects on birth weight and may reduce the risk of perinatal death (Garner & Gülmezoglu 2006).

The use of preventive medicine depends on the level of risk (eg travel destination, season, length of stay). The Therapeutic Goods Administration (TGA) advises that the use of preventive medicines is justified in high-risk situations (TGA 2013).

Practice point k

Beyond the first trimester, mefloquine is approved for use to prevent malaria. Neither malarone or doxycycline are recommended for prophylaxis any time during pregnancy. Chloroquine (or hydroxychloroquine) plus proguanil is safe but less effective so seldom used. For areas where only vivax is endemic, chloroquine or hydroxychloroquine alone is appropriate.

Current information on specific medicines in pregnancy is available from the TGA and information on areas where there is a risk of transmission of malaria is available from the WHO and the Centers for Disease Control and Prevention (see Section 5.4.4).

The risks and benefits of specific anti-malarial medications should be examined for each woman and the advice of an expert in travel medicine sought.

5.4.3 Practice summary: travel

When: Early in antenatal care and when women seek advice about travel during pregnancy.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker, infectious disease specialist, travel medicine specialist.

- **Discuss the use of seat belts:** Explain that using a seat belt will not harm the baby and will improve outcomes should an accident occur. Describe how to fit the seat belt correctly.
- **Discuss air travel:** If a woman is planning long-distance air travel during pregnancy, she should discuss this with a health professional and make enquiries with individual airlines and travel insurers to assess whether planned travel is possible. If travel is arranged, provide advice on minimising the risk of venous thrombosis.
- **Discuss prevention of infection while travelling**: Explain that vaccinations required for travel to some destinations may be contraindicated during pregnancy. Provide advice on malaria prevention to women who are unable to defer travel to malaria-endemic areas.
- **Take a holistic approach:** Assist women who are planning to travel to access relevant services (eg health professionals with expertise in travel medicine). Advise that they take their antenatal record with them when travelling.

5.4.4 Resources

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6 Clinical assessments

A range of clinical assessments is offered to promote and enhance the physical and emotional wellbeing of a woman and her baby during pregnancy. This chapter discusses assessments that are offered to all women during pregnancy. Recommendations are based on evidence about the accuracy of assessments in predicting complications in pregnancy and the effectiveness of interventions in reducing symptoms.

Table 6.1 presents a summary of advice on assessments during pregnancy considered a priority for inclusion in these Guidelines. Advice on other assessments, such as routine breast and pelvic examination (which are not recommended) is included in the NICE Guidelines (NICE 2008).

Table 6.1: Summary of advice for women about assessments during pregnancy

Clinical assessment	Advice about assessment	Section
Weight and height	Calculation of body mass index at the first antenatal visit allows appropriate advice about nutrition and physical activity to be given during pregnancy.	Module I 7.2
Blood pressure	Measuring blood pressure at the first antenatal visit allows identification of women who have chronic hypertension and may require additional monitoring during pregnancy.	Module I 7.3
Proteinuria	Testing women for proteinuria at the first antenatal visit identifies existing kidney disease or urinary tract infection.	Module I 7.4
Gestational age	Ultrasound scanning is most accurate in determining gestational age between 8 and 14 weeks of pregnancy. After 24 weeks of pregnancy, the date of the last menstrual period is used.	Module I 7.1
Fetal development and anatomy	Ultrasound scanning at 18–20 weeks of pregnancy accurately detects structural abnormalities.	6.1
Fetal growth and wellbeing	Fetal growth is assessed at each antenatal visit.	6.2.1
	Promoting awareness of the normal pattern of fetal movement assists women in knowing when to seeking advice if they perceive decreased or absent movements.	6.2.2
	Hearing the fetal heart is not predictive of pregnancy outcomes.	6.2.3
Pre-eclampsia	Routine measuring of blood pressure during pregnancy allows monitoring for new onset hypertension.	6.3
	After the first antenatal visit, proteinuria is tested in women with risk factors for, or clinical indications of, pre-eclampsia	
Risk of preterm birth	Discussing risk and protective factors for preterm birth may assist some women to reduce their risk.	6.4
Psychosocial factors	Assessment of psychosocial factors aims to identify women who are more vulnerable to mental health disorders during pregnancy.	Module I 7.5
Depression	Detecting symptoms of depression enables appropriate follow-up.	Module I 7.6
Anxiety	Anxiety, either alone or with depression, is common in pregnancy.	Module I 7.6
Domestic violence	All women are asked about domestic violence during pregnancy to enable access to additional support and care.	Module I 7.7

6.1 Fetal development and anatomy

Ultrasound examination between 18 and 20 weeks gestation allows assessment of fetal development and anatomy. It is also used to estimate gestational age when this has not been assessed in the first trimester.

6.1.1 Background

Diagnostic ultrasound is a sophisticated electronic technology that uses pulses of high frequency sound to produce an image. This imaging can enable measurement of the baby, estimation of the gestational age and identification of structural abnormalities. Gestational age assessment and screening for chromosomal abnormalities in the first trimester are discussed in Module I of the Guidelines. This section discusses the second trimester scan to assess the development and anatomy of the baby and the position of the placenta. This assessment is also known as the morphology scan.

Congenital abnormalities in Australia

In Australia in 2010, congenital abnormality (including chromosomal and structural abnormalities) was the leading cause of perinatal death in single pregnancies (28.8%) and accounted for 76.1% of neonatal deaths of babies born at 32–36 weeks gestation and 44.1% of deaths of babies born after 37 weeks gestation (Li et al 2012). Available data on neural tube defects among babies born to Aboriginal and Torres Strait Islander women show a higher overall prevalence than among non-Indigenous women (16.6 versus 7.3 per 10,000 total births in 2006–2008) (AIHW 2011).

6.1.2 Offering assessment of fetal development and anatomy

Summary of the evidence

Routinely offering women an ultrasound during the second trimester to screen for fetal abnormalities and location of the placenta is recommended in the United Kingdom (NICE 2008), the United States (ACOG 2009) and Canada (Cargill et al 2009) and has been previously recommended in Australia (RANZCOG 2009). Although cervical length is increasingly reported, there is insufficient evidence to recommend its routine assessment (RANZCOG 2008; 3 Centres Collaboration 2012).

Accuracy and effectiveness of ultrasound assessment of fetal development and anatomy

- *Gestational age:* While gestational age assessment using ultrasound is more accurate in the first trimester (Kalish et al 2004; Caughey et al 2008), some women may not have access to ultrasound until later in pregnancy. Gestational age has been successfully estimated in the second trimester (Johnsen et al 2005; Oleson & Thomsen 2006).
- *Structural abnormalities:* Ultrasound has been used in the second trimester to detect anomalies of the heart (Perri et al 2005; Del Bianco et al 2006; Westin et al 2006; Fadda et al 2009), renal tract (Cho et al 2005) and umbilical artery (Cristina et al 2005), neural tube defects (Norem et al 2005) and anomalies resulting from exposure to alcohol (Kfir et al 2009). The rate of detection of structural anomalies is generally higher in the second than in the first trimester (Saltvedt et al 2006; Hildebrand et al 2010).
- *"Soft" markers:* While the combination of nuchal thickness and biochemical markers in the first trimester is more effective in identifying chromosomal abnormalities (see Module I, Chapter 9), some markers (eg echogenic bowel, short femur, short humerus, thickened nuchal fold, absent nasal bone) identified in the second trimester ultrasound occur more frequently in babies with chromosomal abnormalities (Bottalico et al 2009). A combination of markers is more accurate than a single marker alone; for example only 5% of babies with identified chromosomal abnormality had echogenic bowel as the only finding (Iruretagoyena et al 2010).
- *Placenta:* Second trimester ultrasound has effectively identified placental location (Cargill et al 2009), overlap of the cervical os (Robinson et al 2012), placental length (which may assist in identifying risk of having a small-for-gestational age baby) (McGinty et al 2012) and placenta praevia (which may resolve in women with [61%] and without [90%] a previous caesarean section) (Lal et al 2012).

- *Type of ultrasonography*: Accurate assessment can be performed using standard 2D ultrasonography. Assessment may be performed more rapidly using 3D ultrasonography (Benacerraf et al 2006; Pilu et al 2006).

Timing of ultrasound assessment of fetal development and anatomy

Recommended timing of the ultrasound scan varies in international guidelines but is generally in the range of 18–20 weeks as:

- sensitivity in detecting structural abnormalities increases after 18 weeks gestation (Cargill et al 2009); and
- detection of structural abnormalities before 20 weeks gestation gives women the choice of terminating the pregnancy, where this is permitted under jurisdictional legislation.

Ultrasound can be used to assess gestational age up to 24 weeks gestation and to detect abnormalities throughout the pregnancy.

Recommendation 11 **Grade B**

Offer pregnant women ultrasound screening to assess fetal development and anatomy between 18 and 20 weeks gestation.

Practice point l

Timing of the ultrasound will be guided by the individual situation (eg for women who are obese, visualisation may improve with gestational age).

There is no benefit from repeated diagnostic ultrasound assessments unless clinically indicated. Repeated tests may increase costs for women, be inconvenient and have the potential to increase anxiety (eg through false positives). As well, access for some women is limited as this technology is not available in all settings.

Practice point m

Repeated ultrasound assessment may be appropriate for specific indications but should not be used for routine monitoring.

Other considerations

Benefits and harms

A Cochrane review (Whitworth et al 2010) found a reduced number of inductions for 'prolonged pregnancy' and no significant differences in birth weight, size for gestational age, Agpar scores and rates of admission to neonatal intensive care between babies exposed to ultrasound in early pregnancy (before 24 weeks) and those not exposed. There were no significant differences in growth and development, visual acuity or hearing for children aged 8–9 years (Whitworth et al 2010). Follow-up at 15–16 years (n=4,458) found no significant effect on overall school performance (Stalberg et al 2009).

No studies were identified that assessed psychological benefits or harms to the mother. Women may not be fully informed about the purpose of routine ultrasound and may be made anxious, or be inappropriately reassured by scans (Garcia et al 2002; Lalor & Devane 2007). A small systematic review found insufficient evidence to support either high or low levels of feedback during ultrasound to reduce maternal anxiety and change maternal health behaviour (smoking, alcohol use) (Nabhan & Faris 2010).

Who should conduct the assessment?

Minimum standards for health professionals conducting ultrasound assessments are disseminated by the Australian Society for Ultrasound in Medicine, the Australasian Sonographer Accreditation Registry, the Australian Sonographers Association, the Royal Australian and New Zealand College of Radiologists, and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists.

Practice point n

Ultrasound assessment should only be performed by healthcare professionals with appropriate training and qualifications, within the appropriate scope (eg diagnostic or point of care).

Access to ultrasound

The costs associated with ultrasound may limit access for some women, particularly if bulk-billed services are not available in their area.

In remote regions, it may be difficult for women to access ultrasound examination due to limited availability of appropriate equipment, a lack of accredited and trained professionals in some areas and the costs involved in travelling for the assessment. It is noted that there is a lack of consistency in funding across the States and Territories to support travel and accommodation for women from rural and remote areas to access care and services.

Cost effectiveness

An economic analysis carried out to inform the development of these Guidelines (see Appendix E) found that screening for congenital abnormalities at 18–20 weeks is moderately cost-effective, without generating significant risks, although without driving substantive benefits. This excludes the positive psychological value of the information obtained from the ultrasound (which may be associated with improvements in fetal wellbeing) and benefits from the detection of placental problems and confirmation of gestational age, making these estimates fairly conservative.

6.1.3 Discussing assessment of fetal development and anatomy

Not all women will want an ultrasound and some may not understand the purpose of the assessment or think that it is being offered because there is something wrong with the pregnancy.

In discussing the ultrasound scan, it is important to explain:

- that it is the woman's decision whether the ultrasound takes place;
- where ultrasound services are available if the woman chooses to have one;
- that ultrasound does not detect all fetal and maternal abnormalities;
- any costs involved for the woman and the timeframe for receiving results; and
- choices if any abnormalities are detected (some parents may not want an ultrasound if there is no change in birth outcomes).

6.1.4 Practice summary: fetal development and anatomy

When: Between 18 and 20 weeks.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.

- **Discuss the purpose of the ultrasound**: Explain that ultrasound assessment is offered to all women to check the anatomy and growth of the baby and can also be used to estimate gestational age if this has not already been done.
- **If a woman chooses to have an ultrasound, arrange an appointment or referral**: When arranging referral, ensure that the ultrasound takes place before 20 weeks of pregnancy.
- **Take a holistic approach**: Provide advice to assist women in accessing services (eg availability of bulk-billed services and interpreters). For women who need to travel for assessment, explain the need to plan early and organise travel and accommodation. Provide information on available funding to assist with these costs.
- **Arrange follow-up**: Routinely make sure that women are informed of the results of the scan and document these in her antenatal record. If an abnormality is suspected or identified, offer women access to appropriate counselling and ongoing support by trained health professionals.

6.1.5 Resources

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6.2 Fetal growth and wellbeing

Antenatal visits provide an opportunity to assess fetal growth, auscultate the fetal heart (although this cannot predict pregnancy outcomes) and encourage women to be aware of the normal pattern of fetal movements for their baby.

6.2.1 Fetal growth

During pregnancy, the baby passes through various stages of growth and development. Monitoring growth aims to identify small- and large-for-gestational age babies, both of whom are at increased risk of associated morbidity and mortality.

Current practice in Australia for monitoring growth is assessment by abdominal palpation, symphysis–fundal height measurement, or both.

Perinatal deaths associated with intrauterine growth restriction in Australia

A baby whose estimated weight is below the 10th percentile for its gestational age is considered to be affected by intrauterine growth restriction (Li et al 2012). In Australia in 2010, intrauterine growth restriction was the cause of 6.8% of perinatal deaths among singleton babies (Li et al 2012). Perinatal deaths associated with intrauterine growth restriction among singleton babies were most common at 32–36 weeks gestation (11.3%). Among all perinatal deaths, intrauterine growth restriction was more common among mothers aged less than 20 years (8%) and more than 40 years (9.4%).

Risk factors for intrauterine growth restriction

Intrauterine growth restriction has been associated with pre-eclampsia (Lowe et al 2008), chlamydia (John Hopkins Study Team 1989), cytomegalovirus (McCarthy et al 2011) and decreased fetal movements (ANZSA 2010).

Summary of the evidence

The evidence on methods of growth assessment is limited:

- an observational study found that abdominal palpation had limited value as a screening tool for intrauterine growth restriction in low-risk pregnancies (n=6,318) (Bais et al 2004); and
- two Cochrane reviews (based on the same study) found no difference in detection of intrauterine growth restriction between repeated symphysis–fundal height measurement and abdominal palpation (Neilson 2009; Robert Peter et al 2012);
- detection of intrauterine growth restriction has been shown to be improved by plotting fundal height measurements on fetal growth charts customised for maternal height, weight, parity and ethnic group in an observational study (Roex et al 2012).

Although current evidence does not conclusively support either method for detecting low or high birth weight babies, monitoring growth is important (Robert Peter et al 2012). Monitoring of fetal growth in women whose pre-pregnancy BMI is high (HAPO 2010) or in the underweight category (Dawes & Grudzinskas 1991; Panaretto et al 2006) is of particular importance.

Referral for specialist advice is required when there is a discrepancy of 3 cm between observed and expected symphysis-fundal height measurements.

Consensus-based recommendation i

Offer women assessment of fetal growth (abdominal palpation and/or symphysis-fundal height measurement) at each antenatal visit to detect small- or large-for-gestational-age infants.

Practice point o

Further investigations, such as ultrasound, are a consideration when there is any doubt about fetal growth. This includes ultrasound for women with a BMI ≥30 as clinical assessments of fetal growth have been shown to be less reliable in this group.

Studies into estimating birth weight before labour have found that:

- sensitivity and specificity were similar using ultrasound (12.6%; 92.1%), abdominal palpation (11.8%; 99.6%) or maternal estimate (6.3%; 98.0%) (n=246) (Ashrafganjooei et al 2010);
- abdominal palpation was within 10% of actual birth weight in 65% of babies, with lower accuracy for low birth weight (n=320) (Belete & Gaym 2008);
- abdominal palpation and ultrasound had similar sensitivity and specificity for normal and low birth weights but ultrasound had higher specificity for high birth weight (n=174) (Khani et al 2011); and
- ultrasound was more accurate in predicting low or high birth weight than abdominal palpation (n=262) (Peregrine et al 2007).

6.2.2 Fetal movements

Maternal perception of fetal movement (defined as any discrete kick, flutter, swish or roll) (Neldam 1983) is one of the first indications of fetal life. Most pregnant women become aware of fetal activity between 18 and 20 weeks of gestation (RCOG 2011). Due to a lack of epidemiological studies on fetal activity patterns and maternal perception of fetal activity in normal pregnancies, it is not clear what constitutes a 'normal' pattern of fetal movement (RCOG 2011). There is considerable variation in fetal movements and estimates cover a wide range (eg from 4–100 movements per hour) (Mangesi & Hofmeyr 2007).

Decreased fetal movement

A significant reduction in fetal movement may be associated with poor perinatal outcomes (RCOG 2011). Women's perception of decreased fetal movement is reduced with an anterior placenta, cigarette smoking and maternal obesity (Tuffnell et al 1991).

- *Incidence of decreased fetal movement*: maternal reporting of decreased fetal movement occurs in 5–15% of pregnancies in the third trimester (Froen 2004; Heazell et al 2008; Flenady et al 2009).
- *Risks of decreased fetal movement*: decreased fetal movement indicates that even women with low-risk pregnancies may be at greater risk of adverse outcomes, including intrauterine growth restriction, fetal death and preterm birth (ANZSA 2010). However, the absence of perceived fetal movements does not necessarily indicate fetal compromise or death (Mangesi & Hofmeyr 2007).

Due to the lack of high quality evidence, there is considerable variation in the information provided to women about decreased fetal movements (Heazell et al 2008; Flenady et al 2009; Unterscheider et al 2010).

Summary of the evidence

Fetal movement assessment is widely used to monitor fetal wellbeing (Froen et al 2008; O'Sullivan et al 2009) and is most commonly undertaken through subjective maternal perception. Fetal movement counting is a more formal method to quantify fetal movements (Mangesi & Hofmeyr 2007). Maternal perception rather than formal fetal movement counting is recommended in Australia (ANZSA 2010) and in the United Kingdom (NICE 2008b; RCOG 2011).

Fetal movement counting

A systematic review (n=71,730) (Mangesi & Hofmeyr 2007) found insufficient evidence to recommend for or against fetal movement counting to prevent adverse perinatal outcomes, as the included trials did not compare the effects on perinatal outcome of fetal movement counting with no fetal movement counting. A subsequent systematic review of single studies (Heazell & Froen 2008) concluded that at present, there is no evidence that any absolute definition of reduced fetal movements is more valuable than maternal perception of reduced fetal movements in detecting intrauterine fetal death or fetal compromise. However, a recent RCT (n=1,076) found that maternal ability to detect clinically important changes in fetal activity seemed to be improved by fetal movement counting, with increased detection of intrauterine growth restriction and improved perinatal outcomes but not perinatal mortality (Saastad et al 2011).

Reporting of decreased fetal movement

Guidelines from Australia (ANZSA 2010) and the United Kingdom (RCOG 2011) recommend that women contact their health professional or maternity unit if they are concerned about a reduction in or cessation of fetal movements after 28 weeks of gestation.

A recent systematic review (Hofmeyr & Novikova 2012) concluded that there are insufficient data from randomised trials to guide practice regarding the management of decreased fetal movement. Current management strategies include early birth, expectant management with close surveillance of the baby, cardiotocography, ultrasound examination, and fetal arousal tests (either cardiotocography or clinical observation where electronic fetal assessment methods are not available) to assess the baby's wellbeing (Hofmeyr & Novikova 2012).

Consensus-based recommendation ii

Advise women to be aware of the normal pattern of movement for their baby and to contact their health care professional promptly if they have any concerns about decreased or absent movements.

Discussing fetal movement

Information given to women should include that:

- most women are aware of fetal movements by 20 weeks of gestation, and although fetal movements tend to plateau at 32 weeks of gestation, there is generally no reduction in the frequency of fetal movements in the late third trimester (RCOG 2011);
- patterns of movement change as the baby develops, and wake/sleep cycles and other factors (eg maternal weight and position of the placenta) may modify the mother's perception of movements (ANZSA 2010);
- most women (approximately 70%) who perceive a single episode of decreased fetal movements will have a normal outcome to their pregnancy (RCOG 2011); and
- if a woman does report decreased fetal movement, a range of tests can be undertaken to assess the baby's wellbeing.

6.2.3 Discussing fetal heart rate assessment

Auscultation of the fetal heart has traditionally formed an integral part of a standard antenatal assessment.

Summary of the evidence

Auscultation

Routine auscultation of the fetal heart rate is not recommended in the United Kingdom (NICE 2008a).

Although successful detection of a fetal heart confirms that the baby is alive, it does not guarantee that the pregnancy will continue without complications (Rowland et al 2011) and is unlikely to provide detailed information on the fetal heart rate such as decelerations or variability (NICE 2008a).

The sensitivity of Doppler auscultation in detecting the fetal heart is 80% at 12+1 weeks gestation and 90% after 13 weeks (Rowland et al 2011). Attempts to auscultate the fetal heart before this time may be unsuccessful, and lead to maternal anxiety and additional investigations (eg ultrasound) in pregnancies that are actually uncomplicated (Rowland et al 2011). It is unlikely that the fetal heart will be audible before 28 weeks if a Pinard stethoscope is used (Wickham 2002)

Although there is no evidence on the psychological benefits of auscultation for the mother, it may be enjoyable, reduce anxiety and increase mother–baby attachment.

Consensus-based recommendation iii

If auscultation of the fetal heart rate is performed, a Doppler may be used from 12 weeks and a Pinard stethoscope from 28 weeks.

Cardiotocography

Electronic fetal heart rate monitoring is not recommended as a routine part of antenatal care in the United Kingdom (NICE 2008a) or Canada (Liston et al 2007).

A Cochrane review found no evidence on the use of cardiotocography in women at low risk of complications (Grivell et al 2010).

Anxiety levels in women who undergo routine cardiotocography are increased. This reaction seems to be influenced by the perception of fetal movement during the examination and is more evident in women whose pregnancies are affected by obstetric complications (Mancuso et al 2008).

Consensus-based recommendation iv

Routine use of antenatal electronic fetal heart rate monitoring (cardiotocography) for fetal assessment in women with an uncomplicated pregnancy is not supported by evidence.

6.2.4 Practice summary: Fetal growth and wellbeing

Fetal growth

When: At all antenatal visits.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.

- **Discuss fetal growth:** Early in pregnancy, give all women appropriate written information about the measurement of fetal growth and an opportunity to discuss the procedure with a health professional.
- **Take a consistent approach to assessment:** If using symphysis-fundal height measurement, start measuring at the variable point (the fundus) and continue to the fixed point (the symphysis pubis) using a non-elastic tape measure with the numbers facing downwards so that an objective measurement is taken. Document measurements in a consistent manner, preferably using a customised fetal growth chart.
- **Take a holistic approach:** Abdominal palpation provides a point of engagement between the health professional and mother and baby.

Fetal movements

When: At antenatal visits from 20 weeks.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.

- **Discuss fetal movement patterns**: Emphasise the importance of the woman's awareness of the pattern of movement for her baby and factors that might affect her perception of the movements.
- **Advise early reporting**: Women should report perceived decreased fetal movement on the same day rather than wait until the next day.
- **Take a holistic approach:** Support information given with appropriate resources (eg written materials suitable to the woman's level of literacy, audio or video) and details on whom the woman should contact if decreased fetal movements are perceived.

Fetal heart rate

When: At antenatal visits between 12 and 26 weeks gestation.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.

- **Discuss fetal heart rate**: Explain that listening to the fetal heart does not generally provide any information about the health of the baby and that other tests (such as ultrasound) are relied upon for identification of any problems with the pregnancy.
- **Take a holistic approach:** Some women may be reassured by hearing the fetal heart beat.

6.2.5 Resources

Measuring fundal height. In: *Minymaku Kutju Tjukurpa Women's Business Manual, 4th edition*. Congress Alukura, Nganampa Health Council Inc and Centre for Remote Health. http://www.remotephcmanuals.com.au

Fetal movements

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6.2.6 References

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6.3 Risk of pre-eclampsia

Antenatal care provides an opportunity to identify women with risk factors or clinical signs of pre-eclampsia and provide advice on prevention and symptoms that may indicate a need for additional care.

6.3.1 Background

Hypertensive disorders during pregnancy include (Lowe et al 2008):

- *chronic hypertension* — blood pressure ≥140 mmHg systolic and/or ≥90 mm diastolic confirmed before pregnancy or before 20 completed weeks pregnancy, without a known cause (*essential hypertension*), associated with a secondary cause such as existing kidney disease (*secondary hypertension*) or associated with measurement in a healthcare setting (*white coat hypertension*);
- *gestational hypertension* — new onset hypertension (defined as a blood pressure ≥140 mmHg systolic and/or ≥90 mm diastolic) after 20 weeks pregnancy without any maternal or fetal features of pre-eclampsia, followed by return of blood pressure to normal within 3 months after the birth;
- *pre-eclampsia* — a multi-system disorder characterised by hypertension and involvement of one or more other organ systems and/or the fetus, with raised blood pressure after 20 weeks pregnancy commonly the first manifestation and proteinuria a common additional feature (although not required to make a clinical diagnosis); and
- *superimposed pre-eclampsia* — development of one or more of the systemic features of pre-eclampsia after 20 weeks pregnancy in a woman with chronic hypertension.

In pre-eclampsia, hypertension is accompanied by one or more of the following features (Lowe et al 2008):

- impaired kidney or liver function;
- haematological involvement;
- neurological symptoms (headache, visual disturbances, stroke, convulsions);
- pulmonary oedema;
- fetal growth restriction; and/or
- placental abruption.

Pre-eclampsia is a progressive disorder that worsens if pregnancy continues (Lowe et al 2008). Birth of the baby is the definitive treatment and is followed by resolution, generally over a few days but sometimes much longer (Lowe et al 2008). Decisions about management (eg induction/caesarean section or continuation of the pregnancy) are based on maternal and fetal factors (eg gestational age) (Lowe et al 2008). Early onset pre-eclampsia (<37 weeks) is associated with poorer outcomes (Lowe et al 2008).

Prevalence of pre-eclampsia

Data on the prevalence of pre-eclampsia in Australia are limited.

- In 2009–10, a total of 7,738 women in Australia were hospitalised for pre-eclampsia (AIHW Hospitals Data); around 2.6% of births. There are no data on the difference in rates of pre-eclampsia between Aboriginal and Torres Strait Islander and non-Indigenous women.
- In 2010, hypertension or pre-eclampsia were the reasons for 3.1–12.8% of labour inductions in New South Wales, Queensland, South Australia, Tasmania and the Northern Territory and 2.3–4.8% of caesarean sections in Queensland, South Australia, Tasmania and the Northern Territory. Data collection methods varied and, for other states and territories, were unavailable or unpublished (Li et al 2012).
- Of the five maternal deaths due to hypertensive disease in Australia in 2003–05 (Sullivan et al 2008), two were attributed to eclampsia. One woman had pre-eclampsia in her previous pregnancy but no evidence of pre-eclampsia in the pregnancy preceding her death.

- A decline in the incidence of pre-eclampsia and associated maternal mortality in high income countries occurred between 1940 and 1970 with widespread uptake of antenatal care and increased access to hospital care for timely induction of labour or caesarean section for women with severe pre-eclampsia (Goldenberg et al 2011), and more recently, with the introduction of treatment with magnesium sulphate (Duley et al 2010).

Risks associated with pre-eclampsia

- Significant pre-eclampsia is associated with serious maternal morbidity and, very rarely, with death.
- Women with complicated pre-eclampsia are more likely to have a caesarean section, stillbirth or neonatal death (Bhattacharya & Campbell 2005).
- Neonatal complications associated with pre-eclampsia in a large cross-sectional study (n=647,392)(Schneider 2011) were small for gestational age, acute respiratory distress syndrome, postpartum neonatal hypoglycemia and low Apgar scores.

6.3.2 Assessing risk of pre-eclampsia

Summary of the evidence

Whether a woman will require additional care (eg more frequent antenatal visits) is based on the presence of risk factors for and clinical features of pre-eclampsia.

Identifying women with risk factors for pre-eclampsia

Identifying risk factors for pre-eclampsia at the first antenatal visit to allow additional care to be arranged is recommended in the United Kingdom (NICE 2008; 2010) and Canada (SOGC 2008).

Factors associated with a high risk of pre-eclampsia include (NICE 2008):

- a history of pre-eclampsia (Mendilcioglu et al 2004; Lain et al 2005; Ananth et al 2007; Poon et al 2010; Sibai et al 2011);
- pre-existing hypertension (Lowe et al 2008; Poon et al 2010);
- pre-existing kidney disease;
- pre-existing or gestational diabetes (Bryson et al 2003; Yogev et al 2004; Ostlund et al 2006; HAPO 2010);
- autoimmune disease such as systemic lupus erythematosis or antiphospholipid syndrome; and
- raised blood pressure at the first antenatal visit.

Factors associated with a moderate risk of pre-eclampsia include (NICE 2008):

- first or multiple pregnancy (eg twins or triplets);
- age >40 years;
- more than 10 years since the last pregnancy;
- BMI greater than 35 kg/m^2 at first visit (O'Brien et al 2003; Bodnar et al 2005; Erez-Weiss et al 2005; Fredrick et al 2006; Cnossen et al 2007; Getahun et al 2007; Becker et al 2008; Driul et al 2008; Aliyu et al 2010; Briese et al 2010; Mbah et al 2010; Anderson et al 2012); and
- family history of pre-eclampsia (Poon et al 2010) or hypertensive disease (Qiu et al 2004; Roes et al 2005; Bezerra et al 2010; Jelin et al 2010).

Risk of pre-eclampsia may also be associated with use of ovulation induction medication and African or Indian subcontinent origin (Poon et al 2010) and Factor V Leiden (Kosmas et al 2003; Dudding et al 2008).

While there may be an association between active maternal periodontal disease during pregnancy and pre-eclampsia (Boggess et al 2003), treatment of peridontal disease does not appear to affect the level of risk (Newnham et al 2009) (see Section 10.5 of Module I).

Consensus-based recommendation v

Routinely measure blood pressure to identify new onset hypertension.

Preventive measures

Preventive treatment with low-dose aspirin in women at high risk and calcium supplementation in women with low dietary intake is recommended in the United Kingdom (NICE 2010), Canada (SOGC 2008) and Australia (Lowe et al 2008) and by WHO (2011).

- *Calcium*: There is strong evidence that calcium supplementation is of benefit for women at risk of pre-eclampsia if dietary intake is low (Hofmeyr et al 2010; Patrelli 2012). The WHO defines low dietary intake as <900 mg per day and the Australian and New Zealand Nutrient Reference Values recommend an intake of 1,000 mg per day in pregnant women, 1,300 mg if they are younger than 18 years (NHMRC 2005). In Australia, calcium intake is low in relation to recommendations for some girls and women of reproductive age (NHMRC 2011). The sources and recommended number of serves of calcium-rich foods during pregnancy are discussed in Section 5.1.2.

Recommendation 12 **Grade A**

Advise women at high risk of developing pre-eclampsia that calcium supplementation is beneficial if dietary intake is low.

Practice point p

If a woman has a low dietary calcium intake, advise her to increase her intake of calcium-rich foods.

- *Effectiveness of aspirin in preventing pre-eclampsia*: Systematic reviews and meta-analyses have found that:
  - low-dose aspirin has moderate benefits when used for prevention of pre-eclampsia (RR: 0.78; 95%CI: 0.67–0.90) (Duley et al 2007);
  - there was a reduction in risk among women at risk (eg with previous pre-eclampsia) (RR: 0.79; 95%CI: 0.65–0.97) but not those with low risk (Trivedi 2011);
  - the relative risk of developing pre-eclampsia was 0.90 (95% CI 0.84–0.97), of giving birth before 34 weeks was 0.90 (95% CI 0.83–0.98), and of having a pregnancy with a serious adverse outcome was 0.90 (95% CI 0.85–0.96) (Askie et al 2007); and
  - a systematic review only found a significant effect for preterm pre-eclampsia (RR 0.11, 95% CI 0.04–0.33) (Roberge et al 2012).

Recommendation 13 **Grade B**

Advise women at moderate-high risk of pre-eclampsia that low-dose aspirin from early pregnancy (preferably before 20 weeks) may be of benefit in its prevention.

- *Vitamins*: There is insufficient evidence that the risk of pre-eclampsia is reduced by supplementing vitamin B_2 (Neugebauer et al 2006) or vitamins C and E (Beazley et al 2005; Rumbold & Crowther 2005; Poston et al 2006; Rumbold et al 2006; Polyzos et al 2007; Spinnato et al 2007; Klemmensen et al 2009; Rahimini et al 2009; Basaran et al 2010; Xu et al 2010; Conde-Agudelo et al 2011; Rossi & Mullin 2011; Salles et al 2012). Some studies have found associations between supplementation with vitamins C and E in women at risk of pre-eclampsia and adverse effects, including low birth weight, hypertension and premature rupture of the membranes (Poston et al 2006; Rahimini et al 2009; Xu et al 2010; Conde-Agudelo et al 2011).

Recommendation 14 **Grade B**

Advise women that vitamins are not of benefit in preventing pre-eclampsia.

- *Physical activity:* A systematic review found a trend towards a protective effect from leisure time or recreational physical activity during pregnancy in case-control studies (OR: 0.77; 95%CI: 0.64–0.91) but no significant effect in prospective cohort studies (Kasawara 2012). Physical activity during pregnancy has general health benefits (see Section 5.2).
- *Salt intake*: Reducing salt intake does not reduce the risk of pre-eclampsia (Duley et al 2005). However, avoiding foods with added salt has other health benefits (NHMRC 2013).

Identifying women with clinical signs of pre-eclampsia

Routine measurement of diastolic and systolic blood pressure and testing for proteinuria at each antenatal visit are recommended in the United Kingdom to screen for pre-eclampsia (NICE 2008). However, routine screening for proteinuria is not recommended in the United States (USPSTF 1996; ACOG 2002) or Canada (CTFPHE 1996).

- *Hypertension*: Women with new onset hypertension (defined as a blood pressure ≥140 mmHg systolic and/or ≥90 mm diastolic) that occurs after 20 weeks pregnancy should be assessed for signs and symptoms of pre-eclampsia (Lowe et al 2008).
- *Proteinuria*: Routine testing for proteinuria is not helpful in predicting pre-eclampsia and should be confined to women with increased blood pressure or sudden weight gain (Alto 2005; Rhode et al 2007). When testing is indicated, numerous high and low evidence level studies confirm the correlation of protein-creatinine ratio testing against the 'gold standard' 24-hour urine collection, for point of care testing (Haas et al 2003; Wikstrom et al 2006; Zadehmodarres et al 2006; Aggarwal et al 2008; Chen et al 2008; Poon et al 2008a; Al et al 2009; Soni et al 2009; Nasrin et al 2010; Sethuram et al 2011; Morris et al 2011; Morris 2012; Tun et al 2012). Urine dipstick tests have high false postive/negative rates and should be confirmed by other tests such as spot urine protein-creatinine ratio (Phelan et al 2004).

Measurement of blood pressure and testing for proteinuria is discussed in Module I of the Guidelines (see Sections 7.3 and 7.4).

Recommendation 15 **Grade C**

Offer testing for proteinuria if a woman has risk factors for, or clinical indications of, pre-eclampsia; in particular raised blood pressure.

Where possible, women with clinical signs of pre-eclampsia (hypertension, proteinurea, growth restriction) should be referred for specialist assessment and management.

Predicting pre-eclampsia

A range of measures has been used to further predict risk of pre-eclampsia. These tests are not recommended as they have insufficient sensitivity and specificity (Meads et al 2008).

- *Uterine artery Doppler:* Although some studies have found uterine artery Doppler to be useful in predicting pre-eclampsia when used alone (Gomez et al 2006; Pilalis et al 2007; Ghosh et al 2012) or in combination with other markers (Cnossen et al 2008a; Giguere et al 2010; Pedrosa & Matias 2011) or predictive modelling (Audibert et al 2005; Papageorghiou et al 2005; Onalan et al 2006; Sritippayawan & Phupong 2007; Diab 2008; Poon et al 2009; Kuc 2011), it appears to have poor sensitivity in predicting preeclampsia in low-risk first pregnancies (Myatt et al 2012) and there is insufficient evidence to recommend its use.
- *Serum uric acid:* While rising serum uric acid is associated with severe pre-eclampsia (NICE 2008) the evidence on its validity as a screening or diagnostic test is mixed; one systematic review (n=572) (Cnossen et al 2006) found insufficient evidence to support its use and a subsequent review (n=1,675) (Koopmans et al 2009) concluded that it may be useful for predicting maternal complications.
- *Prediction index model*: A three-step approach to testing (medical examination data, specific haemostasis and coagulation tests and measurement of relative plasma volume) had a satisfactory positive predictive value and cost efficiency ratio in a small analysis of women with and without a history of pre-eclampsia (Emonts et al 2008).
- *Other predictive tests:* There is limited evidence to support identifying women as at risk of pre-eclampsia based solely on markers for Down syndrome (pregnancy-associated placental protein-A [PAPP-A] and free beta-human chorionic gonadotrophin [β-hCG]) (Morris et al 2008; Hui et al 2012) or mean arterial blood pressure (Cnossen et al 2008b; Poon et al 2008b). There is emerging evidence regarding the predictive accuracy of other biomarkers (Kleinrouweler et al 2012), low levels of excreted urinary calcium (Amitava 2012), immunoassays (Benton et al 2011), polymerase chain reaction (PCR) analysis of podocyte-specific molecules (Kelder 2012), intraplacental vascularisation indices (Mihu 2012) and increased plasma D-Dimer levels (Pinheiro et al 2012).

Due to the progressive nature of pre-eclampsia and a lack of therapies effective in altering its progression (Lowe et al 2008), these tests are unlikely to change interventions or outcomes (NICE 2008).

Section 6.3.5 includes resources on the management of hypertensive disorders in pregnancy.

6.3.3 Discussing risk of pre-eclampsia

It is important that women are given information about the symptoms of pre-eclampsia before 20 weeks gestation, or when they first attend for antenatal care if this occurs in the second half of pregnancy.

Practice point q

Women should be given information about the urgency of seeking advice from a health professional if they experience:

- headache;
- visual disturbance, such as blurring or flashing before the eyes;
- epigastric pain (just below the ribs);
- vomiting; and/or
- rapid swelling of the face, hands or feet.

6.3.4 Practice summary: pre-eclampsia

When: A woman has risk factors for pre-eclampsia in the first half or pregnancy or clinical signs in the second half of pregnancy (> 20 weeks gestation).

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.

- **Discuss risk factors for pre-eclampsia early in pregnancy:** Explain that the risk of pre-eclampsia is increased if a woman has certain risk factors.
- **Discuss pre-eclampsia screening:** Explain that if a woman has high blood pressure and/or proteinuria, she will require additional care during the rest of her pregnancy.
- **Discuss symptoms of pre-eclampsia with women at high risk**: Explain the importance of seeking medical advice immediately if symptoms occur.
- **Take a holistic approach**: Ask women at risk of pre-eclampsia about how many serves of calcium-rich foods they eat each day (see Section 5.1.2). Discuss low cost and culturally appropriate strategies for increasing calcium intake.
- **Document and follow-up:** Note risk factors and the results of blood pressure measurement and proteinuria testing in the woman's antenatal record. Further investigations may be warranted if increases in blood pressure or new proteinuria are identified at subsequent visits.

6.3.5 Resources

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6.3.6 References

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6.4 Risk of preterm birth

While the causes of preterm birth are multifactorial, women identified as at risk may benefit from advice about risk and protective factors.

6.4.1 Background

Preterm birth is defined as birth before 37 completed weeks of pregnancy (WHO 2012). Sub-categories of preterm birth are based on weeks of gestational age (WHO 2012): extremely preterm (<28 weeks); very preterm (28 to <32 weeks); and moderate to late preterm (32 to <37 weeks).

Incidence of preterm birth

- Globally, 15 million babies are born preterm each year and 1.1 million die as a result of complications (WHO 2012). The majority (60%) of preterm births occur in Africa and South Asia (Beck et al 2010). The risk of preterm birth is higher among Indigenous populations in Australia, Canada and the United States (Heaman et al 2005; Shah et al 2011). Preterm birth rates are rising globally (Langhoff-Roos et al 2006; Keirse et al 2009; Schaaf et al 2011; WHO 2012), including in Australia (Roberts et al 2003; Tracy et al 2007).
- In Australia in 2010, 8.3% of babies were born preterm. Most of these births occurred at a gestational age of 32–36 completed weeks (Li et al 2012). The Northern Territory had the highest proportion of preterm births, at 10.6% of all births, and New South Wales had the lowest, at 7.4% of all births.
- Preterm birth is a significant cause of morbidity and mortality among infants of Aboriginal and Torres Strait Islander mothers. In 2010, 13.5% of babies of Aboriginal and Torres Strait Islander mothers were born preterm, compared to 8.0% of babies of non-Indigenous mothers (Li et al 2012).

Risks associated with preterm birth

Preterm birth is associated with perinatal mortality, long-term neurological disability (including cerebral palsy), admission to neonatal intensive care, severe morbidity in the first weeks of life, prolonged hospital stay after birth, readmission to hospital in the first year of life and increased risk of chronic lung disease (WHO 2012). Preterm birth can have a serious emotional impact on the family.

6.4.2 Identifying women at increased risk of giving birth preterm

Summary of the evidence

A range of risk and protective factors influence the likelihood of preterm birth. While many risk factors are not modifiable during a woman's current pregnancy, it may be possible to modify their effects. Women at high risk of preterm birth should be referred for specialist assessment and management.

Significant risk factors

There is a significant association between preterm birth and:

- social disadvantage and inequality (DeFranco et al 2008; Gray et al 2008);
- previous preterm birth (Heaman et al 2005; McPheeters et al 2005; Kiran et al 2010; Heaman et al 2013);
- urogenital infections: chlamydia (see Module I, Section 8.5), bacterial vaginosis (Module I, Section 8.8), gonorrhoea (see Section 8.4) and trichomoniasis (see Section 8.5);
- alcohol consumption, in a dose-response fashion (Sokol et al 2007; Aliyu et al 2010; Avalos et al 2011; Patra et al 2011);
- active smoking during pregnancy, with risk further increased among heavy smokers (Kyrklund-Blomberg et al 2005; Fantuzzi et al 2007; Wills & Coory 2008; Freak-Poli et al 2009; Bickerstaff et al 2012);
- pre-existing diabetes (Kock et al 2010) or hypertension (Vreeburg et al 2004); and
- depression (Dayan et al 2006; Grote et al 2010; Fransson et al 2011), although some studies found an association only in women on medication for depression (Suri et al 2007; Gavin et al 2009), which may reflect either an effect of medication or severity of depression.

Other factors

- *Age*: Women younger than 20 years had a higher risk of preterm birth than women aged 20–35 years (Gupta et al 2008) and higher rates of extreme prematurity (<28 weeks) than women aged 20–39 years (Shrim et al 2011). Women aged more than 35 years also had a greater risk of preterm birth than women aged 25–29 years (McIntyre et al 2009; Schure et al 2012).
- *Weight*: Low (Siega-Riz et al 1996; Panaretto et al 2006; Khashan & Kenny 2009) or high (Viswanathan et al 2008; McDonald et al 2010) pre-pregnancy BMI were associated with preterm birth.
- *Pregnancy history:* Previous termination of pregnancy (Moreau et al 2005; Freak-Poli et al 2009; Gagnon et al 2009; Heaman et al 2013) and short inter-pregnancy interval (less than 6 months between birth and the conception of the next baby) (Rodrigues & Barros 2008; Wendt et al 2012) were associated with preterm birth.
- *Periodontal disease treatment:* Some studies found a decreased risk with treatment (Scannapieco et al 2003; Polyzos et al 2009; Pimental Lopes de Oliveira 2010), some found no decrease in risk (Michalowicz et al 2006; Newnham et al 2009; Offenbacher et al 2009; Macones et al 2010; Polyzos et al 2010; Chambrone et al 2011; George et al 2011) and others were inconclusive (Agueda et al 2008; Africa 2011);
- *Pregnancy-related anxiety*: Some studies found a significant association (Dole 2003; Orr et al 2007), while others found no association (Dayan et al 2006).
- *Passive smoking:* Risk increased with the number of smokers in the house (Fantuzzi et al 2007) and there is emerging evidence of a reduction in preterm births following introduction of public smoking bans (Cox et al 2013).
- *Illicit drug use*: Use of amphetamines, opiates and marijuana was associated with preterm birth (Ludlow et al 2004; Hayatbakhsh et al 2012).

Access to antenatal care

- Inadequate antenatal care is strongly associated with preterm birth in adolescents (OR: 7.4; 95%CI: 5.7–9.7 for no antenatal care compared with 75–100% of recommended visits) (Debiec et al 2010). A recent literature review found that group antenatal care (in which women receive antenatal care and education in a group environment) increased attendance among young women and reduced incidence of preterm birth (Allen et al 2012).
- A community-based collaborative approach to antenatal care for Aboriginal and Torres Strait Islander women in Townsville increased access to antenatal care and was associated with a significant reduction in preterm births (Panaretto et al 2005; Panaretto et al 2007). An Aboriginal medical service midwifery program in the ACT with a similar approach showed a slight reduction in preterm births (Wong et al 2011).
- A systematic review found insufficient evidence to conclude that alternative models of organising or delivering antenatal care reduce preterm birth in socially disadvantaged or vulnerable populations compared with standard models of antenatal care (Hollowell et al 2009).

Protective factors

- A literature review (Domingues et al 2009) and cohort studies (Hegaard et al 2008; Juhl et al 2008; Owe et al 2012) identified an association between reduced risk of preterm birth and involvement in leisure-time physical activity during pregnancy (compared to sedentary behaviours).
- Emerging evidence on marine n-3 fatty acids (Salvig & Lamont 2011) and fish consumption (Haugen et al 2008) is inconclusive.

Recommendation 16 **Grade B**

Advise women at risk of giving birth preterm about risk and protective factors.

6.4.3 Discussing risk of giving birth preterm

When risk of preterm birth is increased, modifiable risk factors should be addressed (Freak-Poli et al 2009; Kiran et al 2010; Carter et al 2011). Based on the evidence discussed in Section 6.4.2, discussion with women at risk of preterm labour can include the benefits of:

- quitting tobacco smoking and avoiding passive smoking;
- not drinking alcohol during pregnancy;
- having tests for urogenital infections; and
- being involved in leisure-time physical activity.

Women can also be advised that risk is not reduced by supplementing with Vitamins C or E (Rumbold & Crowther 2005; Hauth et al 2010) or probiotics (Othman et al 2007; Hauth et al 2010).

6.4.4 Practice summary: risk of preterm birth

When: A woman has identified risk factors for giving birth preterm.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.

Discuss lifestyle factors associated with preterm birth

- Explain that smoking during pregnancy makes it more likely that the baby will be born preterm and also causes other serious risks to the pregnancy.
- Explain that not drinking alcohol during pregnancy is the safest option.
- Offer screening for urogenital infection if the woman has risk factors for preterm birth. If results are positive, consider counselling, contact tracing, partner testing and treatment, and repeat testing.

Discuss protective factors

- Explain that moderate physical activity during pregnancy has a range of health benefits.

Take a holistic approach

- Provide information on relevant community supports (eg smoking cessation programs, Drug and Alcohol services, physical activity groups).
- Consider whether a woman may be at increased risk if she has recently arrived from a country with a high prevalence of preterm birth.

6.4.5 References

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7 Common conditions during pregnancy

A number of conditions are common during pregnancy. While these conditions are not harmful to the pregnancy, women may seek advice about managing symptoms. Recommendations are based on evidence about the accuracy of assessments in predicting complications in pregnancy and the effectiveness of interventions in reducing symptoms.

Table 7.1 presents a summary of advice on common conditions during pregnancy considered a priority for inclusion in these Guidelines. Advice on other conditions, such as vaginal discharge and backache is included in the NICE Guidelines (NICE 2008).

Table 7.1: Summary of advice for women about common conditions during pregnancy

Common condition	Advice	Section
Nausea and vomiting	Although distressing and debilitating for some women, nausea and vomiting usually resolves spontaneously by 16 to 20 weeks pregnancy and is not generally associated with pregnancy complications.	Module I 7.8
	Discontinuing iron-containing multivitamins may be advisable while symptoms are present.	
Constipation	Increasing dietary fibre intake and taking bran or wheat fibre supplements may relieve constipation.	Module I 7.9
	Stimulating laxatives are more effective than preparations that add bulk but are more likely to cause diarrhoea or abdominal pain.	
Reflux (heartburn)	Heartburn may be improved by having small frequent meals, and reducing foods that cause symptoms on repeated occasions.	7.1
	Medications may also be considered for relieving heartburn.	
Haemorrhoids	Haemorrhoids may be improved by increasing fibre in the diet and drinking plenty of water. If clinical symptoms remain troublesome, standard haemorrhoid creams can be considered.	7.2
Varicose veins	Varicose veins will not generally cause harm to the woman or baby and usually improve after the birth.	7.3
Pelvic girdle pain	Pregnancy-specific exercises, physiotherapy, acupuncture or use of a support garment may provide some relief from pelvic girdle pain.	7.4
Carpal tunnel syndrome	There is little evidence on treatments for carpal tunnel syndrome.	7.5

7.1 Reflux (heartburn)

Reflux (heartburn) is a common symptom in pregnancy. Most women can relieve mild symptoms by modifying their diet and lifestyle. Women with persistent or more severe symptoms may also require advice about specific treatments.

7.1.1 Background

Reflux (heartburn) is very common antenatally. While it is considered a normal part of a healthy pregnancy, symptoms may be frequent and distressing to women.

Reflux is generally a symptom of gastro-oesophageal reflux disorder (GORD), where some gastric contents are regurgitated into the oesophagus, causing discomfort and a burning sensation behind the sternum and/or throat. Acid regurgitation may also reach the pharynx, resulting in a bitter or sour taste in the mouth. While the exact causes of the increase in reflux during pregnancy are not clear, it is thought that hormonal effects on antireflux barriers in the lower oesophagus and on gastric function may play a part (Ali & Egan 2007; Majithia & Johnson 2012). When symptoms persist, further investigation may identify other causes — eg women who have had bariatric surgery, stomach cancer and Helicobacter pylori infection, which is common in newly arrived refugees (Tiong et al 2006; Cherian et al 2008) — and treatment after the birth may be needed.

Incidence during pregnancy

- Reflux is estimated to occur in 30–50% of pregnancies, with the incidence up to 80% in some groups (Richter 2003; Ali & Egan 2007). Symptoms tend to become both more severe and frequent as pregnancy progresses (Ramu et al 2011).
- Older women and those having second or subsequent pregnancies are more likely to experience heartburn (Dowswell & Neilson 2008). There is also evidence suggesting that pre-pregnancy heartburn and weight gain during pregnancy increase the risk of heartburn during pregnancy (Rey et al 2007).

7.1.2 Discussing reflux

Summary of the evidence

Reflux is not associated with adverse pregnancy outcomes and therefore treatment aims to relieve symptoms. There is limited evidence on the effectiveness or safety of current interventions. Generally, the first approach is advice on diet and lifestyle, either to reduce acid production or avoid reflux associated with postural change (Richter 2005).

Lifestyle approaches

Narrative reviews recommend lifestyle modifications for mild symptoms, including (Tytgat et al 2003; Ali & Egan 2007):

- abstaining from alcohol, tobacco and medications that may increase symptoms (eg anticholinergics, calcium channel antagonists);
- having smaller more frequent meals;
- avoiding lying down within 2–3 hours of eating; and
- elevating the head of bed by 10–15 cm.

Consensus-based recommendation vi

Offer women experiencing mild symptoms of heartburn advice on lifestyle modifications and avoiding foods that cause symptoms on repeated occasions.

Treatments

A range of medications affecting different physiological processes (eg antacids, histamine-2 [H2] receptor antagonists, proton pump inhibitors) may be used to relieve persistent or severe symptoms (Dowswell & Neilson 2008).

RCT evidence on the safety of reflux medications during pregnancy is limited (Richter 2005). Available evidence from lower level studies suggests that the use of antacids, proton pump inhibitors and H2

blockers for reflux during pregnancy presents no known significant safety concern for either the mother or baby:

- antacids are considered safe in pregnancy and may be preferred by women as they give immediate relief; calcium-based formulations are preferable to those that contain aluminium (Tytgat et al 2003);
- the use of proton pump inhibitors during pregnancy is not associated with an increased risk for major congenital birth defects, spontaneous abortions, preterm birth, perinatal mortality or morbidity (Diav-Citrin et al 2005; Gill et al 2009a; Gill et al 2009b; Pasternak & Hviid 2010; Majithia & Johnson 2012; Matok et al 2012); and
- the use of H2 blockers in pregnancy is not associated with any increase in risk of spontaneous abortion, preterm birth or small-for-gestational-age baby (Gill et al 2009b).

One small RCT (n=36) (da Silva et al 2009) found that the use of acupuncture in pregnancy may reduce reflux symptoms.

Recommendation 17 **Grade C**

Give women who have persistent reflux information about treatments.

7.1.3 Practice summary: reflux

When: A woman is experiencing reflux.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker, dietitian.

- **Provide advice**: Advise women that avoiding reflux-inducing food and drinks may reduce symptoms. Sleeping on the left side, raising the head of the bed, and not lying down after eating may also help. Reassure women that symptoms usually subside after pregnancy, but may recur in a subsequent pregnancy.
- **Discuss treatments:** Discuss any remedies the woman may be using to treat reflux. Advise women that if symptoms persist or become more severe, medication can be considered.
- **Take a holistic approach:** Assist women to identify food and drinks that may cause reflux and to find culturally appropriate alternatives. Consider costs if prescribing medication to treat reflux.

7.1.4 Resources

Common discomforts in pregnancy. In: *Minymaku Kutju Tjukurpa Women's Business Manual, 4th edition*. Congress Alukura, Nganampa Health Council Inc and Centre for Remote Health. http://www.remotephcmanuals.com.au

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Diav-Citrin O, Arnon J, Shechtman S et al (2005) The safety of proton pump inhibitors in pregnancy: a multicentre prospective controlled study. *Aliment Pharmacol Ther* 21(3): 269–75.

Dowswell T & Neilson JP (2008) Interventions for heartburn in pregnancy. *Cochrane Database Syst Rev*(4): CD007065.

Gill SK, O'Brien L, Einarson TR et al (2009a) The safety of proton pump inhibitors (PPIs) in pregnancy: a meta-analysis. *Am J Gastroenterol* 104(6): 1541–45.

Gill SK, O'Brien L, Koren G (2009b) The safety of histamine 2 (H2) blockers in pregnancy: a meta-analysis. *Dig Dis Sci* 54(9): 1835–38.

Majithia R & Johnson DA (2012) Are proton pump inhibitors safe during pregnancy and lactation? Evidence to date. *Drugs* 72(2): 171–79.

Matok I, Levy A, Wiznitzer A et al (2012) The safety of fetal exposure to proton-pump inhibitors during pregnancy. *Dig Dis Sci* 57(3): 699–705.

Pasternak B & Hviid A (2010) Use of proton-pump inhibitors in early pregnancy and the risk of birth defects. *N Engl J Med* 363(22): 2114–23.

Ramu B, Mohan P, Rajasekaran MS et al (2011) Prevalence and risk factors for gastroesophageal reflux in pregnancy. *Indian J Gastroenterol* 30(3): 144–47.

Rey E, Rodriguez-Artalejo F, Herraiz MA et al (2007) Gastroesophageal reflux symptoms during and after pregnancy: a longitudinal study. *Am J Gastroenterol* 102(11): 2395–400.

Richter JE (2003) Gastroesophageal reflux disease during pregnancy. *Gastroenterol Clin North Am* 32(1): 235–61.

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Tytgat GN, Heading RC, Muller-Lissner S et al (2003) Contemporary understanding and management of reflux and constipation in the general population and pregnancy: a consensus meeting. *Aliment Pharmacol Ther* 18(3): 291–301.

7.2 Haemorrhoids

Haemorrhoid symptoms are common in pregnancy, particularly in the second and third trimesters. Advice on avoiding constipation may assist women to prevent or lessen the effects of haemorrhoids. Topical products can be used to ease continuing symptoms.

7.2.1 Background

Haemorrhoids are enlarged, swollen veins around the anus that are characterised by anorectal bleeding, painful bowel movements, anal pain and anal itching. While the mechanism is not clear, this is thought to be a result of prolapse of the anal canal cushions, which play a role in maintaining continence. Constipation (see Section 7.9 of Module I) is the major precipitating factor for haemorrhoids. Pregnancy also facilitates development or exacerbation of haemorrhoids, due to increased pressure in rectal veins caused by restriction of venous return by a woman's enlarged uterus (Avsar & Keskin 2010).

Incidence during pregnancy

- Haemorrhoids that were present previously may become symptomatic for the first time in pregnancy. Haemorrhoidal symptoms are most common in the second and third trimesters of pregnancy and after birth (Avsar & Keskin 2010).
- While estimates vary, it is thought that 25–35% of pregnant women are affected by haemorrhoids (Staroselsky et al 2008; Abramowitz & Batallan 2003). One observational study found that 8% of pregnant women (n=165) experienced thrombosed external haemorrhoids in the last 3 months of pregnancy (Abramowitz et al 2002).

Diagnosis

Pain with bowel movements, bleeding and itching are often the first signs and symptoms of haemorrhoids. Diagnosis is made by examining the anus and anal canal, usually by inspection. Digital rectal examination and endoscopy (sigmoidoscopy and colonoscopy) may also be used. It is important to rule out more serious causes of bleeding (Avsar & Keskin 2010).

7.2.2 Discussing haemorrhoids

Summary of the evidence

Treatment during pregnancy aims mainly to relieve symptoms and control pain (Avsar & Keskin 2010).

Most evidence for the effectiveness of haemorrhoid treatments comes from studies of non-pregnant patients. Given the overall lack of evidence, there is consensus in clinical reviews for conservative management in pregnancy including avoiding constipation, dietary modification, dietary fibre supplementation and stool softeners (Avsar & Keskin 2010; Dietrich et al 2008; Wald 2003).

Topical products with analgesics and anti-inflammatory effects provide short-term local relief of symptoms. There is no evidence on the effectiveness or safety of creams used in pregnancy; however, the small doses and limited systemic absorption mean that they are unlikely to harm the third trimester infant (Starolesky et al 2008).

While surgical removal of haemorrhoids may be a consideration in extreme circumstances, surgery is rarely an appropriate intervention for pregnant women as haemorrhoidal symptoms often resolve spontaneously after the birth (Staroselsky et al 2008).

Consensus-based recommendation vii

Offer women who have haemorrhoids information about increasing dietary fibre and fluid intake. If clinical symptoms remain, advise women that they can consider using standard haemorrhoid creams.

7.2.3 Practice summary: haemorrhoids

When: A woman had haemorrhoids before pregnancy or has symptoms of haemorrhoids.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker, dietitian.

- **Provide advice**: Advise women that avoiding constipation (see Section 7.9 of Module I) is the best way to prevent and manage haemorrhoids during pregnancy and they should also try to avoid straining with bowel motions.
- **Discuss treatments:** Advise women that haemorrhoid creams can be used to further ease their symptoms.
- **Take a holistic approach:** Explore culturally appropriate, low cost ways for women to increase their fibre intake. Advise women who are increasing their fibre intake to make sure they drink adequate fluids.

7.2.4 Resources

NHMRC (2013) *Australian Dietary Guidelines*. Canberra: Commonwealth of Australia. http://www.nhmrc.gov.au/guidelines/publications/n55

7.2.5 References

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Staroselsky A, Nava-Ocampo AA, Vohra S et al (2008) Hemorrhoids in pregnancy. *Can Fam Phy* 54(2): 189–90.

Wald A (2003) Constipation, diarrhea, and symptomatic hemorrhoids during pregnancy. *Gastroenterol Clin North America* 32: 309–22.

7.3 Varicose veins

Varicose veins occur often within the general population and are a common symptom during pregnancy. While there is little evidence to support any particular treatment, use of compression stockings may help to relieve symptoms.

7.3.1 Background

Varicose veins are caused by the pooling of blood in the surface veins as a result of inefficient valves that would normally prevent blood draining back down the leg. They can occur as blue swollen veins on the calves, the inside of the legs and the vulva, and may cause itching and aching. Feet and ankles can also become swollen.

In 70–80% of women who develop problems with varicose veins during pregnancy, the symptoms appear during the first trimester, often within 2 to 3 weeks of gestation (Carr 2006).

A family history of varicose veins, increasing number of full term pregnancies and increasing age have been found to be risk factors for the development of varicose veins (Dindelli et al 1993; Jawien 2003; Beebe-Dimmer et al 2004).

Factors influencing varicose veins in pregnancy

- *Elevated pressure*: Increased blood volume early in pregnancy, followed by fetal growth and weight gain, increase intra-abdominal pressure and central venous return, with the potential for the elevated pressure to lead to valve failure and development of varices (Beebe-Dimmer et al 2005).
- *Hormones*: Hormonal fluctuations in early pregnancy strongly influence the development of varicose veins (Carr 2006; Lenkovic et al 2009).

7.3.2 Discussing varicose veins

Summary of the evidence

There is a lack of evidence about treatments for varicose veins that are effective and safe in pregnancy. Existing systematic reviews are based on small RCTs with a high risk of bias (Bamigboye & Hofmeyr 2006; Bamigboye & Smyth 2007). The evidence on vulval varices is too limited for conclusions to be drawn.

Given the overall lack of evidence, there is consensus in clinical reviews that advice to women should be based on reassurance, conservative management and symptom relief. Avoiding long periods of standing, use of compression stockings and elevating the feet have been found to improve symptoms in the general population (Carr 2006).

Treatments for varicose veins

- *Compression stockings*: A small RCT on preventing varicose veins in pregnancy with compression stockings (n=42) (Thaler et al 2001) found that compression stockings do not prevent or improve varicose veins, but do improve leg symptoms (pain, discomfort, cramps) (RR 0.74, 95%CI 0.59–0.93).
- *Surgery:* Surgical techniques including stripping and ligation, ablation or scleropathy, may be used to remove varicose veins when people remain symptomatic (Carr 2006). As symptoms of varicose veins often improve after the birth (Bamigboye & Smyth 2007), surgery is rarely considered an appropriate intervention for pregnant women.

Consensus-based recommendation viii

Advise women that varicose veins are common during pregnancy, vary in severity, will not generally cause harm and usually improve after the birth. Correctly fitted compression stockings may be helpful.

7.3.3 Practice summary: varicose veins

When: A woman had varicose veins before pregnancy or has symptoms of varicose veins.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.

- **Provide advice**: Explain that varicose veins are common in pregnancy, especially in second and subsequent pregnancies and multiple pregnancies.
- **Discuss treatments**: Advise women that symptoms can be relieved by elevating the feet while resting and avoiding long periods of standing.
- **Take a holistic approach:** Women may not mention that they have varicose veins and they may not be visible to the health professional. Asking about itching or discomfort in the legs can assist in identifying varicose veins.

7.3.4 Resources

Common discomforts in pregnancy. In: *Minymaku Kutju Tjukurpa Women's Business Manual, 4th edition*. Congress Alukura, Nganampa Health Council Inc and Centre for Remote Health. http://www.remotephcmanuals.com.au

7.3.5 References

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Beebe-Dimmer JL, Pfeifer JR, Engle JS et al (2005) The epidemiology of chronic venous insufficiency and varicose veins. Annals Epidemiol 15(3): 175–84.

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7.4 Pelvic girdle pain

The severity of pelvic girdle pain (symphysis pubis dysfunction) during pregnancy varies widely. Advice should be aimed towards minimising pain.

7.4.1 Background

Pelvic girdle pain has been described as a collection of signs and symptoms of discomfort and pain in the pelvis and lower back (lumbopelvic) area, including musculoskeletal pain radiating to the upper thighs and perineum. Symptoms occur due to relaxation of the pelvic ligament and increased joint mobility in pregnancy. Symptoms vary from mild discomfort to severe and debilitating pain that can hinder mobility. Other causes of pain in the pelvic area (eg urinary tract infection, preterm labour) should be excluded (Kanakaris et al 2011). Pelvic girdle pain usually resolves spontaneously after the birth (Elden et al 2008), although symptoms may recur during subsequent pregnancies (Leadbetter et al 2004).

Incidence in pregnancy

- The true incidence of pelvic girdle pain in pregnancy is unknown and estimates from low-level evidence are contradictory, ranging from approximately 4% to 84% (Bastiaanssen et al 2005; Morgren & Pohjanen 2005; Robinson et al 2006; 2010). The wide variation can be attributed to various factors including the absence of a precise definition and diagnostic criteria, differences in study design and selection of the study population.
- The incidence of pelvic girdle pain has been found to be higher in late pregnancy (Gutke et al 2006; Leadbetter 2006; Van de Pol et al 2007; Robinson et al 2010; Kovacs et al 2012) and among women with a higher BMI (Kovacs et al 2012).
- There is currently no evidence regarding the incidence of pelvic pain in specific population groups.

Factors influencing pelvic girdle pain

Low-level evidence indicates that (Morgren 2005; Albert et al 2006; Eberhard-Gran & Eskild 2008; Biering 2010):

- pelvic pain is more common in women with a previous history of low back pain (Albert 2006; Bjelland et al 2010) or trauma of the back or pelvis (Albert 2006);
- risk factors for developing pelvic pain include: increased number of previous pregnancies (Albert 2006; Bjelland et al 2010; Robinson et al 2010); physically demanding work (Morgren 2005; Bjelland et al 2010); high BMI (Albert 2006; Eberhard-Gran & Eskild 2008; Bjelland et al 2010); emotional distress (Bjelland et al 2010); and smoking (Albert 2006; Biering et al 2010).

The evidence on age as a risk factor for pelvic pain in pregnancy is inconsistent (Eberhard-Gran & Eskild 2008; Bjelland et al 2010).

7.4.2 Discussing pelvic girdle pain

Summary of the evidence

NICE (2008) found little evidence on which to base clinical practice. Subsequent evidence is limited by the heterogeneity and low quality of studies and the inconsistency of findings.

Treatments for pelvic pain

Systematic reviews into interventions for women with pelvic girdle pain have found low-level evidence:

- women receiving acupuncture or physiotherapy reported less intense pain in the morning or evening than women receiving usual antenatal care and acupuncture was more effective in reducing evening pain than physiotherapy (Pennick & Young 2007);
- acupuncture was more effective than standard treatment, physiotherapy, or stabilising exercises (Ee et al 2008);
- exercise, pelvic support garments and acupuncture improved functional outcomes (Richards et al 2012); and
- exercise during pregnancy may decrease pelvic girdle pain (Schiff Boissonnault et al 2012).

RCTs have found benefits from a multimodal approach (manual therapy, stabilisation exercises, patient education) (George et al 2012) and no reduction of pain with exercise (Eggen et al 2012; Stafne et al 2012).

Lower level evidence supports acupuncture as an effective intervention (Ekdahl & Petersson 2010). No serious adverse effects were reported (minor side effects included bruising, pain on needle insertion, bleeding, haematoma and fainting).

Recommendation 18 **Grade C**

Advise women experiencing pelvic girdle pain that pregnancy-specific exercises, physiotherapy, acupuncture or using a support garment may provide some pain relief.

Advice on managing pelvic girdle pain

There is consensus from low-level evidence and clinical reviews about providing advice on minimising pain, including (Vleeming et al 2008; Leadbetter et al 2004; Aslan & Fynes 2007):

- wearing low-heeled shoes;
- seeking advice from a physiotherapist regarding exercise and posture;
- reducing non-essential weight-bearing activities (eg climbing stairs, standing/walking for long periods of time);
- avoiding standing on one leg (eg by sitting down to get dressed);
- avoiding movements involving hip abduction (eg getting in/out of cars, baths or squatting); and
- applying heat to painful areas.

7.4.3 Practice summary: pelvic girdle pain

When: A woman has pelvic girdle pain.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker, physiotherapist.

- **Provide advice**: Reassure the woman that pelvic girdle pain will not harm her or her unborn child, and is likely to resolve after the birth. Advise the woman about steps she can take to minimise pain.
- **Take a holistic approach**: Consider possible barriers to women being able to make changes to minimise their pain (eg work requirements, cultural attitudes to exercise, costs of allied health services).

7.4.4 Resources

Common discomforts in pregnancy. In: *Minymaku Kutju Tjukurpa Women's Business Manual, 4th edition*. Congress Alukura, Nganampa Health Council Inc and Centre for Remote Health. http://www.remotephcmanuals.com.au

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Aslan E & Fynes M (2007) Symphysial pelvic dysfunction. *Current Opinion in Obstetrics and Gynecology* 19(2): 133-139.

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Eggen MH, Stuge B, Mowinckel P et al (2012) Can supervised group exercises including ergonomic advice reduce the prevalence and severity of low back pain and pelvic girdle pain in pregnancy? A randomized controlled trial. *Phys Ther* 92(6): 781–90.

Ekdahl L & Petersson K (2010) Acupuncture treatment of pregnant women with low back and pelvic pain — an intervention study. *Scand J Caring Sci* 24: 175–82.

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George JW, Skaggs CD, Thompson PA et al (2012) A randomized controlled trial comparing a multi-modal intervention and standard obstetrical care for low back and pelvic pain in pregnancy. *Am J Obstet Gynecol* 1: S360.

Gutke A, Ostgaard H, Oberg B (2006) Pelvic girdle pain and lumbar pain in pregnancy: a cohort study of the consequences in terms of health and functioning. *Spine* 31(5): E149–55.

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Morgren I (2005) Previous physical activity decreases the risk of low back pain and pelvic pain during pregnancy. *Scand J Public Health* 33: 300–06.

Morgren I & Pohjanen A (2005) Low back pain and pelvic pain during pregnancy: prevalence and risk factors. *Spine* 30: 983–91.

Pennick V & Young G (2007) Interventions for preventing and treating pelvic and back pain in pregnancy. *Cochrane Database Sys Rev 2007* Issue 2. Art. No.: CD001139. DOI: 10.1002/14651858.CD001139.pub2.

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Robinson H, Eskild A, Heiberg E et al (2006) Pelvic girdle pain in pregnancy: the impact on function. *Acta Obstet Gynecol Scand* 85:160–64.

Stafne SN, Salvesen KA, Romundstad PR et al (2012) Does regular exercise during pregnancy influence lumbopelvic pain? A randomized controlled trial. *Acta Obstet Gynecol Scand* 91(5): 552–59.

Stuge B, Hilde G, Vollestad N (2003) Physical therapy for pregnancy-related low back and pelvic pain: a systematic review. *Acta Obstet Gynecol Scand* 82(11): 983–90.

Van de Pol G, Brummen J, Bruinse H et al (2007) Pregnancy related pelvic girdle pain in the Netherlands. *Acta Obstet Gynecol Scand* 86: 416–22.

Vleeming A, Albert H, Ostgaard HC et al (2008) European guidelines for the diagnosis and treatment of pelvic girdle pain. *Eur Spine J* 17: 794–819.

7.5 Carpal tunnel syndrome

Carpal tunnel syndrome is common during pregnancy, particularly in the third trimester. There is little evidence to support intervention in pregnancy but symptoms are likely to resolve after the birth.

7.5.1 Background

Carpal tunnel syndrome results from compression of the median nerve within the carpal tunnel in the hand. It is characterised by tingling, burning pain, numbness and a swelling sensation in the hand that may impair sensory and motor function.

Incidence during pregnancy

- Due to differences in methods of diagnosis between studies (eg neurophysiologically confirmed, clinically diagnosed, patient-reported), there is great variability in estimates of the incidence of pregnancy-related carpal tunnel syndrome; estimates range from approximately 2% to 72% (Eogan et al 2004; Finsen & Zeitlmann 2006; Baumann et al 2007; Mondelli et al 2007; Padua et al 2010).

Factors influencing carpal tunnel syndrome

- In non-pregnant populations, carpal tunnel syndrome has been reported to occur more frequently in occupations that involve repetitive activity, forceful work or vibration (Palmar et al 2007).
- In pregnancy, likely causes of carpal tunnel syndrome are hormonal changes (Ablove & Ablove 2009) and oedema (Pazzaglia et al 2005; Ablove & Ablove 2009).
- Carpal tunnel syndrome is more common in the third trimester (Shaafi et al 2006; Baumann et al 2007).
- Carpal tunnel syndrome is more common in women with gestational diabetes due to generalised slowing of nerve conduction (Ablove & Ablove 2009) but impaired median nerve conduction also occurs in pregnant women without gestational diabetes (Eogan et al 2004; Baumann et al 2007).

7.5.2 Discussing carpal tunnel syndrome

Summary of the evidence

The recent evidence on interventions to treat carpal tunnel syndrome during pregnancy is limited to small case series studies (n=20–30) that found reduced symptoms associated with night splinting (Finsen & Zeitlmann 2006) or steroid (dexamethasone) injections (Niempoog et al 2007; Moghtaderi et al 2011).

Activity modification, avoiding positions of extreme flexion or extension of the wrists and avoiding exposure to vibration have been suggested as adjuncts to splinting (Mabie 2005; Borg-Stein et al 2006; Ablove & Ablove 2009) but there is no evidence that these are effective for carpal tunnel syndrome.

While carpal tunnel syndrome usually resolves after the birth (Pazzaglia et al 2005), persistence of symptoms has been reported in more than 50% of women after 1 year and in about 30% after 3 years (Padua et al 2010).

Consensus-based recommendation ix

Advise women who are experiencing symptoms of carpal tunnel syndrome that the evidence to support either splinting or steroid injections is limited and symptoms may resolve after the birth.

7.5.3 Practice summary: carpal tunnel syndrome

When: A woman has symptoms of carpal tunnel syndrome.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker, physiotherapist, occupational therapist.

- **Provide advice**: Explain that carpal tunnel syndrome is common due to increased fluid retention during pregnancy and may resolve after the birth.
- **Discuss treatments:** Explain that there is a lack of research about treatments for carpal syndrome during pregnancy and give advice on avoiding movements that may exacerbate symptoms (eg using a splint to keep the joint straight overnight).
- **Consider referral —** Women with persistent and severe symptoms of nerve compression should be referred for specialist evaluation.
- **Take a holistic approach:** For women whose occupations involve repetitive activity or vibration advise frequent breaks or a temporary change in role where possible.

7.5.4 Resources

AAOS (2007) *Clinical Practice Guideline on the Diagnosis of Carpal Tunnel Syndrome*. Rosemont IL: American Academy of Orthopaedic Surgeons. http://www.aaos.org/Research/guidelines/CTS_guideline.pdf

AAOS (2007) *Clinical Practice Guideline on the Treatment of Carpal Tunnel Syndrome*. Rosemont IL: American Academy of Orthopaedic Surgeons. http://www.aaos.org/Research/guidelines/CTSTreatmentGuideline.pdf

Common discomforts in pregnancy. In: *Minymaku Kutju Tjukurpa Women's Business Manual, 4th edition*. Congress Alukura, Nganampa Health Council Inc and Centre for Remote Health. http://www.remotephcmanuals.com.au

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8 Maternal health screening

This section discusses the evidence for offering women tests for anaemia, diabetes, haemoglobin disorders, gonorrhoea, trichomoniasis, Group B streptococcus, cytomegalovirus, toxoplasmosis, cervical abnormalities and thyroid function. Tests for human immunodeficiency virus (HIV), chlamydia, syphilis, rubella, hepatitis B, hepatitis C, asymptomatic bacteriuria, bacterial vaginosis and vitamin D deficiency are discussed in Module I.

Recommendations are based on evidence about the diagnostic accuracy of available tests, the effectiveness of interventions to prevent mother-to-child transmission of infection or other effects on the unborn baby, and the availability of treatments. For some conditions, testing is recommended for all women. For others, testing is recommended only for women who may be at higher risk.

For notifiable infections (HIV, hepatitis B, hepatitis C, rubella, syphilis, chlamydia, gonorrhoea), diagnoses are required to be reported to the National Notifiable Diseases Surveillance System. This allows analysis of trends in jurisdictions and groups at risk, although data quality varies for the different conditions and reporting of Indigenous status is incomplete in some States and for some conditions. Evidence on the prevalence and incidence of other conditions is generally from observational studies and may not be representative of the Australian population or groups within the population. While incidence or prevalence data are not always available, each chapter includes a brief discussion that aims to give health professionals an indication of the likelihood that women in their community will be affected.

Tables 8.1 and 8.2 summarise advice on maternal health screening tests considered a priority for inclusion in these Guidelines. Advice on testing for blood group and rhesus D status is included in the NICE Guidelines (NICE 2008).

Table 8.1: Summary of advice on screening tests offered to all women during pregnancy[10]

Condition	Test(s)	Follow-up	Section
Anaemia	Haemoglobin concentration	Full blood count and consideration of possible nutrient deficiencies for women with low haemoglobin concentrations	8.1
Gestational diabetes	Plasma glucose (fasting or following 75 g glucose loading)	Treatment of gestational diabetes reduces the risk of perinatal complications	8.2
Haemoglobin disorders	Full blood count	Further investigations for women with abnormal red cell indices, family history or origin in a high-risk country	8.3
Group B streptococcus*	Self-collected vaginal-rectal swab culture	Identification of colonisation allows treatment during labour to prevent transmission to the baby	8.6
HIV**	EIA and Western blot	Antiretroviral treatment in pregnancy reduces risk of transmission	Module I 8.1
Hepatitis B**	Blood test for HbsAg#	Vaccination of newborn reduces risk of infection	Module I 8.2
Rubella	Blood test for rubella antibody	Vaccination after birth protects future pregnancies. Inadvertent vaccination in early pregnancy is highly unlikely to harm the baby	Module I 8.4
Syphilis#	Treponemal EIA tests Onsite tests	Treatment benefits mother and prevents congenital syphilis	Module I 8.6
Asymptomatic bacteriuria	Midstream urine culture	Treatment reduces risk of pyelonephritis	Module I 8.7

* According to organisational policy.
** Specialist care and psychosocial support are required for women with HIV or hepatitis B.
# Psychosocial support, partner testing and contact tracing needed for women with sexually transmitted infections.
EIA=enzyme immunoassay; HbsAg=hepatitis B surface antigen; HIV=human immunodeficiency virus.

[10] Tests are offered in the context of engagement and consultation with women. Health professionals must use standard precautions for infection prevention and control. Tests evolve with advances in technology.

Table 8.2: Summary of advice on screening tests offered to women at increased risk

Condition	Offer test to:	Test(s)	Follow-up	Section
Undiagnosed type 2 diabetes	Women with risk factors for type 2 diabetes	Plasma glucose (fasting, following 75 g glucose loading or random)	Treatment of pre-existing diabetes reduces the risk of perinatal complications	8.2
Gonorrhoea*	Women with known risk factors or living in areas where prevalence is high	Vaginal, urine or endocervical specimens NAAT	Treatment may prevent neonatal infection	8.4
Trichomoniasis*	Women with symptoms	Culture or PCR testing of vaginal swabs	Treatment may prevent certain infections in the newborn but is associated with adverse effects	8.5
Toxoplasmosis	Women may request testing based on exposure to sources	Studies into tests are limited and inconclusive	Insufficient evidence on treatment. Advice on prevention may reduce the risk of infection	8.7
Cytomegalovirus	Women who have frequent contact with large numbers of very young children	Studies into tests are limited and inconclusive	Insufficient evidence on treatment. Advice on prevention may reduce the risk of infection	8.8
Cervical abnormalities	Women who have not had a Pap smear in the past 2 years	Pap smear	Allows detection of precancerous cervical abnormalities	8.9
Thyroid function	Women with symptoms or risk factors	Blood test for thyroid-stimulating hormone	Treatment improves obstetric outcomes	8.10
Chlamydia*	Women younger than 25 years All pregnant women in areas of high prevalence	First pass urine NAAT	Treatment may reduce the risk of preterm birth, premature rupture of the membranes and low birth weight	Module I 8.5
Hepatitis C**	Women with a history of risk factors for hepatitis C	Blood test for hepatitis antibody RNA if antibodies detected	No interventions are currently proven to prevent transmission	Module I 8.3
Asymptomatic bacterial vaginosis	Women with a previous preterm birth	High vaginal swab Amsel's criteria Nugent's criteria	Early treatment (<20 wks) may reduce risk of premature rupture of the membranes and low birth weight	Module I 8.8
Vitamin D deficiency	Women considered to be at risk	Blood test for serum 25-OHD	Women at high risk of deficiency may benefit from supplementation	Module I 8.9

* Psychosocial support, partner testing and contact tracing are required for women with sexually transmitted infections.

****** Specialist care and psychosocial support are required for women with hepatitis C.

25-OHD=25-hydroxyvitamin D; NAAT=nucleic acid amplification test; PCR=polymerase chain reaction; RNA=ribonucleic acid.

Considerations before testing

Before tests are carried out, it is essential that:

- women are informed that it is their choice to have tests;
- women are able to give informed consent — verbal discussion should cover the reasons for testing, harms and benefits and associated treatments and be supported by appropriate resources (eg written materials, audio or video);
- women have opportunities to ask questions about tests and treatments;
- women are reassured that test results remain confidential (unless the condition is notifiable);
- discussions about consent are documented by the health professional involved;
- women who decline testing are offered the opportunity to discuss any concerns they may have without being coerced to reconsider the test; and
- there are processes for follow-up of women with a positive test result, their babies and, in some situations, partners.

Discussion of testing should be approached with sensitivity, particularly when there is a potential for testing to raise maternal anxiety or if testing is for a sexually transmitted infection.

Considerations after a positive test result

- *Referral for specialist care:* For some conditions, such as haemoglobin disorders and thyroid dysfunction, specialist involvement will be required.
- *Psychosocial support:* Diagnosis of a condition that may affect pregnancy and/or the health of the baby can be distressing, particularly if there are no interventions that can change outcomes. Women should be given information about available supports and assisted to access these.
- *Sexually transmitted infections*: If a sexually transmitted infection is identified, there is an increased risk of other sexually transmitted infections. Testing and treatment of sexually transmitted infections and contract tracing have public health benefits as transmission to partners is reduced.
- *Blood-borne infections*: Specific supports are likely to be required for women identified as using intravenous drugs.
- *Notification:* State/Territory legislation on notification of communicable diseases must be followed.

Type of test

The tests discussed in this section are those currently in use in Australia. With continuous advances in technology and testing, techniques change rapidly. The most appropriate test may also depend on the particular clinical setting.

Testing in rural and remote areas

It is acknowledged that in Australia, access to tests may vary (eg due to distance from pathology services), storing tests and samples appropriately may be challenging (eg due to high temperatures or humidity) and there may be difficulties in recalling women to receive test results. In these situations, resources should be focused on responding to local needs (eg ensuring that tests are available to identify highly prevalent conditions).

8.1 Anaemia

Antenatal care provides an opportunity to identify women with possible anaemia. If anaemia is diagnosed, supplementation with the deficient nutrient (most commonly iron) is advised.

8.1.1 Background

Anaemia is a lower than normal concentration of haemoglobin or number of red blood cells, which results in reduced capacity of the blood to carry oxygen. During pregnancy, the WHO criteria for mean minimum normal haemoglobin concentration in healthy pregnant women is 110 mg/dL in the first half of pregnancy and 105 mg/dL in the second. Iron deficiency is the most common cause of anaemia in pregnancy worldwide (WHO 2001), but other deficiencies may also cause anaemia:

- *iron deficiency*: demand for iron is increased during pregnancy (NPS 2010) and insufficient iron intake or absorption (eg diet poor in iron-rich foods and/or rich in foods that diminish iron absorption) or blood loss (eg due to gastrointestinal parasites) (ACOG 2008) can result in microcytic anaemia;
- *folate deficiency*: demand for folate is also increased during pregnancy and inadequate dietary intake, prolonged vomiting or impaired absorption (eg due to gastric bypass surgery or gastrointestinal conditions) can result in macrocytic anaemia;
- *vitamin B_{12} deficiency*: prolonged inadequate intake (eg limited access to source foods or vegetarian diet) or impaired absorption (eg due to gastric bypass surgery, pernicious anaemia or gastrointestinal conditions) can result in macrocytic anaemia; and
- *haemoglobinopathies*: these include sickle cell anaemia and thalassaemia (see Section 8.2).

Symptoms of anaemia include general weakness and tiredness but the threshold concentrations of haemoglobin at which these symptoms occur in pregnancy is not known (Reveiz et al 2011).

Prevalence of iron, folate and vitamin B_{12} deficiency during pregnancy

- Recent estimates report that one-quarter of the world's population has anaemia. The burden of anaemia is considerably higher among indigenous populations compared to the general population (Khambalia et al 2011).
- The prevalence of iron-deficiency anaemia during pregnancy is generally low (< 20%) in developed countries (van den Broek 2003) and higher (35–75%) in developing countries (Africa, Asia, South America) (van den Broek 2003; Kalaivani 2009) and areas of socioeconomic disadvantage (USPSTF 2006). Reported predictors for having anaemia by 32 weeks gestation include young maternal age, non-white ethnic origin and increasing parity (Barroso et al 2011).
- Few studies have reported the prevalence of iron-deficiency anaemia during pregnancy in Australia. Iron-deficiency anaemia was identified in 18% of pregnant women in a Tasmanian study (n=2,654) (Khalafallah et al 2010) and in 11% of pregnant women in a South Australian study (n=430) (Zhou et al 2006).
- Data from Queensland suggest higher prevalence of iron-deficiency anaemia during pregnancy among Aboriginal than non-Indigenous women (Wills & Coory 2008). Smaller studies have found a prevalence of anaemia during pregnancy among Aboriginal women of 50% in remote Northern Territory communities (Bar-Zeev et al in press), 12% across 34 Aboriginal community health services (range 3–22%) (n=535) (Rumbold et al 2011) and 10% in Brisbane (n=1,523) (Stapleton et al 2011).
- Data from Western Australia and South Australia show higher prevalence of iron-deficiency anaemia during pregnancy among adolescent (14%) than adult women (6%) and among Aboriginal (23–25%) compared with non-Indigenous (8–10%) adolescent women (Westernberg et al 2002; Lewis et al 2009).
- Mandatory fortification of flour with folic acid has reduced the prevalence of low folate levels among Australian women of childbearing age (0.16% in 2010) (Brown et al 2011). A Western Australian study found low folate levels in 10% of Aboriginal women before flour fortification (Maxwell et al 2012).

- Vitamin B_{12} deficiency is common in most of the developing world (Stabler & Allen 2004; Allen 2009). Few studies have examined the prevalence of vitamin B_{12} deficiency in Australia (Flood et al 2006). However, there is emerging evidence of vitamin B_{12} deficiency among refugees due to limited or no sources of animal foods before resettlement (Benson et al 2010; Benson et al 2013).

Preventing iron deficiency (through inclusion of iron-rich foods in the diet and/or iron supplementation) is discussed in Section 5.1.3.

Risks associated with iron, folate and vitamin B_{12} deficiency during pregnancy

Severe iron-deficiency anaemia (haemoglobin concentration <70 mg/dL) can cause cardiac failure, (Lops 1995; WHO 1992; Williams & Wheby 1992) and reduce tolerance of blood loss after birth. It is unclear whether mild to moderate anaemia is associated with poor outcomes (Reveiz et al 2011).

Deficiencies of folate (De-Regil et al 2011) or vitamin B_{12} (Molloy et al 2008) during pregnancy are associated with neural tube defects.

8.1.2 Screening for anaemia

Routinely offering a full blood count early in pregnancy and at 28 weeks is recommended in the United Kingdom (NICE 2008) and in Australia (RANZCOG 2009). Initial haemoglobin concentration is usually assessed in the context of this full blood count.

Assessing haemoglobin concentration

During pregnancy maternal red cell mass and plasma volume increase and the haemoglobin concentration is reduced (NICE 2008). Haemoglobin is therefore checked against gestation-related thresholds.

Table 8.3: Assessing haemoglobin concentration during pregnancy

Gestational age	Minimum haemoglobin concentration
0–20 weeks	110 mg/dL
20+ weeks	105 mg/dL

Source: WHO (1993).

Consensus-based recommendation x

Routinely offer testing for haemoglobin concentration to pregnant women early in pregnancy (at the first visit) and at 28 weeks gestation.

Practice point r

In areas where prevalence of iron-deficiency anaemia is high consider testing ferritin at the first antenatal visit.

Further investigations

Haemoglobin concentration is not sensitive enough to be the sole means of diagnosing anaemia. Diagnostic tests include:

- full blood count (if this has not already been conducted);
- serum ferritin, which is the most sensitive single screening test to detect adequate iron stores (90% sensitivity at a cut-off of 30 μg/litre) (Breymann 2002); and
- specific tests for folate and vitamin B_{12}, if mean cell volume is high.

Practice point s

Further investigation is required for women with a low haemoglobin concentration for their gestational stage. Repeat screening at 36 weeks may also be required for women who have symptoms or risk factors for anaemia or who live in or have come from an area of high prevalence.

8.1.3 Treating iron-deficiency anaemia

Summary of the evidence

Effectiveness and safety of treatments for iron-deficiency anaemia

The evidence on treatments for iron-deficiency anaemia covers a very wide range of supplements, doses and routes of administration and focuses on changes in maternal haemoglobin concentration.

- Iron supplementation improves maternal haemoglobin concentrations, but there is a lack of evidence about the overall benefits of treating mild iron-deficiency anaemia in pregnancy (Reveiz et al 2012).
- Oral iron causes gastrointestinal adverse effects (eg nausea, constipation) (Reveiz et al 2012). Intramuscular or intravenous iron is more effective than oral iron, but may have adverse effects (venous thrombosis and allergic reactions for intravenous treatment and pain, discolouration and allergic reactions for intramuscular treatment) (Reveiz et al 2012).

Iron as part of general nutritional supplementation is discussed in Section 10.4 of Module 1. Given the lack of evidence on outcomes, the recommendation is not to routinely offer iron supplementation to women during pregnancy.

Recommendation 19 **Grade B**

Advise iron supplementation for women identified as having iron-deficiency anaemia.

Dose of supplementation

Recent studies provide high-level evidence on lower doses of iron supplementation. Iron supplements that are low dose (eg 20 mg) or taken less often than daily appear to be effective in treating anaemia in pregnancy with fewer gastrointestinal side effects compared with high-dose (eg 80 mg) or daily supplements (de Souza et al 2004; Sharma et al 2004; Zhou et al 2009; Reveiz et al 2012).

Recommendation 20 **Grade B**

Advise women with iron-deficiency anaemia that low-dose iron supplementation is as effective as high dose, with fewer side effects.

Other considerations

Treatment for hookworm infestation should also be considered in areas of high prevalence.

8.1.4 Discussing anaemia

When haemoglobin concentration is low, points for discussion include:

- while anaemia in pregnancy is most commonly associated with iron deficiency, deficiencies of folate or vitamin B_{12} also result in anaemia and further tests are required to identify the cause;
- if a deficiency is identified, supplementation with the appropriate nutrient can correct the deficiency;
- supplements can be combined with foods rich in the relevant nutrient:
  - iron-rich foods include meat, seafood and poultry; including a vitamin C rich fruit or vegetable in each meal and limiting tea and coffee to between meals aids absorption (Marsh et al 2009);
  - foods rich in folate include fortified bread and cereals, dried beans and peas, dark green vegetables and citrus fruit and juice; and
  - foods that contain vitamin B_{12} include meat, eggs, milk and cheese.

8.1.5 Practice summary: anaemia

When: Early in pregnancy and at 28 weeks gestation.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.

- **Discuss the reasons for screening for anaemia:** Explain that anaemia causes tiredness and can have other effects on the pregnancy.
- **Explain the causes of anaemia:** Iron-deficiency anaemia is common during pregnancy. Other causes of anaemia may be a consideration for women who live in or have come from areas where folate or vitamin B_{12} deficiencies are common.
- **Take a holistic approach:** Consider the availability of iron-rich foods appropriate to the woman's cultural practices and preferences and the affordability of supplements. For women taking supplements for iron-deficiency, explore culturally appropriate, low cost ways for women to increase their fibre and fluid intake if they are experiencing constipation.
- **Consider referral:** If there is concern about the quality of dietary iron intake or if the woman would like information about nutrition for herself and her family, consider referral to a dietitian.
- **Document and follow-up:** When a woman is tested for anaemia, tell her the results and note them in her antenatal record. Have a system in place so that women with iron-deficiency anaemia during pregnancy are given information about iron supplementation and receive ongoing follow-up, including further investigation if anaemia does not resolve after pregnancy.

8.1.6 Resources

Anaemia (weak blood) in pregnancy. In: *Minymaku Kutju Tjukurpa Women's Business Manual, 4th edition*. Congress Alukura, Nganampa Health Council Inc and Centre for Remote Health. http://www.remotephcmanuals.com.au

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8.2 Diabetes

Identifying risk of diabetes in pregnancy enables women to receive advice on preventing excessive weight gain, early testing if risk factors are present and additional monitoring if diabetes is identified.

8.2.1 Background

Hyperglycaemia (raised blood glucose level) in pregnancy includes impaired fasting glucose, impaired glucose tolerance (pre-diabetes), type 2 diabetes (pre-existing before pregnancy) and gestational diabetes (developing during pregnancy). Gestational diabetes mostly develops during the second or third trimester and usually disappears after the baby is born. However it can recur in later pregnancies. Women who develop gestational diabetes are at high risk of developing type 2 diabetes later in life.

Diabetes in pregnancy is primarily managed with changes to diet and exercise but insulin and/or oral agents may be required.

This chapter only addresses hyperglycaemia related to the woman's pregnancy. It does not address the care of women who already have Type 1 diabetes.

Prevalence of diabetes in pregnancy

The prevalence of gestational diabetes varies with the characteristics of the population being screened and the diagnostic criteria used. Population-based studies in other countries have estimated prevalence ranging from 1% to 50% (Hartling et al 2012). It is clear that the prevalence of gestational diabetes has increased over the past decades in parallel with the increase in rates of obesity and type 2 diabetes and this trend is expected to continue (Aljohani et al 2008; Hartling et al 2012).

In Australia, the number of women with diabetes in pregnancy can be estimated from the National Hospital Morbidity Database and the National Perinatal Data Collection. In 2007–08, about 5% of women aged 15–49 years who gave birth in hospital had been diagnosed with gestational diabetes, with more than one-third of diagnoses occurring among women aged 35 years and over (AIHW 2010).

Data from the National Perinatal Data Collection in 2005–07 showed that (AIHW 2010):

- Aboriginal and Torres Strait Islander mothers were three to four times more likely to have pre-existing diabetes and twice as likely to have gestational diabetes than non-Indigenous mothers;
- women born in high-diabetes-risk populations (such as Polynesian, South Asian, Asian, Hispanic and Middle Eastern women) were slightly more likely to have type 2 diabetes, and three times as likely to have gestational diabetes, than mothers born in Australia.

Risks associated with diabetes in pregnancy

Cohort studies have found an independent relationship between hyperglycaemia during pregnancy and adverse outcomes for mother and baby (Sacks et al 1995; Sermer et al 1998; Schmidt et al 2001; Metzger et al 2008). The most comprehensive of these studies, the Hyperglycemia and Adverse Pregnancy Outcome (HAPO) study, showed a continuum of risk across maternal glucose levels for adverse pregnancy outcomes, including pre-eclampsia, caesarean birth, birth trauma, high birth weight and percentage of body fat as well as premature birth (Metzger et al 2008). High birth weight babies are at risk of birth complications (eg shoulder dystocia) (Crowther et al 2005; Falavigna et al 2012) and of long-term effects including childhood overweight (Li et al 1987; Langer et al 1989) and metabolic factors that may increase risk of cardiovascular disease (Garner et al 1997).

In Australia in 2005–07 (AIHW 2010):

- women with pre-existing diabetes had a high risk of preterm birth, induced labour, caesarean birth, hypertension and hospital stay longer than 7 days and their babies had high rates of stillbirth, high birth weight, low Agpar score and admission to neonatal intensive care unit;
- women with gestational diabetes had a high risk of induced labour and were more likely to have a preterm birth, caesarean birth, hypertension and longer hospital stay than women without diabetes, and their babies were more likely to be admitted to a neonatal intensive care unit; and

- Aboriginal and Torres Strait Islander mothers with pre-existing diabetes or gestational diabetes were at the highest risk of preterm birth, induced labour, caesarean birth and hypertension and their babies had higher rates of stillbirth, low Agpar score and admission to neonatal intensive care unit than non-Indigenous babies.

8.2.2 Assessing risk of diabetes

Summary of the evidence

Identifying women at risk of impaired glucose tolerance

Studies have found that higher weight gain in pregnancy (Herring et al 2009) and increasing maternal age (Karcaaltincaba et al 2009) are associated with increased risk of impaired glucose tolerance.

Identifying women at risk of diabetes during pregnancy

The risk factors for undiagnosed type 2 diabetes are similar to those for gestational diabetes. There is a considerable body of evidence to support an independent association between increased risk of gestational diabetes and the following factors.

- *Age* — Risk increases with maternal age (Scott et al 2002; Gonzalez-Clemente et al 2007; Iqbal et al 2007; Cypryk et al 2008; Karcaaltincaba et al 2009; Yang et al 2009; Ogonowski & Miazgowski 2010; Yogev et al 2010; Ismail et al 2011; Nanda et al 2011; Teede et al 2011; Teh et al 2011; Far et al 2012; Hartling et al 2012; Makgoba et al 2012; Ramos-Levi et al 2012) but no threshold at which risk increases has been established.
- *Weight* — Risk increases with increased BMI (Scott et al 2002; Gonzalez-Clemente et al 2007; Rudra et al 2007; Cypryk et al 2008; Kwak et al 2008; Radesky et al 2008; Torloni et al 2009; Yang et al 2009; Ogonowski & Miazgowski 2010; Waugh et al 2010; Nanda et al 2011; Schneider et al 2011; Teede et al 2011; Teh et al 2011; Far et al 2012; Hartling et al 2012; Hedderson et al 2012; Heude et al 2012; Lagerros et al 2012; Makgoba et al 2012; Ramos-Levi et al 2012; Singh et al 2012) or percentage of body fat (Iqbal et al 2007). BMI thresholds for increased risk vary by ethnic group and the risk is high even at relatively low BMIs in Asian women (Hedderson et al 2012). Excessive weight gain early in pregnancy also contributes to risk (Hedderson et al 2010b; Ogonowski & Miazgowski 2010; Ismail et al 2011; Carreno et al 2012; Gibson et al 2012; Heude et al 2012).
- *Previous obstetric history* — Risk is increased among women with previous gestational diabetes (Gonzalez-Clemente et al 2007; Radesky et al 2008; Getahun et al 2010; Ogonowski & Miazgowski 2010; Waugh et al 2010; Nanda et al 2011; Teede et al 2011; Teh et al 2011; Hartling et al 2012), a previous high birth weight baby (Cypryk et al 2008; Ogonowski & Miazgowski 2010; Waugh et al 2010; Nanda et al 2011; Hartling et al 2012) or previous pregnancy losses, including spontaneous miscarriage and unexplained stillbirth (Hartling et al 2012)
- *Family history* — Maternal family history of diabetes (Scott et al 2002; McLean et al 2006; Gonzalez-Clemente et al 2007; Cypryk et al 2008; Yang et al 2009; Waugh et al 2010; Ismail et al 2011; Teede et al 2011; Teh et al 2011; Mao et al 2012; Ramos-Levi et al 2012), especially type 2 diabetes in a first-degree relative (Ogonowski & Miazgowski 2010; Nanda et al 2011; Hartling et al 2012), increases the risk of developing gestational diabetes.
- *Family origin* — Risk of gestational diabetes is increased among members of ethnic groups with a high prevalence of type 2 diabetes (Waugh et al 2010). These include Aboriginal and Torres Strait Islander peoples (Porter et al 2012) and people who are of Hispanic, African, Native American, South or East Asian or Pacific Island origin (Scott et al 2002; Nanda et al 2011; Teede et al 2011; Teh et al 2011; Hartling et al 2012; Makgoba et al 2012; Singh et al 2012). Being a migrant also increases risk (Hedderson et al 2010a; Gagnon et al 2011; Schneider et al 2011).

Other evidence suggests that increased risk of gestational diabetes is associated with physical inactivity before and during early pregnancy (Iqbal et al 2007; Harizopoulou et al 2010), increased parity (eg third or subsequent pregnancy) (Cypryk et al 2008; Far et al 2012); polycystic ovary syndrome (Toulis et al 2009; Hartling et al 2012; Reyes-Munoz et al 2012) and metabolic syndrome (Hartling et al 2012). An association has also been suggested between short sleep duration and snoring (Qiu et al 2010), vitamin D deficiency (Burris et al 2012; Poel et al 2012) and some dietary factors (eg high intake of iron from animal-based sources, animal fats, cholesterol and sugar-sweetened cola) (Gonzalez-Clemente et al 2007; Chen et al 2009;

Bowers et al 2011; Qiu et al 2011a; Qiu et al 2011b; Bowers et al 2012) However, due to the nature of the studies, it is not clear whether these factors are causes of gestational diabetes.

Recommendation 21 **Grade B**

At the first antenatal visit, assess a woman's risk of diabetes — including her age, BMI, previous gestational diabetes, previous high birth weight baby, family history of diabetes, and family origin.

Lifestyle interventions for preventing gestational diabetes

- *Physical activity* — A Cochrane review (Han et al 2012) concluded that exercise programs had no clear effect on preventing gestational diabetes. A randomised controlled trial found that a physical activity intervention did not reduce the risk of gestational diabetes but did reduce maternal weight gain and the risk of caesarean birth and having a high birth weight newborn (Barakat et al 2013).
- *Dietary interventions* — A low glycaemic index diet during pregnancy did not reduce the risk of having a high birth weight baby but had a positive effect on maternal weight gain and glucose intolerance (Walsh et al 2012).
- *Combined interventions* — Two RCTs found advice on diet, physical activity and weight gain did not reduce the risk of gestational diabetes (Korpi-Hyovalti et al 2011) but resulted in lower weight gain (Korpi-Hyovalti et al 2011; Hui et al 2012). A lower level study found a lower incidence of high birth weight newborns among women receiving a combined intervention (Luoto et al 2011).
- *Management plans* — An Australian study reported that a four-step management plan for women who were obese reduced the incidence of gestational diabetes (Quinlivan et al 2011). The plan involved continuity of care by a single maternity care provider, assessing weight gain at each antenatal visit, a brief intervention (5 min) by a food technologist before each visit and an assessment by a clinical psychologist.

Recommendation 22 **Grade A**

Advise women at risk of hyperglycaemia that physical activity and healthy eating help to prevent excessive weight gain.

8.2.3 Screening for diabetes

There is no agreement among current guidelines on whether screening for diabetes should be offered to all women or only to women with risk factors. However, a number of major international guidelines recommend universal screening, including the American Diabetes Association (ADA), the Australasian Diabetes in Pregnancy Society (ADIPS) and The International Association of Diabetes and Pregnancy Study Groups (IADPSG).

The decision whether to screen all pregnant women or only those with risk factors depends on the background frequency of abnormal glucose metabolism in the population and on local circumstances (Metzger et al 2010). The World Health Organization (WHO) guidelines leave it to local health authorities to specify the screening coverage according to local burden, resources and priorities (WHO 2013). Whether screening is universal or risk factor based, it is important that organisational protocols are consistently followed and outcomes audited.

A technical report from the United Kingdom concluded that screening for diabetes in pregnancy is worthwhile due to the costs of managing pregnancies complicated by diabetes (Waugh et al 2010). An Australian study suggested that treating mild gestational diabetes involved additional costs to hospitals and women but resulted in reductions in perinatal mortality and serious perinatal complications (Moss et al 2007).

Undiagnosed Type 2 diabetes

As the ongoing epidemic of obesity and diabetes has led to more type 2 diabetes among women of childbearing age, the number of pregnant women with undiagnosed type 2 diabetes has increased. Detection and treatment of undiagnosed diabetes in early pregnancy can reduce potential immediate and long-term harm to the baby and have a positive effect on maternal health (Hughes & Moore 2013). For these reasons, it has been recommended that women with risk factors for type 2 diabetes be tested for hyperglycaemia at the first antenatal visit (Simmons & Campbell 2007; ADA 2013).

The RACGP and NACCHO recommend screening Aboriginal and Torres Strait Islander women who have a BMI >30 kg/m^2, family history of diabetes, previous gestational diabetes at the first antenatal visit (NACCHO & RACGP 2012).

Glycated haemoglobin (HbA1c) may have a role in identifying type 2 diabetes early in pregnancy, but further research is required (Waugh et al 2010). A study in progress in New Zealand found that, early in pregnancy, HbA1c ≥5.6% had a sensitivity of 77.3% and specificity of 42.2% for predicting diabetes (Hughes & Moore 2013). Scottish guidelines recommend that women with an HbA1c ≥6.5% in early pregnancy be treated as having pre-existing diabetes (SIGN 2010). However, HbA1c is not appropriate for assessing glycaemic control in the second and third trimesters of pregnancy (NICE 2008).

International consensus guidelines recommend the use of fasting plasma glucose, plasma glucose 2 hours after 75 g glucose loading, or random plasma glucose for testing for undiagnosed type 2 diabetes (Metzger et al 2010; WHO 2013).

Consensus-based recommendation xi

Offer early testing for hyperglycaemia to women with risk factors for type 2 diabetes.

Gestational diabetes

A lack of an agreed gold standard for diagnosing gestational diabetes creates challenges for assessing the accuracy of tests, making comparisons between them and establishing clear thresholds (Hartling et al 2012). There is currently no universally accepted screening or diagnostic regimen for gestational diabetes.

International consensus guidelines recommend the use of fasting plasma glucose or plasma glucose 1 hour or 2 hours after 75 g glucose loading for testing for gestational diabetes (Metzger et al 2010; WHO 2013).

Consensus-based recommendation xii

- Offer testing for hyperglycaemia to all women between 24 and 28 weeks gestation.

Diagnostic thresholds

The optimal diagnostic threshold for diabetes in pregnancy is uncertain and difficult to determine based on the available evidence.

After review of the findings of the HAPO Study, the IADPSG developed consensus recommendations based on the risk of adverse outcomes. These recommendations have been adopted by the WHO (WHO 2013) and the American Diabetes Association (ADA 2013). Recent ADIPS guidelines on diagnosis of gestational diabetes also include these criteria (Nankervis et al 2013).

Table 8.4: IADPSG/WHO criteria for diagnosis of diabetes in pregnancy

Diabetes in pregnancy — one or more of the following criteria are met	
Fasting plasma glucose	≥ 7.0 mmol/l (126 mg/ dl)
2-hour plasma glucose	≥ 11.1 mmol/l (200 mg/dl) following a 75g oral glucose load
Random plasma glucose	≥ 11.1 mmol/l (200 mg/ dl) in the presence of diabetes symptoms
Gestational diabetes — one or more of the following criteria are met at any time during pregnancy	
Fasting plasma glucose	5.1–6.9 mmol/l (92 -125 mg/dl)
1-hour plasma glucose	≥ 10.0 mmol/l (180 mg/dl) following a 75g oral glucose load
2-hour plasma glucose	8.5–11.0 mmol/l (153 -199 mg/dl) following a 75g oral glucose load

Source: WHO 2013.

The WHO criteria for diagnosing pre-existing diabetes are based on the risk of developing microvascular complications, predominantly retinopathy. There are no data available to assess diagnostic accuracy of current diabetes diagnostic criteria if used in pregnancy in untreated women (WHO 2013). The WHO grade the quality of the evidence supporting the criteria for diagnosing gestational diabetes as very low (WHO 2013). The criteria are not based on diagnostic accuracy because there is no reference test ("gold standard") to define disease status.

A systematic review found evidence to support a positive association between increasing plasma glucose on a 75 g or 100 g oral glucose tolerance test and high birth weight and primary caesarean birth but clear thresholds for increased risk were not identified (Hartling et al 2012). Some lower level studies support the use of the IADPSG/WHO criteria (Bodmer-Roy et al 2012; Benhalima et al 2013).

It is acknowledged that using the IADPSG/WHO criteria would increase the diagnosis of gestational diabetes in Australia, with resource implications. A prospective study in Wollongong using the IADPSG/WHO criteria found a prevalence of gestational diabetes of 13.0% compared with 9.6% when a fasting plasma glucose level of ≥5.5mmol/L or a 2-hour plasma glucose level of ≥8.0 mmol/L was used (Moses et al 2011). An analysis of the HAPO sites in Australia using the IADPSG/WHO criteria found a prevalence of gestational diabetes of 13.2% in Brisbane and 13.6% in Newcastle (Sacks et al 2012).

8.2.4 Discussing diabetes in pregnancy

Discussion to inform a woman's decision-making about screening for diabetes should take place before testing and include that:

- it is the woman's choice whether she has the test or not;
- undetected and uncontrolled diabetes during pregnancy is associated with risks to the mother (eg high blood pressure, pre-eclampsia) and to the baby in the short term (eg stillbirth, preterm birth, high birth weight, birth complications) and the longer term (childhood overweight); and
- a diagnosis of gestational diabetes may lead to increased monitoring and interventions during pregnancy and labour (eg induced labour, caesarean birth).

If diabetes is diagnosed during pregnancy, points for discussion include:

- the role of diet, physical activity and body weight in preventing and managing diabetes;
- the need for insulin or oral hypoglycaemic agents if diet and physical activity are not effective in controlling blood glucose levels;
- the importance of controlling blood glucose levels during labour and birth and early feeding of the baby to reduce the risk of the baby having low blood glucose levels after the birth;
- the possibility of transient morbidity in the baby in the period after the birth, which may require admission to a neonatal intensive care unit; and
- the risk of the baby developing obesity and/or diabetes in later life.

8.2.5 Practice summary: diabetes in pregnancy

When: Assess risk at the first antenatal visit, offer screening at 24–28 weeks
Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.
• **Discuss the reasons for screening blood glucose levels:** Explain that diabetes in pregnancy can have effects on the pregnancy and the baby and that management can reduce the risk of these effects.
• **Take a holistic approach:** Provide practical advice on healthy eating (see Section 5.1.2) and physical activity (see Section 5.2.2) to prevent excessive weight gain.
• **Consider referral:** Where possible, women diagnosed with pre-existing diabetes or gestational diabetes should be referred for specialist assessment and management.
• **Document and follow-up:** When a woman's blood glucose level is tested, tell her the results and note them in her antenatal record. Have a system in place so that women diagnosed with diabetes receive ongoing follow-up, including further testing of blood glucose levels after pregnancy.

8.2.6 Resources

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8.3 Haemoglobin disorders

While identifying parents who are carriers for haemoglobin disorders before conception is preferable, discussing screening and the implications of carrier status early in pregnancy enables women and their partners to make informed choices.

8.3.1 Background

Mutation of the genes that contain the information for cells to make haemoglobin can result in low or absent production of normal adult haemoglobin (thalassaemias) or changes in the structure of the haemoglobin protein (haemoglobin variants such as sickle cell disease).

When babies inherit mutated globin genes from both parents, they may be affected by or be a carrier for a haemoglobin disorder. It is very unlikely that the baby will be affected when only one parent is a carrier for a haemoglobin disorder, but the baby may be a carrier.

Prevalence of haemoglobin disorders

- Globally, over 330,000 affected infants are born each year (83% sickle cell disorders and 17% thalassaemias), around 7% of pregnant women are carriers of haemoglobin disorders and over 1% of couples are at risk (Modell & Darlison 2008).
- The risk of being a carrier for a haemoglobin disorder varies with ethnicity (Gaff et al 2007):
  - alpha thalassaemia is most prevalent among people of Chinese and South-East Asian origin but occurs in many other ethnic groups, including people from Southern European countries, the Middle East, the Indian subcontinent, Pakistan, Africa, the Pacific Islands and New Zealand (Maori);
  - beta thalassaemia is prevalent among people from the Middle East, Southern Europe, Indian subcontinent, Central and South-East Asia and Africa;
  - sickle cell disease is seen in many populations including people from Africa, the Middle East, Southern Europe, India, Pakistan, South America and the Caribbean.
- In Australia (Gaff et al 2007):
  - alpha thalassaemia has been identified in some Aboriginal and Torres Strait Islander communities in the Northern Territory and northern Western Australia; and
  - sickle cell disease has been most commonly seen in individuals of Southern European and Middle-Eastern origin (especially Lebanese and Turkish) but is becoming more prevalent with increasing immigration from sub-Saharan Africa and the Indian subcontinent.

Risks associated with haemoglobin disorders

- Thalassaemias vary in severity depending on the number of faulty globin genes (CGE 2007). Symptoms range from mild anaemia to severe anaemia that requires blood transfusions lifelong. A baby with alpha thalassaemia, if born alive, does not usually survive for long after the birth (Bart's hydrops fetalis).
- Sickle cell anaemia is characterised by chronic anaemia, bone and chest pain, organ damage, failure to thrive, repeated infections and painful swelling of the hands and feet (CGE 2007).

8.3.2 Screening for haemoglobin disorders

Summary of the evidence

In Australia, RANZCOG recommends that local policies for screening for haemoglobin disorders take into account the ethnic mix of women screened (RANZCOG 2009).

Discussing ethnicity

It is not possible to assume ethnicity from country of birth or surname. More information can be obtained by asking women where their parents, grandparents or great-grandparents were born (Gaff et al 2007). An RCT in the United Kingdom found that a questionnaire listing a range of ethnicities was more effective in ascertaining ancestry than a simple question about ethnic origins outside the United Kingdom (Dyson et al 2006).

Screening test

The RANZCOG recommends that mean corpuscular volume (MCV) and mean corpuscular haemoglobin (MCH) be tested in all women (RANZCOG 2009). A small study found that MCV had a sensitivity of 92.9% and specificity of 83.9% for thalassaemia screening (Sirichotiyakul et al 2005).

Screening using MCV and MCH will identify some but not all carriers of alpha and beta globin gene changes. It should be noted that some beta globin gene changes (eg sickle cell trait) result in normal red cell indices and detection relies on haemoglobin electrophoresis.

Harms and benefits of screening

Narrative reviews indicate screening of women at increased risk of being carriers for haemoglobin disorders can identify couples who are both carriers and have a 25% risk of having a pregnancy with a significant genetic disorder for which antenatal diagnosis is possible (Langlois et al 2008). No studies identified harms associated with screening. One study found that being well informed about haemoglobin disorders may reduce anxiety in women who are subsequently identified as carriers (Brown et al 2011).

Timing of screening

Narrative reviews suggest that the ideal time for screening for haemoglobin disorders would be preconception (Gaff et al 2007). If this is not possible, screening should take place as early as possible in pregnancy. Studies have found that when screening was offered in primary care (eg as part of the pregnancy confirmation visit), women were screened at an earlier gestation (Thomas et al 2005; Dormandy et al 2010a; Dormandy et al 2010b).

Cost-effectiveness of screening

Studies have found that antenatal screening in populations with a high prevalence of haemoglobin disorders is cost effective (Leung et al 2004; Koren et al 2009). While screening at confirmation of pregnancy may require additional resources, it increases the number of women screened by 10 weeks gestation (Dormandy et al 2010a). Cost-effectiveness studies support screening of fathers after a woman has been identified as a carrier for a haemoglobin disorder rather than on confirmation of pregnancy (Dormandy et al 2010a; Bryan et al 2011).

Consensus-based recommendation xiii

As early as possible in pregnancy, routinely provide information about haemoglobin disorders and offer screening (full blood count).

Practice point t

Consider offering ferritin testing and haemoglobin electrophoresis as part of initial screening to women from high-risk population groups.

Further investigations

Further testing is recommended for women who (Gaff et al 2007):

- have a MCV ≤ 80 fL and/or MCH ≤ 27 pg;
- have a family history of anaemia, thalassaemia or other abnormal haemoglobin variant; and/or
- originate from high-risk areas: Southern Europe, Middle East, Africa, China, South-East Asia, the Indian subcontinent, Pacific Islands, New Zealand (Maori), South America and some northern Western Australian and Northern Territory Aboriginal and Torres Strait Islander communities.

Relevant tests include:

- ferritin testing to exclude iron-deficiency anaemia; and
- electrophoresis or high pressure liquid chromatography, to identify haemoglobin variants (red cell indices can be normal in carriers for some haemoglobin disorders).

Further studies (eg DNA analysis) may be carried out for final clarification of the carrier state.

Diagnosis of an affected baby is generally by chorionic villus sampling (CVS), usually in the first trimester (Gaff et al 2007). A small study (n=777) found that ultrasound markers (middle cerebral artery peak systolic velocity combined with fetal cardiothoracic ratio) had a low false positive rate in diagnosing alpha thalassaemia (Leung et al 2010).

8.3.3 Discussing haemoglobin disorders

Providing women with sufficient information about haemoglobin disorders enables informed choices about screening (Brown et al 2011). Discussion to inform a woman's decision-making about screening for haemoglobin disorders should take place before testing and include:

- it is the woman's choice whether she has the test or not;
- people can be carriers of haemoglobin disorders without being affected by the condition or may be only mildly affected;
- people from some ethnic groups are more likely to be carriers of or affected by haemoglobin disorders;
- if only one parent is a carrier, it is unlikely that the baby will be affected but he or she may be a carrier;
- if both parents are carriers for a haemoglobin disorder, there is a chance that the baby will be affected by the condition; and
- there are implications for the health of an affected baby.

8.3.4 Practice summary: haemoglobin disorders

When: At the first antenatal visit.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.

- **Discuss the reasons for screening for haemoglobin disorders:** Explain that when both parents are carriers for a haemoglobin disorder, the baby may be affected (1 in 4 chance) with possible serious consequences.
- **Offer screening to fathers:** If a woman is identified as a carrier of a significant haemoglobin disorder, screening should be offered to the father. Other family members may also benefit from being offered screening.
- **Take a holistic approach**: Arrange counselling for parents when both are identified as carriers of haemoglobin disorders.
- **Document and follow-up:** Ensure that women receive timely notice of the results of any screening tests carried out. Have a system in place so that women identified as carriers of haemoglobin disorders receive ongoing support.

8.3.5 Resources

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8.4 Gonorrhoea

Gonorrhoea is a sexually transmitted infection that can cause complications in pregnancy. Antenatal care provides opportunities for women from population groups with a high prevalence of the infection to be offered testing.

8.4.1 Background

Gonorrhoea is a sexually acquired infection caused by *Neisseria gonorrhoea*. In women it may be asymptomatic, or present as an abnormal vaginal discharge, pelvic pain and/or difficulty urinating. Women with untreated gonorrhoea infection can have high morbidity (eg pelvic inflammatory disease, chronic pelvic pain). In pregnancy, gonorrhoea infection can cause adverse obstetric and neonatal outcomes. There is evidence that screening tests can accurately detect gonorrhoea infection and that antibiotics are effective in its treatment (USPSTF 2005).

Diagnoses of gonorrhoea in Australia

Data on diagnoses of gonorrhoea are incomplete and may provide a distorted view of population rates in Australia. Differences in rates of diagnosis between areas and populations may reflect a range of factors, including variations in approaches to offering testing, the uptake of testing, access to services, and recording of Indigenous status. Rates reported vary by community and will be higher if local screening programs are in place or research is being carried out.

- *Rates of diagnosis*: In 2011, rates of diagnoses of gonorrhoea per 100,000 population were 52 in the general population overall; 22 among non-Indigenous Australians and 673 among Aboriginal and Torres Strait Islanders living in states and territories other than ACT and NSW (Kirby Inst 2012). The rate of diagnosis was lowest in inner regional areas and increased with remoteness among both non-Indigenous Australians and Aboriginal and Torres Strait Islanders (Kirby Inst 2012).
- *Country of origin:* In 2008, the World Health Organization estimated the incidence of gonorrhoea per 1,000 women aged 15–49 years to be 50 in Africa, 35 in the Western Pacific, 19 in the Americas, 16 in South-East Asia and 8 in Europe (WHO 2012).
- *Age distribution:* Among women, approximately 75% of diagnoses of gonorrheoa in 2011 were in the 15–29 year age group (Kirby Inst 2012).
- *Incidence in pregnancy:* The incidence of gonorrhoea in pregnant women who are not at high risk for infection is generally low. However, it varies by population; approximately 1% among pregnant women in the United States (Goldenberg et al 2005) (range 0.2–4%) (CDC 2004), 3.3% in a developing country setting (Sullivan et al 2004) and 3.4% among adolescent women in a low-income area in the United States (Niccolai et al 2003).
- *Risk factors:* Increased risk of gonorrhoea has been associated with previous gonorrhoea infection or other sexually transmitted infection, new or multiple sex partners and inconsistent condom use, commercial sex work and drug use and living in communities with a high prevalence of gonorrhoea (USPSTF 2005).

Risks associated with gonorrhoea in pregnancy

Untreated gonorrhoea during pregnancy is associated with adverse obstetric outcomes including ectopic pregnancy, septic spontaneous abortion, chorioamnionitis, premature rupture of membranes, preterm labour and postpartum infection (Hollier & Workowski 2005; USPSTF 2005).

N. gonorrhoeae can be transmitted from the mother's genital tract to the newborn at the time of birth and occasionally, when there is prolonged rupture of the membranes, it can be transmitted to the baby before birth (Brocklehurst 2009). The usual manifestation of neonatal infection is conjunctivitis (ophthalmia neonatorum), which begins in the first days of life and, if left untreated, may lead to blindness (Brocklehurst 2009). The risk of transmission from an infected mother is between 30% and 47% (Galega et al 1984; Fransen et al 1986).

8.4.2 Screening for gonorrhoea

While screening all women for gonorrhoea during pregnancy is recommended in Canada (PHAC 2008), a number of bodies in the United States recommend screening only women at high risk (AAP 2002; ACOG 2003; AAFP 2004; USPSTF 2005). The Royal Australian College of General Practitioners (RACGP) also supports screening only women considered to be at risk (RACGP 2009). The prevalence of gonorrhoea is regionally variable and, in some areas, high prevalence may occur with that of other sexually transmitted infections, such as chlamydia. It is important for health professionals to be aware of the rates of sexually transmitted infection in their community and develop local protocols accordingly.

Summary of the evidence

Diagnostic accuracy of tests

In Australia, culture methods for detection of *N. gonorrhoeae* have been increasingly replaced by nucleic acid detection tests, especially in remote areas (Smith et al 2005). These tests can be performed on self-collected vaginal swabs, urine and endocervical specimens. The sensitivity and specificity of vaginal swabs are similar whether collected by the woman (96.1%; 99.3%) or health professional (96.2%; 99.3%), identifying as many infections as endocervical swabs and more than first-catch urine samples (Schachter et al 2005). These tests are evolving and guidelines for laboratories on their use and interpretation have been developed to reduce the high risk of false positives associated with some tests (Smith et al 2005). Where possible, positive results should be confirmed with culture for antibiotic sensitivity testing and to exclude false positives, particularly in low-risk individuals.

In a retrospective study, repeat testing of women at high risk at 34 weeks identified additional women with infection (n=751) (Miller et al 2003). In the United States (USPSTF 2005) and Canada (PHAC 2008), testing is recommended in the first trimester, with testing in subsequent trimesters (Canada) or in the third trimester (United States) for women at continued risk or with a new risk factor.

Harms and benefits of screening

There is some evidence that testing and subsequent treatment of pregnant women at high risk of gonorrhoea may prevent complications associated with gonococcal infection during pregnancy (USPSTF 2005; Darling 2009). Potential harms of screening include false-positive test results, anxiety and unnecessary antibiotic use (USPSTF 2005). There is insufficient evidence to quantify the magnitude of these harms but it is likely that they are outweighed by the benefits of screening women at increased risk (USPSTF 2005).

No evidence on the cost-effectiveness of screening for gonorrhoea in pregnancy was identified.

Effect of treatments on risks associated with gonorrhoea

The aim of treating gonorrhoea during pregnancy is to eradicate the infection and prevent neonatal infection, postpartum sepsis for the mother and transmission to sexual partners (Brocklehurst 2009). In a systematic review (n=346)(Brocklehurst 2009), all tested antibiotic regimens (penicillins, spectinomycin or ceftriaxone) demonstrated a high level of effectiveness as judged by 'microbiological cure', with eradication rates of between 89% and 97%. However, the effects of treatment on substantive outcomes such as ophthalmia neonatorum have not been reported and may vary between different antibiotics.

Consensus-based recommendation xiv

Do not routinely offer gonorrhoea testing to all women as part of antenatal care.
Offer gonorrhoea testing to pregnant women who have known risk factors or live in or come from areas where prevalence is high.

8.4.3 Discussing gonorrhoea

Discussion to inform a woman's decision-making about gonorrhoea screening should take place before testing takes place and include:

- it is the woman's choice whether she has the test or not;
- it is possible to have gonorrhoea without experiencing symptoms;
- risk factors for sexually transmitted infection;
- the possibility of false positive results;
- gonorrhoea causes problems with the pregnancy including spontaneous abortion, preterm birth and infection of the newborn;
- treatment of gonorrhoea may prevent pregnancy complications associated with infection;
- testing and treatment of partners is advisable if infection is identified and the couple should abstain from sex until treatment is complete and symptoms have resolved;
- testing for other sexually transmitted infections may be needed;
- a second test may be given a week later if symptoms remain; and
- repeat testing for gonorrhoea may be needed for women at ongoing risk of infection.

8.4.4 Practice summary: gonorrhoea

When: A woman has risk factors for gonorrhoea infection, lives in an area of high prevalence or has come from a country with high prevalence.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker, sexual health worker.

- **Discuss the reasons for gonorrhoea screening:** Explain that it is important to find out whether a woman has gonorrhoea because of the effects that infection can have on the pregnancy and the baby.
- **Take a holistic approach**: If a woman is found to have gonorrhoea infection, other considerations include counselling, contact tracing, partner testing, testing for other sexually transmitted infections and follow-up.
- **Document and follow-up:** If a woman is tested for gonorrhoea, tell her the results and note them in her antenatal record. Have a follow-up system in place so that infected women receive timely treatment or referral. Consider repeat testing for women who may be at ongoing risk of infection.

8.4.5 Resources

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8.5 Trichomoniasis

Identifying the cause of vaginitis symptoms enables a woman to make an informed decision about treatment during pregnancy.

8.5.1 Background

Trichomoniasis is a sexually transmitted vaginitis caused by the single-celled protozoan parasite *Trichomonas vaginalis*. Around 70% of people with trichomoniasis do not experience symptoms (Workowski & Berman 2010). When symptoms are present in women, they include a smelly, yellow-green vaginal discharge with vulvar irritation (Workowski & Berman 2010). Trichomoniasis is associated with infertility, pelvic inflammatory disease and enhanced HIV transmission (Sobel 2005; Sutton et al 2007; Johnston & Mabey 2008; Fichorova 2009).

Prevalence of trichomoniasis in pregnancy

Trichomoniasis is the most common curable sexually transmitted infection globally, with a prevalence among women of 8.1% (WHO 2011). Prevalence varies with age as well as geographical region.

- *Population-level data*: There are no accurate national data available regarding the prevalence of trichomoniasis in Australia and the infection is not notifiable.
- *Aboriginal and Torres Strait Islander women:* Small studies of discrete populations have found an prevalence among pregnant women of 15.5–17.6% (Josif et al 2012) in remote areas and 7.2% in an urban area (Panaretto et al 2006).
- *Country of origin*: Prevalence has been estimated as 3–3.7% among women in the United States (French et al 2006; Sutton et al 2007; Mann et al 2009), 0.3–6% among South American women (Lobo et al 2003; Gondo et al 2010), 5.5–8.5% among Asian women (Sami & Baloch 2005; Azargoon & Darvishzadeh 2006; Madhivanan et al 2009), 10–14% among African American women (Caliendo et al 2005; Miller et al 2005; French et al 2006) and 5.4–17.6% among African women (Adu-Sarkodie 2004; Stringer et al 2010).
- *Risk factors*: Risk factors include multiple sexual partners, previous sexually transmitted infections, non-use of barrier contraceptives, work in the sex industry, intravenous drug use, smoking, low socioeconomic status and incarceration (Brown 2004; Say & Jacyntho 2005; Johnston & Mabey 2008; Workowski & Berman 2010).

Risks associated with trichomoniasis in pregnancy

- *Pregnancy risks:* Trichomoniasis in pregnancy is associated with increased risk of preterm birth and low birth weight (Buchmayer et al 2003; Mann et al 2009; Gülmezoglu & Azhar 2011).
- *Risks to the baby:* Maternal trichomoniasis has been associated with genital and respiratory infections of the newborn (Carter & Whithaus 2008; Trintis et al 2010).

8.5.2 Screening for trichomoniasis

Summary of the evidence

In the United States (Workowski & Berman 2010), testing for trichomoniasis during pregnancy is only recommended for women with symptoms. Recommendations on screening during pregnancy have not previously been developed in the United Kingdom or Australia.

Specimen collection

Small low-level studies in non-pregnant populations have concluded that:

- self-collected vaginal swabs correlate with specimens collected by health professionals (Smith et al 2005; Kashyap et al 2008; Huppert et al 2010) and are easy to perform (Kashyap et al 2008); and
- self-collection by tampon sampling is acceptable to women (van de Wijgert et al 2006), is easily incorporated into practice and may be suitable in remote settings as samples do not require refrigeration (Garland & Tabrizi 2004).

Diagnostic test accuracy

A range of testing methods for trichomoniasis is used in Australia; the most appropriate test will depend on the clinical setting.

- *Polymerase chain reaction* (PCR) testing of vaginal swabs has high sensitivity (96–100%) and specificity (97–100%) (Lobo et al 2003; Caliendo et al 2005; Smith et al 2005; Pillay et al 2007). Small studies have found that PCR testing of tampon samples has high sensitivity (94–100%) (Knox et al 2002; Sturm et al 2004). PCR testing of urine samples has lower sensitivity and specificity (76.7% and 97%) (Pillay et al 2007).
- *Culture testing* of vaginal swabs has high sensitivity (63.0–98.2%) and specificity (99.4–100%) (Lobo et al 2003; Adu-Sarkodie 2004; Caliendo et al 2005; Smith et al 2005). It requires an incubator and culture medium, and may take up to 7 days for a result.
- *Wet mount microscopy* has low sensitivity (43.6–81.5%) but a high specificity (93–100%) (Lara-Torre & Pinkerton 2003; Lobo et al 2003; Adu-Sarkodie 2004; Smith et al 2005; Pillay et al 2007). Accurate diagnosis depends on immediate evaluation of a moist specimen and the skill of the examiner (Hollier & Workowski 2005).
- *Pap smear* is not adequate as the sole method of diagnosis of trichomoniasis because of its low sensitivity (60.7–72.1%) and the delay in obtaining results (Lara-Torre & Pinkerton 2003; Lobo et al 2003; Smith et al 2005).

There is insufficient evidence to assess the accuracy of the latex agglutination kit in diagnosing trichomoniasis (Adu-Sarkodie 2004).

Benefits and harms of screening

While accurate diagnostic tests are available, the benefits of screening are limited by uncertainties about the effect of treatments during pregnancy. Advantages of identifying and treating trichomoniasis include relief of symptoms, reduced risk of further transmission and possible prevention of genital and respiratory infections in the newborn (Workowski & Berman 2010). Potential harms of screening include false positive diagnosis (Johnson et al 2007) and adverse effects associated with treatment (see below).

Recommendation 23 **Grade B**

Offer testing to women who have symptoms of trichomoniasis, but not to asymptomatic women, during pregnancy.

Availability of safe and effective treatments for trichomoniasis

Metronidazole and tinidazole are used to treat trichomoniasis (Owen & Clenney 2004; Fung & Doan 2005; Wendel & Workowski 2007; Workowski & Berman 2010). The Therapeutic Goods Administration classifies metronidazole as pregnancy category B2 and tinidazole as B3.

Based on the limited evidence available, treatment with metronidazole provides parasitological cure in around 90% of women and would likely be more effective if partners were also treated (Workowski & Berman 2010; Gülmezoglu & Azhar 2011). However, it does not reduce risk of preterm birth or low birth weight in asymptomatic women (Gülmezoglu & Azhar 2011) and may increase the risk of preterm birth (Carey & Klebanoff 2003; Hay & Czeizel 2007).

Studies into the effect of treatment in women with symptomatic trichomoniasis are also limited and findings are inconsistent. Some suggest an increased incidence of preterm birth (Riggs & Klebanoff 2004; Okun et al 2005) and others found no association with preterm birth (Mann et al 2009). Findings may be affected by method of assessing gestational age (Stringer et al 2010) and timing of diagnosis.

Due to the lack of clarity on the risk of preterm birth, treatment of asymptomatic pregnant women is not recommended but may be a consideration after 37 weeks gestation. Treatment for women with symptoms requires consideration of the risks and benefits for the individual woman.

Repeat screening

Due to the high rates of reinfection among women diagnosed with trichomoniasis, rescreening 3 months following treatment may be a consideration, although this approach has not been evaluated (Workowski & Berman 2010).

8.5.3 Discussing trichomoniasis

Discussion to inform a woman's decision-making about trichomoniasis screening should take place before testing takes place and include:

- it is the woman's choice whether she has the test or not;
- trichomonisasis is a sexually transmitted infection and most people do not experience symptoms;
- trichomoniasis is associated with increased risk of preterm birth and low birth weight and may cause some types of infection in the newborn;
- treatment of trichomoniasis relieves symptoms, reduces the risk of transmission and may prevent related infections in the newborn but may not reduce the risk of preterm birth;
- testing and treatment of partners is advisable if infection is identified and the couple should abstain from sex until treatment is complete and symptoms have resolved; and
- testing for other sexually transmitted infections may be needed.

8.5.4 Practice summary: trichomoniasis

When: A woman has signs or symptoms of vaginitis.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker, sexual health worker.

- **Discuss the reasons for testing for trichomoniasis:** Explain that testing is necessary to identify the cause of the symptoms.
- **Take a holistic approach**: If a woman is found to have trichomoniasis, other considerations include counselling, contact tracing, partner testing and treatment and testing for other sexually transmitted infections.
- **Document and follow-up:** If a woman is tested for trichomoniasis, tell her the results and note them in her antenatal record. Have a system in place so that women's decisions about treatment are documented and women who test positive for trichomoniasis during pregnancy are given ongoing follow-up and information.

8.5.5 Resources

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8.6 Group B streptococcus

Identifying women who are at risk of having a baby with Group B streptococcus enables treatment to be given during labour to prevent transmission of infection to the baby.

8.6.1 Background

Group B streptococcus is a common bacterium that can colonise people of all ages without symptoms. It is generally found in the gastrointestinal tract, vagina and urethra. The bacteria can be passed from mother to baby during labour and lead to infection in the first week of life (early onset infection). Late onset infection can develop up to 3 months of age. Prevention focuses on early onset, which is the most common cause of serious infection in newborn babies.

Prevalence and incidence

- *Maternal colonisation*: A systematic review estimated rates of maternal colonisation in Europe to range from 6.5% to 36% (Barcaite et al 2008; 2012), with one-third of included studies reporting rates greater than 20%. Lower level studies in Europe and other regions have found similar rates (Whitney et al 2004; Chohan et al 2006; Valkenburg-van den Berg et al 2006; Busetti et al 2007; Konrad & Katz 2007; Hakansson 2008; Jahromi 2008; Rausch et al 2009; Hong et al 2010; Lee et al 2010; Kunze 2011; Yu et al 2011). Australian studies have identified colonisation rates in the range of 20% to 24% (Hiller et al 2005; Angstetra et al 2007). A study of antenatal care for Aboriginal and Torres Strait Islander women in Townsville (n=456) identified Group B streptococcus as a complication of pregnancy in 15.2% of women (Panaretto et al 2006), with a screening rate of around 60% (Panaretto et al 2006; 2007).
- *Group B streptococcus infection in the newborn*: The incidence of neonatal Group B streptococcus infection ranges from 0.2/1,000 live births to 1.71/1,000 live births (Ali 2004; Kenyon et al 2004; Mifsud et al 2004; Trotman & Bell 2006; Berardi et al 2007; Konrad & Katz 2007; Trijbels-Smeulders et al 2007; Carbonell-Estrany et al 2008; Berardi et al 2010; Vergnano et al 2010; Kunze 2011; Yu et al 2011).
- *Risk factors*: Risk factors for early onset Group B streptococcus infection of the newborn include maternal colonisation during the pregnancy, previous infant with Group B streptococcus infection, preterm birth, prolonged rupture of the membranes and maternal fever during labour (Ohlsson & Shah 2009). There is low-level evidence that Group B streptococcus colonisation in a previous pregnancy may be a risk factor for recolonisation in a subsequent pregnancy (Cheng et al 2008; Turrentine & Ramirez, 2008; Tam et al 2012) but this association was not found in all studies (Weintraub et al 2011). HIV infection does not appear to increase the risk of colonisation (Shah et al 2011).

Risks associated with Group B streptococcus colonisation during pregnancy

- A positive result for Group B streptococcus on urine culture may be a risk factor for preterm labor, premature rupture of the membranes, intrapartum fever and chorioamnionitis (Kessous et al 2012).
- Early onset Group B streptococcus may affect babies before birth and increase the risk of preterm birth or caesarean section (Tudela et al 2012). In the newborn, the infection is usually evident as respiratory disease, general sepsis, or meningitis within the first week after birth. Population-based surveillance in the United States suggests a neonatal death rate of around 5% of affected babies (CDC 2012).

8.6.2 Preventing Group B streptococcus

Intravenous antibiotic treatment during labour has been shown to prevent early onset Group B streptococcus infection in 86–89% of newborns (Lin et al 2001; Schrag et al 2002). Preventive approaches involve offering treatment to all women with a previous infant with Group B streptococcus infection and to other women based on:

- colonisation as identified by routine antenatal culture of vaginal-rectal swabs: recommended in the United States (Verani et al 2010; Cagno et al 2012; Randis & Polin 2012) and Canada (SOGC 2004); or
- risk factors for transmission during labour (preterm birth, maternal body temperature >38°C, membrane rupture > 18 hours): recommended in the United Kingdom (NICE 2008; RCOG 2012).

Both routine antenatal screening and risk-based treatment approaches are currently used in Australia.

Summary of the evidence

Benefits and harms of preventive approaches

While there is no high level evidence on the benefits of approaches to prevent transmission of Group B streptococcus, prospective and retrospective studies have identified reductions in the incidence of Group B streptococcus in the newborn associated with both routine antenatal screening (Angstetra et al 2007; Chen et al 2005; Eberly & Rajnik, 2009; Phares et al 2008; Puopolo et al 2005) and risk-based screening (Trijbels-Smeulders et al 2007).

Narrative reviews have identified limitations associated with routine antenatal screening including a lack of predictive certainty that a positive Group B streptococcus culture will lead to infection of the newborn, the potential for a false negative result and maternal anxiety (Daley & Garland 2004; Konrad & Katz 2007; Berardi et al 2010).

Both preventive approaches increase maternal and neonatal exposure to antibiotics, which can have harmful effects (eg allergic reactions, increase in drug-resistant organisms) (Ohlsson & Shah 2009). However, anaphylaxis following treatment with penicillin is rare (4/10,000–4/100,000 women with no known allergy) and the risk is greatly offset by the reduced incidence of neonatal and maternal sepsis (Schrag et al 2002).

Recommendation 24 **Grade C**

Offer either routine antenatal screening for Group B streptococcus colonisation or a risk factor-based approach to prevention, depending on organisational policy.

Cost-effectiveness

In the United Kingdom, available modelling on cost-effectiveness does not support introducing routine antenatal screening (Colbourn et al 2007; Kaambwa et al 2010). A French study found that PCR screening during the birth was associated with lower hospital costs than antenatal screening (El Helali et al 2012). No Australian evidence on the cost-effectiveness of approaches to preventing early onset Group B streptococcus was identified in the systematic literature review.

An economic analysis carried out to inform the development of these Guidelines (see Appendix E) found that the benefits of screening do not outweigh the costs involved, whatever approach is taken. This is because of the relatively low number of newborns affected and the absence of robust data on severe or long-term health effects in the event of an infection. Of the strategies evaluated, routine screening only is slightly more cost-effective than routine screening with treatment for certain risk factors, when compared to 'doing nothing'.

Timing of antenatal screening

A systematic review (Valkenburg-van den Berg et al 2010) into the optimal timing of antenatal screening found cultures collected in late pregnancy had a high positive predictive value for colonisation during labour. These findings are supported by other smaller studies (Hiller et al 2005; Towers et al 2010).

Recommendation 25 **Grade B**

If offering antenatal screening, arrange for testing to take place at 35–37 weeks gestation.

Type of antenatal screening test

Detection rates of Group B streptococcus are higher when a combined vaginal-rectal swab is taken (Kovavisarach et al 2007; Daniels et al 2009; Verani et al 2010; RANZCOG 2011), with a sensitivity of 84% compared to 58% for a vaginal swab and 71% for a rectal swab (Daniels et al 2009). Limited low-level evidence suggests vaginal-perianal swabs may be an alternative to vaginal-rectal swabs as culture yields are similar and collection causes less discomfort to the woman (Jamie et al 2004; Trappe et al 2011).

Self-collection of vaginal-rectal specimens has been found to have similar culture yields to collection by a health professional (Arya et al 2008; Hicks & Diaz-Perez 2009; Price et al 2006), without the need for standardised or lengthy information about specimen collection methods (Hicks & Diaz-Perez 2009).

Recommendation 26 **Grade C**

Encourage women to self-collect vaginal-rectal specimens for culture testing for Group B streptococcus and offer information about how to do this.

Organisational practice

Prospective studies evaluating the effects of introducing routine antenatal screening have found that, although screening had been extensively and successfully adopted, early onset Group B streptococcal infection still occurred due to culture detection failure, deviation from protocol (Berardi et al 2010) or missed screening (Van Dyke et al 2009; Faro et al 2010). This highlights the importance of consistently following organisational protocols and auditing outcomes.

8.6.3 Discussing Group B streptococcus

Discussion about Group B streptococcus should take place at around 35 weeks gestation so that women have received information about preventive treatment before they go into labour. This timing also enables testing at 35–37 weeks and receipt of test results, if screening is being offered. Points for discussion include:

- Group B streptococcus is part of the normal bacteria that live in the body and anyone can become colonised with Group B streptococcus without having symptoms;
- Group B streptococcus is transmitted to the baby during the birth in 1–2 per 1,000 live births and can cause serious infection in the newborn;
- treatment with intravenous antibiotics during labour prevents transmission of the infection to the baby; and
- women may be advised to remain in hospital for at least 24 hours after the birth so that the baby can be observed for signs of Group B streptococcus infection.

8.6.4 Practice summary: Group B streptococcus

When: At around 35 weeks gestation.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.

- **Discuss prevention:** Explain that treatment during labour is offered to women who are identified as being colonised with Group B streptococcus, have previously had a baby with Group B streptococcus infection and/or have risk factors for transmission during labour.
- **If screening is offered, give information about the test:** Discuss how the test is carried out and, unless the woman would prefer to have the specimen collected by a health professional, provide the test for her to carry out in the health care setting or at home. For women who choose to self-collect, provide clear explanation of how this is done (eg using diagrams or pictures).
- **Take a holistic approach:** Explain the implications of a positive test result or a previous baby with Group B streptococcus (eg a woman may not be able to give birth in the setting she had planned, treatment may not be possible if labour is very short). If a woman needs to travel to give birth, explain the importance of the test being carried out at 35–37 weeks (ie she needs to plan to have the test before she travels or arrange to have it where she will give birth).
- **Document and follow-up:** If antenatal screening is carried out, tell the woman the results and note them in her antenatal record. Have a system in place so that a woman with a positive test result or a previous infant with Group B streptococcus infection is informed about the importance of relaying this information to the health professionals who will care for her during labour.

8.6.5 Resources

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8.7 Toxoplasmosis

There is limited evidence to support screening for toxoplasmosis during pregnancy. As infection may be transmitted to the baby during pregnancy, the focus is on providing women with advice about how to avoid sources of toxoplasmosis.

8.7.1 Background

Toxoplasmosis, which is caused by the parasite *Toxoplasma gondii*, is usually asymptomatic and self-limiting. Symptoms when they occur include swollen lymph nodes, muscle aches and pains and fever.

When women who have not previously been exposed to the parasite (eg are non-immune) become infected during pregnancy, the infection can be transmitted to the baby (Di Mario et al 2009). The likelihood of a woman acquiring a primary infection during pregnancy varies, depending on local prevalence (Pappas et al 2009):

- *low prevalence*: the potential for a woman to become infected is low but if she is infected during pregnancy it will most likely be a primary infection; and
- *high prevalence*: primary infection during pregnancy is unlikely due to previous exposure.

Toxoplasmosis infection can be acquired by (Di Mario et al 2009):

- eating raw or insufficiently cooked meat;
- not washing hands thoroughly after handling raw meat or gardening;
- contact with cat faeces (directly or indirectly through the soil or cat litter); or
- contact with contaminated raw vegetables or fruits.

Prevalence and incidence

In Australia, primary infection with toxoplasmosis during pregnancy is rare (Gilbert 2002) although it is estimated that between 60% and 80% of Australians are non-immune (Pappas et al 2009).

- *Country of origin*: The prevalence of immunity to toxoplasmosis is high in Latin America, parts of Eastern/Central Europe, the Middle East, parts of South-East Asia and Africa. There is a trend towards lower prevalence of immunity in many European countries and the United States (Pappas et al 2009).
- *Congenital toxoplasmosis*: The incidence of congenital toxoplasmosis has been reported to range from 0.03/1,000 live births in England and Wales (Gilbert et al 2006) to 0.3/1,000 live births in south-eastern Brazil (Carvalheiro et al 2005).

Risks associated with toxoplasmosis during pregnancy

- Mother-to-child transmission rates have been reported to range from 11.3% (Ricci et al 2003) to 18.5% (Varella et al 2009). The risk of transmission increases with gestational age (from 5% at 12 weeks to 80% just before birth) (Dunn et al 1999). However, babies infected early in pregnancy have a greater risk of congenital abnormalities (Di Mario et al 2009).
- Congenital toxoplasmosis has been associated with stillbirth, intracranial abnormalities and/or developmental delay, ocular inflammation (Gilbert et al 2006) and impaired hearing (Andrade et al 2008; Brown et al 2009). In a prospective cohort study (n=620), babies with congenital toxoplasmosis had lower gestational age but there was no significant association with low birth weight or small for gestational age (Freeman et al 2005).

8.7.2 Screening for toxoplasmosis

Summary of the evidence

The evidence on the benefits to women and babies of screening for toxoplasmosis is limited and inconclusive. Routine screening for toxoplasmosis during pregnancy is not recommended in the United Kingdom (NICE 2008).

Diagnostic accuracy of tests

Screening tests for toxoplasmosis aim to identify whether maternal infection is acute or chronic. Studies have compared a range of tests for IgG and IgM antibodies and IgG avidity (Petersen et al 2005; Thalib et al 2005; Flori et al 2008; Bobic et al 2009; Kasper et al 2009; Lachaud et al 2009; Elyasi et al 2010; Wallon et al 2010; Jost et al 2011; Lesle et al 2011; Robert-Gangneux et al 2011; Yamada et al 2011). There is great heterogeneity between the studies, making it difficult to comment on the predictive and diagnostic accuracy of one test over another. Studies into the timing of screening are limited and inconclusive (Gilbert & Gras 2003).

No evidence on the cost-effectiveness of screening for toxoplasmosis was identified.

Harms and benefits of screening

No high-level evidence on the harms and benefits of screening for toxoplasmosis was identified. A narrative review found that psychological consequences of screening included parental anxiety due to false positive results and uncertainties related to prognosis of children with an antenatal diagnosis of congenital toxoplasmosis (Khoshnood et al 2007).

Recommendation 27 **Grade C**

Do not routinely offer screening for toxoplasmosis to pregnant women.

Availability of safe and effective treatments

Spiramycin and sulphonamide medications have been used to treat toxoplasmosis with the aim of reducing mother-to-child transmission and the severity of fetal infection (Peyron et al 2010).

A systematic review (Thiébaut et al 2007) found weak evidence for an association between early maternal treatment and reduced risk of congenital toxoplasmosis. A subsequent review (Peyron et al 2010) concluded that despite the large number of studies performed, it is still not known whether treatment of pregnant women with presumed toxoplasmosis reduces the transmission of *T. gondii*.

While some studies have reported a lack of symptoms among babies whose mothers were treated during pregnancy (Berrebi et al 2007; 2010; Cortina-Borja et al 2010), current research is inadequate to assess whether the possible benefits outweigh the potential harm to the baby from treatment (Peyron et al 2010).

8.7.3 Discussing toxoplasmosis

There is suggestive evidence that women may have low levels of knowledge about the risks associated with *T. gondii* (Ferguson et al 2011) and that health education approaches may help reduce risk of congenital toxoplasmosis (Gollub et al 2008).

Recommendation 28 **Grade C**

Advise pregnant women about measures to avoid toxoplasmosis infection such as:

- washing hands before handling food;
- thoroughly washing all fruit and vegetables, including ready-prepared salads, before eating;
- thoroughly cooking raw meat and ready-prepared chilled meals;
- wearing gloves and thoroughly washing hands after handling soil and gardening; and
- avoiding cat faeces in cat litter or in soil.

8.7.4 Practice summary: toxoplasmosis

When: Early in pregnancy.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.

- **Discuss sources of toxoplasmosis:** Explain that becoming infected with toxoplasmosis during pregnancy can lead to the infection being transmitted to the baby so it is important to take measures to avoid infection.
- **Take a holistic approach**: Women who are originally from an area of low prevalence are at risk of primary infection if they travel to countries where toxoplasmosis is highly prevalent.
- **Document and follow-up:** If a woman is tested for toxoplasmosis, tell her the results and note them in her antenatal record. Have a system in place so that women who become infected with toxoplasmosis during pregnancy are given ongoing follow-up and information.

8.7.5 Resources

SA Perinatal Practice Guidelines Workgroup (2004; reviewed 2010) Chapter 53 Toxoplasmosis in pregnancy. In: *South Australian Perinatal Practice Guidelines*. Adelaide: SA Health. http://www.health.sa.gov.au/ppg/Default.aspx?PageContentID=742&tabid=35

8.7.6 References

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8.8 Cytomegalovirus

There is limited evidence to support screening for cytomegalovirus during pregnancy.
As cytomegalovirus may be transmitted to the baby and can have serious consequences, the focus is on giving women advice about hygiene measures that reduce their risk of infection.

8.8.1 Background

Cytomegalovirus is a member of the herpes virus family transmitted by contact with saliva, urine or genital secretions (Gilbert 2002). Most people who acquire the virus after birth experience few or no symptoms. Cytomegalovirus remains latent in the host after primary infection and may become active again, particularly during times of compromised immunity including pregnancy.

Incidence

- *Maternal immunity*: European studies (Alanen et al 2005; Gaytant et al 2005; Naessens et al 2005, Picone et al 2009; Enders et al 2012a) estimate an incidence of cytomegalovirus immunity in pregnant women of 41–56%, with incidence as high as 98.3% among Turkish women (Uysal et al 2012) and 100% among Pakistani immigrants in Norway (Bjerke et al 2011). A Japanese study (Tagawa et al 2010) found an incidence of 87.3%.
- *Transmission*: Rates of mother-to-child transmission vary depending on whether the maternal infection was primary or secondary. Low-level evidence suggests a transmission rate of 30–50% after primary infection, and 0.5–3.0% following secondary infection (Burny et al 2004; Coll et al 2009; Kenneson et al 2007; Leung 2003; Ornoy & Diav-Citrin 2006; Yinon et al 2011).
- *Congenital infection*: The overall prevalence of congenital cytomegalovirus at birth is estimated to be 0.62–0.70% (Schlesinger et al 2003; Dollard et al 2007; Kenneson et al 2007; Naessens et al 2005). Congenital cytomegalovirus in Australia is diagnosed in 4.02 per 100,000 live births, with confirmed diagnoses in 15 infants in 2007 and 34 infants in 2008 (Ridley et al 2008).
- *Risk factors:* The evidence suggests that cytomegalovirus infection during pregnancy is more common among women of lower socioeconomic status (1.2%) than among women of higher socioeconomic status (0.39%) (Dollard et al 2007). Evidence of primary infection (seroconversion) is also more likely in this group (Gaytant et al 2005). Frequent and prolonged contact with a child less than 3 years of age (eg as parent or child care worker) increases the risk of infection as cytomegalovirus is shed for long periods of time by children in this age group (Alder 2011).

Risks associated with cytomegalovirus during pregnancy

- The most common cause of congenital infection in developed countries, mother-to-child transmission of cytomegalovirus, occurs in around 40% of primary infections during pregnancy (McCarthy et al 2011). Adverse effects on the developing baby include late miscarriage and growth restriction (McCarthy et al 2011). About 10% of infants with congenital cytomegalovirus infection display manifestations at birth (including growth restriction, abnormal brain development, impaired hearing, inflammation of the choroid and retina) and are at risk of neurological consequences, including cognitive and motor deficits, hearing and visual impairments (McCarthy et al 2011).
- While the risk of transmission increases with gestational age, babies infected early in pregnancy have a greater risk of severe symptoms (Feldman et al 2011; Enders et al 2012b).

8.8.2 Screening for cytomegalovirus

Summary of the evidence

Conclusions on the value of antenatal screening for cytomegalovirus are limited by a lack of evidence on the appropriate timing of screening, the prognosis for an infected baby and the efficacy of treatments in preventing mother-to-child transmission. Routine maternal screening for cytomegalovirus is not recommended in the United States (CDC 2008), Canada (Yinon et al 2010) or the United Kingdom (NICE 2008).

Diagnostic accuracy of tests

Cytomegalovirus is diagnosed by isolation of the virus from body fluids, molecular testing for cytomegalovirus genome by polymerase chain reaction (PCR) and detection of cytomegalovirus antibodies (McCarthy et al 2011). To determine whether primary infection occurred before or during pregnancy, antibody detection needs to occur at around 12–16 weeks (Enders et al 2013). The heterogeneity of studies identified (Parmigiani et al 2003; Khare et al 2004; de Paschale et al 2010; Gabbay-Ben Ziv et al 2012; Goncé et al 2012; Peled et al 2012; Sonoyama et al 2012) makes it difficult to comment on the diagnostic accuracy of one approach to testing over another.

Risks and benefits of screening

There is no high-level evidence on the benefits and risks of screening. Narrative reviews suggest that:

- possible benefits include (Burny et al 2004; Demmler 2005; ECCI 2006; Nyholm & Schleiss 2010):
  - identification of women at risk of primary infection enabling provision of prevention advice;
  - diagnosis of infection during pregnancy;
  - monitoring of the pregnancy and the option of diagnostic testing of the baby for women with known infection;
  - the opportunity to terminate the pregnancy if fetal infection is detected early in the pregnancy;
  - early commencement of neonatal antiviral treatment;
- risks or limitations include (Burny et al 2004; ECCI 2006; Coll et al 2009; Nyholm & Schleiss 2010; Lazzarotto et al 2011; Nigro & Adler 2011):
  - maternal anxiety;
  - lack of evidence on the appropriate timing of screening as the virus may be acquired and affect the developing baby throughout pregnancy;
  - the potential for false positive results;
  - difficulties in determining whether maternal infection is primary or secondary;
  - lack of an effective vaccine or treatment;
  - potential harm from diagnostic testing of the baby (eg amniocentesis-related miscarriage); and
  - lack of predictive certainty that an infected baby will be symptomatic at birth.

Conclusions on the cost-effectiveness of screening for cytomegalovirus are limited by insufficient evidence on the effectiveness of treatments in preventing congenital cytomegalovirus (Cahill et al 2009).

Consensus-based recommendation xv

Only offer screening for cytomegalovirus to pregnant women if they come into frequent contact with large numbers of very young children (eg child care workers).

Availability of safe and effective treatments

The evidence is insufficient to assess whether any interventions prevent mother-to child transmission or adverse outcomes for the congenitally infected infant (McCarthy et al 2011). Low-level evidence suggests some benefit from maternal intravenous hyperimmunoglobulin in preventing and treating congenital cytomegalovirus infection (Buxman et al 2012; Nigro et al 2012; Polilli et al 2012; Visentin et al 2012; Yamada et al 2012). Two RCTs to test the efficacy of hyperimmunoglobulin as passive immunisation are in progress.

8.8.3 Discussing cytomegalovirus prevention

Studies have identified low levels of knowledge about cytomegalovirus and its prevention among women (Ross et al 2007; Cannon et al 2012; Cordier et al 2012) and that health professionals may not give advice about prevention (CDC 2008).

A systematic review (Harvey & Dennis 2008) found that infection rates consistently decreased as cytomegalovirus education and support increased. These findings are supported by other lower level studies (Adler et al 2004; Picone et al 2009; Vauloup-Fellous et al 2009; Cordier et al 2012).

Providing advice to pregnant women about preventing cytomegalovirus acquisition through hygiene measures is recommended in the United States (CDC 2008). The NHMRC recommends that women of childbearing age working with children pay particular attention to good hand hygiene after contact with urine or saliva, especially after changing nappies or assisting in toilet care (NHMRC 2013).

Consensus-based recommendation xvi

Advise pregnant women about hygiene measures to prevent cytomegalovirus infection such as frequent hand washing, particularly after exposure to a child's saliva or urine.

8.8.4 Practice summary: cytomegalovirus

When: Early in pregnancy.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker, infectious disease specialist.

- **Discuss transmission of cytomegalovirus:** Explain that becoming infected with cytomegalovirus during pregnancy can lead to the infection being transmitted to the baby.
- **Take a holistic approach:** Explain that frequent hand washing is the most important measure in controlling the spread of cytomegalovirus and is especially important after contact with articles contaminated with urine or saliva.
- **Document and follow-up:** If a woman is tested for cytomegalovirus, tell her the results and note them in her antenatal record. If a woman has a positive result, seek advice or referral to a health professional with appropriate expertise.

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8.9 Cervical abnormalities

Cervical screening aims to identify women who may have a cervical abnormality and require further diagnostic testing.

8.9.1 Background

Cervical cancer is one of the most preventable and curable cancers. Cells in the cervix show changes or 'abnormalities' before any progression to cancer, which takes around 15 years. Most low-grade abnormalities regress without treatment. High-grade abnormalities may occur after persistent infection with human papilloma virus (HPV), which is a sexually transmitted infection that generally has no symptoms and resolves within 2 years. In a small number of women, persistent infection with a high-risk type of HPV may eventually lead to cervical cancer (AIHW 2012). HPV 16 and 18 are high-risk types that are detected in 70–80% of cases of cervical cancer in Australia (AIHW 2012). A program of vaccination against HPV types 16 and 18 was introduced in Australia in 2007.

Cervical cancer and screening in Australia

- *Prevalence of HPV infection:* An Australian study (before the introduction of the vaccination program) found that prevalence of HPV types 16 and 18 was similar for Aboriginal (9.4% and 4.1%) and non-Indigenous women (10.5% and 3.8%) (Garland et al 2011). Prevalence of HPV infection is higher among women from developing countries, with regions of high prevalence including Africa (22.1%) and Central America and Mexico (20.4%) (de Sanjose et al 2007). In all world regions, HPV prevalence is highest among women younger than 35 years (de Sanjose et al 2007).
- *Other risk factors for cervical cancer*: The risk of progression of HPV-related abnormalities to cervical cancer is increased by immunodeficiency (such as that caused by HIV infection), higher number of pregnancies, tobacco smoking, co-infection with other sexually transmitted infections and long-term (> 5 years) use of oral contraceptives (WHO 2006).
- *Cervical cancer incidence and mortality*: Incidence of, and mortality from, cervical cancer in Australia have both halved since 1991, remaining at their historic lows of 9 new cases and 2 deaths per 100,000 women since 2002 (AIHW 2012). Incidence does not vary significantly with geographical region but mortality is higher in remote areas (AIHW 2012). In 2004–08, the incidence of cervical cancer was 2.8 times higher among Aboriginal and Torres Strait Islander women than among non-Indigenous women (AIHW & AACR 2012), with data from 2006–10 showing that mortality was 4.4 times higher (AIHW 2012). Women from developing countries have an increased incidence, with the highest incidence (>45 per 100,000 women) found in Central and South America, eastern Africa, South and South-East Asia, and Melanesia (WHO 2006).
- *Uptake of cervical screening:* In 2009–2010, 57% of women in the Australian screening population had Pap smears, with participation highest among women aged 40–54 years (AIHW 2012). While cervical screening among women aged 20–24 years is low and decreasing, Australia is one of the few countries that screen this age group (AIHW 2012). Participation in screening did not vary significantly by geographical region but was lower in areas of social disadvantage (AIHW 2012). Information on participation for Aboriginal and Torres Strait Islander women is not available, as Indigenous status of participants is not collected, although there is evidence that this population group is under-screened (Coory et al 2002; Binns & Condon 2006).

Prevalence of abnormal cervical smear results in pregnancy

The prevalence of abnormal cervical smear results in pregnancy does not appear to differ from the age-matched non-pregnant population (Muller & Smith 2005) and is estimated to be 0.5–3% depending on the population being screened (Brown et al 2005; Muller & Smith 2005; McIntyre-Seltman & Lesnock 2008).

8.9.2 Cervical screening in pregnancy

Current recommendations in Australia are that a Pap smear be offered to every well pregnant woman, without symptoms of cervical cancer, who has not had cervical screening within the past 2 years (NCSP 2009; RANZCOG 2009).

Table 8.5: National Cervical Screening Program recommendations

Who	All women who have ever been sexually active, including women who have received HPV vaccination
What	Pap smear
When	Starting between the ages of 18 and 20 years, or 1–2 years after first sexual intercourse, whichever is later
How often	Every 2 years

Source: AIHW 2012.

Summary of the evidence

Diagnostic test accuracy

Cervical cytology has a high specificity (62–98%) for detecting abnormalities in non-pregnant women, with few false positives. However, the low sensitivity (40–86%) increases the risk of false negatives (IARC 2005). The strength of cervical screening comes from repeated testing at agreed intervals, which allows abnormalities to be detected over the long pre-invasive stage of cervical cancers (Dickinson 2002).

While cervical cytology appears to be equally accurate in pregnant and non-pregnant women, factors associated with pregnancy can complicate sampling and analysis and may result in false positives (Hunter et al 2008).

Type of test

One small study found that rates of endocervical cell recovery in pregnant women are not statistically different using conventional or liquid-based cytology (Kruger et al 2003). Several studies affirm improved efficacy and safety of using a cytobrush when taking samples from pregnant women (Bond 2009).

Timing of screening

While no specific evidence was found regarding when in pregnancy Pap smears should be performed, narrative reviews recommend that a Pap smear be done during the initial antenatal visit (Swenson 2001; Muller & Smith 2005; Govindappagari et al 2011) and preferably before 24 weeks gestation (NCSP 2009).

Benefits and harms of screening

Benefits of screening include detection of previously unrecognised cervical abnormalities (Nygard et al 2007; Flannelly 2010). A potential harm is that the greater risk of false-positive results during pregnancy may result in unnecessary intervention and increased maternal anxiety (Flannelly 2010).

Consensus-based recommendation xvii

Offer women cervical screening as specified by the National Cervical Screening Program.

Management of cervical abnormalities

There are few studies detailing the progression of low-grade abnormalities to cancer during pregnancy, but this appears to be extremely rare (NHMRC 2005). The NHMRC recommends investigation of abnormalities during pregnancy as follows (NHMRC 2005):

- in general, women with a low-grade abnormality should have a repeat smear in 12 months; and
- women with high-grade abnormalities should be referred to a colposcopist experienced in assessing the pregnant cervix.

8.9.3 Discussing cervical screening

Discussion to inform a woman's decision-making about cervical screening should take place before testing and include that:

- cervical screening during pregnancy is only necessary for women who have been sexually active for more than 1 or 2 years and have not had a Pap smear in the last 2 years;
- cervical screening should be performed before 24 weeks gestation;
- it is the woman's choice whether she has the test or not;
- a Pap smear is safe during pregnancy, although some spotting or bleeding may occur; and
- while low-grade changes require no further assessment during pregnancy, further assessment may be needed if high-grade changes are identified.

8.9.4 Practice summary: cervical abnormalities

When: Early antenatal visit, if the woman has not had a Pap smear in the last 2 years.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker, sexual health worker, women's health provider.

- **Discuss the reasons for cervical screening:** Explain that 2-yearly Pap smears are recommended for sexually active women as repeated screening can identify changes in cervical cells and enable treatment of high-grade abnormalities before they progress to cancer.
- **Provide advice to women with a positive result:** Explain that the Pap smear is not diagnostic, false positives are possible and changes are unlikely to progress during pregnancy. Advise women with low-grade changes to have another Pap smear in 12 months. Refer women with high-grade abnormalities for further assessment.
- **Take a holistic approach**: Provide advice to assist women in accessing services (eg pathology services that bulk bill). Explain that inclusion on State or Territory Pap test registries is confidential and automatic (unless a woman requests otherwise) and that the registries send reminders to women who are overdue for screening.
- **Document results and referrals:** If a woman has a Pap smear, tell her the results and note them in her antenatal record. Also document inclusion on the State/Territory registry and any follow-up required.

8.9.5 Resources

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8.10 Thyroid dysfunction

There is currently insufficient evidence to support routine screening for thyroid dysfunction. As there is an association between thyroid dysfunction and adverse pregnancy and fetal outcomes, the focus is on identifying and treating women with symptoms or at high risk of the condition.

8.10.1 Background

Thyroid dysfunction in pregnancy often results from a pre-existing condition but may arise during pregnancy. Thyroid dysfunction involves either over or under activity of the thyroid gland.

- *Hyperthyroidism,* in which thyroid hormone levels are raised, is most commonly caused by Graves' disease, an autoimmune disorder (Marx et al 2008) but may also be induced by excessive exposure to iodine (Benoist et al 2007). Symptoms include weight loss, heat intolerance and hypertension. It is generally diagnosed and treated before conception (Mestman 2004; Marx et al 2008).
- *Hypothyroidism* is a thyroid hormone deficiency, which may be overt (with symptoms including weight gain, sensitivity to cold and dry skin) (Abalovich et al 2007), or subclinical with few or no symptoms but abnormal levels of thyroid hormones (Reid et al 2013). It is most commonly caused by endemic iodine deficiency (Lazarus et al 2011). Autoimmune thyroid disease (eg Hashimoto's disease) is the most common cause when iodine intake is adequate (Reid et al 2013). Detection of thyroid autoantibodies (to thyroid peroxidase or thyroglobulin) confirms the autoimmune origin of hypothyroidism, or in euthyroid women may indicate increased risk of thyroid dysfunction (Reid et al 2013).

Incidence

- Thyroid dysfunction is the second most common endocrine condition (after diabetes mellitus) affecting women of reproductive age (Reid et al 2013).
- The incidence of hyperthyroidism in pregnancy is in the range of 0.1–0.4% (Abalovich et al 2007).
- Studies in relatively iodine-sufficient populations estimate an incidence of 0.3–0.5% for overt hypothyroidism and 3–5% for subclinical hypothyroidism (Abalovich et al 2007; Casey & Leveno 2006; Casey et al 2007). It is likely that incidence would be higher in areas of iodine insufficiency.
- Studies specific to the iodine status of pregnant women in Australia are limited but suggest that it was inadequate before mandatory iodine fortification of bread (APHDPC 2007). It is anticipated that with fortification, most of the population will get adequate iodine and women should enter pregnancy with adequate iodine intake (FSANZ 2008).
- The WHO Global Database on Iodine Deficiency identifies moderate iodine deficiency in some African countries (Algeria, Chad, Senegal), Afghanistan, Belarus and Vietnam (Benoist et al 2007). Urinary iodine levels associated with a high risk of iodine-induced hyperthyroidism or autoimmune thyroid disease were identified in Brazil, Chile, Ecuador, Liberia and Uganda.
- Thyroid autoantibodies are present in 7.9–18% of pregnant women (Negro et al 2006; Negro et al 2007; Lazarus 2005; McElduff et al 2008).

Risks associated with thyroid dysfunction in pregnancy

- Overt hypothyroidism and hyperthyroidism are associated with a range of adverse obstetric outcomes (miscarriage, pre-eclampsia, placental abruption, preterm birth and post-partum haemorrhage) and risks to the baby (low birth weight, increased neonatal respiratory distress and decreased cognitive function) (Lazarus 2011; Lazarus et al 2012).
- Studies are now focusing on the potential effect of subclinical thyroid dysfunction and autoimmune disease (Abalovich et al 2007; Stagnaro-Green et al 2011). A systematic review found that subclinical hypothyroidism in pregnancy is associated with pre-eclampsia (OR: 1.7; 95%CI: 1.1–26) and perinatal mortality (OR: 2.7; 95%CI: 1.6–4.7) and the presence of maternal thyroid autoantibodies is associated with miscarriage (OR: 3.73; 95%CI: 1.8–7.6) and preterm birth (OR: 1.9; 95%CI: 1.1–3.5) (van den Boogaard et al 2011). A meta-analysis of cohort studies had similar findings for miscarriage (OR: 3.90; 95%CI: 2.48–6.12) (Thangaratinam et al 2011) and a systematic review of cohort studies for preterm birth (RR: 1.41; 95%CI: 1.08–1.84) (He et al 2012).

8.10.2 Screening for thyroid dysfunction

Summary of the evidence

Targeted rather than routine screening for thyroid dysfunction is recommended in the United States (Abalovich et al et al 2007; ACOG 2007; Stagnaro-Green et al 2011). Debate about screening grows as the evidence about adverse outcomes resulting from subclinical disease or antibodies accumulates. Some studies have found that targeted thyroid hormone testing fails to detect the majority of pregnant women with thyroid dysfunction (Negro et al 2010).

No Australian evidence on the cost-effectiveness of screening for thyroid dysfunction was identified. While it is based on decision analysis and may not be applicable in Australia, one study in the United States found that universal screening for subclinical hypothyroidism in pregnancy would be cost-effective (Thung et al 2009).

Benefits and harms of screening

Despite the association between thyroid dysfunction and adverse outcomes, there is currently insufficient evidence that identifying and treating thyroid dysfunction in pregnant women improves maternal or fetal outcomes (van den Boogaard et al 2011). Recent RCTs have found that:

- risk of adverse outcomes did not differ between universal screening and targeted screening groups (Negro et al 2010);
- following treatment of hypothyroidism or hyperthyroidism in women at low risk, women identified by universal screening had significantly fewer complications (average of 0.74 in 50 women) than women identified by targeted screening (average of 1.67 in 39 women) (Negro et al 2010).
- no significant difference in cognitive function of children at 3 years of age following antenatal screening (at a median gestational age of 12 weeks 3 days) and maternal treatment for hypothyroidism (Lazarus et al 2012).

Recommendation 29	**Grade B**
Do not routinely offer pregnant women thyroid function screening.	

Identifying women at risk of thyroid dysfunction

The United States Endocrine Society identifies women with one or more of the following as being at high risk of thyroid dysfunction (Abalovich et al 2007):

- personal or family history of thyroid dysfunction;
- presence of goitre;
- presence of thyroid autoantibodies;
- symptoms or clinical signs suggestive of thyroid dysfunction including anaemia and elevated cholesterol;
- type I diabetes or other autoimmune disease; or
- history of miscarriage or preterm birth.

Assessment of risk factors at the first visit is recommended (Abalovich et al 2007). However, onset of thyroid dysfunction can occur later in pregnancy (Moleti et al 2009).

Recommendation 30	**Grade B**
Offer screening to pregnant women who have symptoms or high risk of thyroid dysfunction.	

Interpreting thyroid function test results

Thyroid function is initially assessed through testing of thyroid-stimulating hormone (TSH), with measurement of serum thyroxine if maternal TSH is either elevated or reduced.

Diagnosis of thyroid dysfunction in pregnancy is complicated by the fact that normal TSH levels differ from the non-pregnant state (Stagnaro-Green 2011). Applying the general laboratory reference range for TSH to pregnant women can result in misclassification of thyroid status (Dashe et al 2005; Stricker et al 2007; Gilbert et al 2008; Lee et al 2009). TSH levels vary with gestational age and between single and twin

pregnancies (Dashe et al 2005). Pregnancy-specific reference ranges that take into account gestational age and fetal number (eg Panesaer et al 2001) should therefore be used.

Effectiveness and safety of treatments

For women with pre-existing thyroid disease, hormone levels are monitored throughout pregnancy and medications adjusted to maintain a euthyroid state. Regular monitoring and adjustment of medication dosage is also needed when thyroid dysfunction is detected during pregnancy; this is likely to require referral or specialist consultation.

Economic analysis

A review of the cost implications of routine screening for thyroid dysfunction was undertaken to inform the development of these Guidelines (see Appendix E). The review found that there is not enough clinical evidence so show that treatment reduces adverse obstetrical and neonatal outcomes, and there are no economic evaluations relevant to Australia that enable an assessment of the impact of a routine screening program for thyroid dysfunction to detect women with hypothyroidism that have not already been diagnosed. Further research is needed before a comprehensive economic analysis can be conducted.

8.10.3 Discussing thyroid dysfunction

Discussion to inform a woman's decision-making about thyroid function screening should take place before testing and include that:

- thyroid function can be affected by autoimmune disorders or inadequate or excessive exposure to iodine in the diet;
- a family history of thyroid dysfunction means that a woman is more likely to be at risk;
- an under-active or over-active thyroid can cause complications to the pregnancy and risks to the baby;
- as some symptoms of an over-active thyroid may be part of normal pregnancy (eg heat intolerance) and under-active thyroid may not cause symptoms, it is important to test thyroid function in women who have symptoms or are at high risk of thyroid problems (eg if they have recently arrived from a country with a high prevalence of iodine deficiency);
- it is the woman's choice whether she has a thyroid function test or not;
- consultation with a specialist may be necessary if thyroid problems are identified.

8.10.4 Practice summary: thyroid dysfunction

When: A woman has symptoms or risk factors for thyroid dysfunction.
Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker, endocrinologist.
• **Discuss the reasons for thyroid function testing:** Explain that it is important to check a woman's thyroid hormone levels because of the effects that thyroid problems can have on the pregnancy and the baby.
• **Use pregnancy specific ranges**: If interpreting thyroid function test results, use pregnancy-specific reference ranges that take into account gestational age and fetal number.
• **Take a holistic approach**: While iodine fortification of bread in Australia means that women will likely enter pregnancy with adequate iodine intake, supplementation (150 micrograms a day) is still recommended during pregnancy and breastfeeding (see Module I, Section 10.4.3). Women who have recently arrived in Australia may have previous exposure to inadequate or excessive iodine, depending on their country of origin.
• **Document and follow-up:** If a woman's thyroid function is tested, tell her the results and note them in her antenatal record. Also note whether thyroid dysfunction is newly diagnosed or was previously treated. Have a follow-up system in place to facilitate timely referral and treatment.

8.10.5 Resources

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8.10.6 References

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9 Clinical assessments in late pregnancy

This chapter discusses the evidence for aspects of care during late pregnancy. At this stage, antenatal care becomes more frequent and includes planning and preparing for the birth. Some situations will require additional discussion, and women should be given advice and information to help them make informed decisions about options for interventions and birth. For example, identifying atypical fetal presentation (eg breech) from 35 weeks allows for timely discussion, planning and referral if necessary. With prolonged pregnancy, the longer the pregnancy the more complex the decisions may become, as the risks to mother and baby increase. Discussion at 38 weeks gestation will give women time to consider the options before a decision needs to be made.

Recommendations are based on the evidence for interventions that aim to reduce the need for induction or unplanned caesarean section. Decisions about management are made after considering the risks and benefits and taking the woman's preferences into account. When there is a high risk of adverse outcomes, discussion with specialists (eg obstetrician, neonatologist, paediatrician) is advisable.

9.1 Fetal presentation

Identifying fetal presentation and discussing management options with women who have a malpresentation late in pregnancy enables informed planning for the birth.

9.1.1 Background

Fetal presentation refers to the part of the baby that is overlying the maternal pelvis. Fetal lie refers to the relationship between the longitudinal axis of the baby with respect to the longitudinal axis of the mother (longitudinal lie, transverse lie, oblique lie).

Most babies present with the crown of the head at the cervix (vertex presentation). Less optimal situations are when the presenting part is the face or brow; the buttocks (breech presentation); or foot or feet (footling presentation). Babies that are in a transverse lie may present the fetal back or shoulders, arms or legs, or the umbilical cord (funic presentation). In an oblique lie, generally no palpable fetal part is presenting. This lie is usually transitory and occurs as the baby is moving.

Fetal presentation can be identified by palpation of the maternal abdomen, and confirmed by ultrasound if there is any doubt.

Fetal presentation at birth

Among women who gave birth in Australia in 2010, most fetal presentations were vertex (94.4%). Malpresentations included breech (3.9%), face or brow presentation (0.2%) and shoulder/transverse and compound presentations (0.7%) (Li et al 2012).

9.1.2 Abdominal palpation

Abdominal palpation is accurate in identifying presentation, especially if carried out by an experienced health professional (Webb et al 2011). In Australia, it is recommended that all health professionals providing antenatal care be experienced in palpation of the pregnant abdomen including identification of the presenting part (RANZCOG 2009). While the positive effects of abdominal palpation are difficult to quantify, no risks have been identified and it provides a point of engagement with the mother and baby. Assessment of presentation by abdominal palpation before 36 weeks is not always accurate.

Recommendation 31 **Grade C**

Assess fetal presentation by abdominal palpation at 36 weeks or later, when presentation is likely to influence the plans for the birth.

Where there is any doubt as to the presenting part, obstetric ultrasound should be used to confirm the palpation findings. Ultrasound can also exclude fetal anomaly, low-lying placenta, hyperextension of the baby's head and the presence of umbilical cord around the fetal neck (RANZCOG 2009).

Practice point u

Suspected non-cephalic presentation should be confirmed by an ultrasound assessment.

9.1.3 Breech presentation

Breech presentation is common in mid pregnancy, with incidence decreasing as the pregnancy approaches term. Turning the baby (eg using external cephalic version [ECV]) reduces the number of babies who are breech at term, thereby improving the chance of a vaginal birth.

The optimal mode of birth for women who have a baby in the breech position is the subject of much controversy. Following the initial findings of the Term Breech Trial of fewer adverse outcomes among babies following planned caesarean section than planned vaginal birth (Hannah et al 2000), breech birth is now more likely to occur by caesarean section. Rates of singleton vaginal breech births in Australia fell from 23.1% in 1991 (Sullivan et al 2009) to 4.0% in 2010 (Li et al 2012).

However, several studies have shown that with careful selection criteria and involvement of experienced health professionals, vaginal breech birth can be successful in 49–82.9% of women, with rates of morbidity equal to that of caesarean section and higher success rates among multiparous women (Sibony et al 2003; Alarab et al 2004; Kumari & Grundsell 2004; Oboro et al 2004; Ulander et al 2004; Krupitz et al 2005; Uotila et al 2005; Goffinet et al 2006; Daskalakis et al 2007; Hopkins et al 2007; Jadoon et al 2008).

Evidence into neonatal or maternal outcomes associated with mode of breech birth is inconsistent:

- *Risks to the infant*: Some cohort studies (Kumari & Grundsell 2004; Doyle et al 2005; Molkenboer et al 2007) found no differences in mortality and morbidity between vaginal births and caesarean sections, while others found higher rates of morbidity following vaginal birth (Gilbert et al 2003; Herbst 2005; Rietberg et al 2005; Daskalakis et al 2007; Hopkins et al 2007; Toivonen et al 2012) and one found a higher risk of neonatal mortality among babies of 1,000–1,500 g following vaginal birth but no significant difference in neonatal mortality above these weights (Demirci et al 2012). An observational study found that the risk of adverse perinatal outcomes following vaginal birth was increased among babies with a birthweight below the 10th percentile and a gestational age of less than 39 weeks (Azria et al 2012). A systematic review of cohort studies found a lower risk of developmental dysplasia of the hip following caesarean section compared with vaginal birth (Panagiotopoulou et al 2012). Importantly, the follow-up study from the babies born in the Term Breech Trial showed that risk of death or developmental delay at 2 years of age did not differ with mode of birth (Whyte et al 2004).
- *Risks to the mother*: Some studies have found lower rates of maternal morbidity following vaginal birth (Kumari & Grundsell 2004; Oboro et al 2004; Hopkins et al 2007; Toivonen et al 2012), while another found a lower risk of maternal complications following caesarean section (Krebs & Langhoff-Roos 2003).

Identifying breech presentation at around 36 weeks gestation enables timely discussion of ECV and referral as required (eg to a health professional with expertise in ECV) or referral to a health professional and centre with expertise in vaginal breech birth.

Summary of the evidence

Offering ECV when clinically appropriate is recommended in the United Kingdom (RCOG 2010), the United States (ACOG 2006) and Australia (RANZCOG 2009).

Effectiveness

The reported success rate of ECV is in the range of 36.7–72.3% (Hutton et al 2003; Fok et al 2005; Nor Azlin et al 2005; Nassar et al 2006; El-Toukhy et al 2007; Weiniger et al 2007; Grootscholten et al 2008; Kok et al 2008c; Rijnders et al 2010; Buhimschi et al 2011; Burgos et al 2011; Gottvall & Ginstman 2011; Obeidat et al 2011; Bogner et al 2012; Cho et al 2012; Cluver et al 2012).

A spontaneous reversion rate of 3–14% has been reported after 36 weeks (Nassar et al 2006; El-Toukhy et al 2007; Buhimschi et al 2011; Cho et al 2012).

Benefits and risks

Successful ECV reduces the rate of caesarean sections, with vaginal birth following ECV being successful in 71–84% of women (El-Toukhy et al 2007; Buhimschi et al 2011; Gottvall & Ginstman 2011; Bogner et al 2012; Reinhard et al 2013).

ECV has been found to be a safe procedure when performed in a setting where an urgent caesarean section can be performed (Nassar et al 2006; Grootscholten et al 2008; Gottvall & Ginstman 2011; Bogner et al 2012; Cho et al 2012). In a systematic review, the most frequently reported complications of ECV were transient abnormal cardiotocography patterns (5.7%), persisting pathological cardiotocography (0.37%), vaginal bleeding (0.47%) and placental abruption (0.12%) (Collaris & Oei 2004). Caesarean section was performed in 0.43% of all procedures and perinatal mortality was 0.16%.

Small studies have shown that the moderate degree of pain associated with ECV is well tolerated by the majority of women because of its short duration (Fok et al 2005) and that most women rate ECV as a good experience, whether it is successful (94%) or unsuccessful (71%) (Rijnders et al 2010).

Factors influencing success of ECV

Factors predicting successful ECV include posterior placental location, complete breech position, amniotic fluid index (AFI) >10, unengaged presenting part, maternal weight <65 kg and thicker fundal myometrium on ultrasound (Hutton et al 2008; Kok et al 2008b; Kok et al 2009; Buhimschi et al 2011; Burgos et al 2011; Obeidat et al 2011; Bogner et al 2012; Burgos et al 2012; Cho et al 2012). ECV is also more successful in multiparous (57–78% than primiparous (27–53%) women (Nassar et al 2006; El-Toukhy et al 2007; Kok et al 2008c; Rijnders et al 2010; Burgos et al 2011; Cho et al 2012), and if the health professional performing the ECV is experienced. ECV at 34–35 weeks versus ≥37 weeks increased the likelihood of cephalic version but did not decrease the rate of caesarean section (Hutton et al 2011).

The use of tocolytics (uterine relaxants) to facilitate ECV has been shown to increase cephalic presentations (RR: 1.38; 95%CI: 1.03–1.85) and reduce the rate of caesarean sections (RR: 0.82; 95%CI: 0.71–0.94) in both nulliparous and multiparous women (Cluver et al 2012). The available evidence supports the use of betastimulants for tocolysis (Kok et al 2008a; Wilcox et al 2011; Cluver et al 2012).

A small non-randomised study suggested that clinical hypnosis combined with tocolysis before ECV may increase success rates (Reinhard et al 2012).

Recommendation 32 **Grade B**

Offer external cephalic version to women with uncomplicated singleton breech pregnancy after 37 weeks of gestation.

Consensus-based recommendation xviii

Relative contraindications for external cephalic version include a previous caesarean section, uterine anomaly, vaginal bleeding, ruptured membranes or labour, oligohydramnios, placenta praevia and fetal anomalies or compromise.

Practice point v

External cephalic version should be performed by a health professional with appropriate expertise.

Other interventions

- *Acupoint stimulation*: The evidence for the effectiveness and safety of moxibustion (a Chinese medicine treatment that involves burning of *Artemisia argyi* close to the skin at an acupuncture point) is inconsistent and largely based on small studies, many of which are of poor quality with high heterogeneity. Some systematic reviews (van den Berg et al 2008; Li et al 2009; Vas et al 2009), RCTs (Habek et al 2003; Neri et al 2004) and a cohort study (Grabowska & Manyande 2009) have reported a higher rate of cephalic version with moxibustion and other acupunture point stimulation methods, while others have found no beneficial effect (Cardini et al 2005; Guittier et al 2009). Although small studies have not observed significant maternal or fetal side effects associated with moxibustion (Neri et al 2007; Guittier et al 2008), a recent Cochrane review identified a need for further evidence on its safety and effectiveness (Coyle et al 2012).

- *Posture*: A Cochrane review (n=417) found insufficient evidence to support the use of posture management to turn a breech baby (Hofmeyr & Kulier 2011). Combined with moxibustion, postural techniques may reduce the number of non-cephalic presentations at birth (RR: 0.73; 95%CI: 0.57–0.94) (Coyle et al 2012).

9.1.4 Discussing fetal presentation

If a woman has a baby that is in the breech position, she should be given information in a calm, reassuring manner using simple terminology so that she can decide which options are most suitable to her situation. Points for discussion include that:

- when the baby presents with bottom presenting first, the birth process can be more challenging, so birth by caesarean section is more common than if the baby presents head first;
- for babies in the breech position, ECV may be offered (this involves a health professional using his or her hands on the woman's abdomen to gently turn the breech baby and is successful in approximately half of women, with success more likely if medications to relax the uterus are used);
- ECV is not appropriate in some situations (eg when there is vaginal bleeding, a low level of amniotic fluid or fetal or uterine anomalies);
- ECV has low complication rates but should be carried out where there are facilities for emergency caesarean section;
- other interventions to turn a breech baby (posture and acustimulation) are less effective than ECV and the evidence on their safety is limited; and
- if a woman chooses not to have ECV, the procedure is unsuccessful or the baby returns to breech position, vaginal birth may still be possible depending on the individual situation.

9.1.5 Practice summary: fetal presentation

When: At around 36 weeks gestation.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.

- **Discuss the risks associated with malpresentation**: Explain that, while most babies turn to present with the crown of the head before labour, the birth process can be complicated if this does not occur.
- **Discuss ECV with women with a breech baby:** Explain that turning the baby before the birth reduces the need for caesarean section. Discuss the benefits and risks of the procedure and where it would take place.
- **Discuss plans for the birth:** Explain the risks and benefits associated with planned vaginal birth and caesarean section.
- **Take a holistic approach**: Encourage women to attend with family members to discuss plans for ECV and birthing options.

9.1.6 Resources

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9.2 Prolonged pregnancy

Identification of prolonged pregnancy relies on accurate dating. True cases of prolonged pregnancy require careful monitoring and management, to reduce the risk of adverse consequences for mother and baby.

9.2.1 Background

The standard definition of a prolonged pregnancy (also called post-term or post-dates) is gestation that has lasted 42 weeks (294 days) or longer from the first day of the last normal menstrual period, or 14 days beyond the best obstetric estimate of the birth date (ACOG 2004; Briscoe et al 2005; Siozos & Stanley 2005; Caughey et al 2008b; Mandruzzato et al 2010).

Incidence of prolonged pregnancy

- The reported frequency of prolonged pregnancy is approximately 5–10%, with the most common reason being inaccurate dating (ACOG 2004; Caughey et al 2008a; Caughey et al 2008b; Delaney et al 2008; Doherty & Norwitz 2008). Routine ultrasound dating before 20 weeks gestation (see Section 7.1 of Module I) significantly reduces the rate of prolonged pregnancy (Bennett KA 2004; Mandruzzato et al 2010) and the rate of induced labour (NICE 2008). Primiparity and previous prolonged pregnancy are the most common identifiable causes of true prolonged pregnancy (ACOG 2004).
- In Australia in 2010, 91.7% of women who gave birth did so at 37–41 completed weeks of gestation (term) and 0.8% gave birth at 42 or more weeks gestation (this includes spontaneous or induced labour and births by caesarean section) (Li et al 2012).

Risks associated with prolonged pregnancy

- *Perinatal:* The perinatal mortality rate (stillbirths plus early neonatal deaths) at 40 weeks of gestation approximately doubles by 42 weeks (4–7 deaths versus 2–3 deaths per 1,000 births) and increases by 6-fold and higher at 43 weeks and beyond (Briscoe et al 2005). A higher risk of complications has also been reported, including (Olesen et al 2003; Clark & Fleischman 2011; Yurdakok 2011):
  - meconium aspiration syndrome;
  - oligohydramnios (deficiency in amniotic fluid);
  - central nervous system damage; and
  - macrosomia and its associated complications (cephalopelvic disproportion, shoulder dystocia and birth injury).
- *Maternal*: reported maternal complications include:
  - increased risk of prolonged labour, trauma to the pelvic floor, vagina and perineum due to fetal macrosomia, caesarean section and postpartum haemorrhage (Olesen et al 2003; ACOG 2004; Briscoe et al 2005; Siozos & Stanley 2005; Caughey et al 2008b);
  - anxiety, particularly if the woman perceives her prolonged pregnancy as high risk (ACOG 2004; Heimstad et al 2007); and
  - potential harms from unnecessary interventions resulting from false-positive test results associated with increased fetal surveillance (Divon & Feldman-Leidner 2008).

9.2.2 Options in prolonged pregnancy

Policies vary on intervening in low-risk prolonged pregnancies. Offering labour induction after 41 weeks is recommended in the United Kingdom (NICE 2008) and the United States (ACOG 2004). Factors to be considered include the results of fetal assessment, favourability of the cervix (as assessed by Bishop's score), gestational age and the woman's preferences, after discussion of available alternatives and their risks and benefits (ACOG 2004; Norwitz et al 2007).

Summary of the evidence

Sweeping the membranes

Procedures for cervical ripening, such as membrane sweeping, may be of benefit in preventing prolonged pregnancy, particularly in first pregnancies (Mandruzzato et al 2010). Membrane sweeping

involves the health professional introducing a finger into the cervical os and 'sweeping' it around the circumference of the cervix during an vaginal examination, with the aim of separating the fetal membranes from the cervix and triggering the release of prostaglandins (NICE 2008).

A systematic review (n=2,797) (Boulvain et al 2005) found an association between membrane sweeping, and reduced frequency of pregnancy continuing beyond 41 weeks (RR: 0.59; 95%CI: 0.46–0.74) and 42 weeks (RR: 0.28; 95%CI: 0.15–0.50). The strength of the review was limited by small sample sizes and heterogeneity of the studies and possible publication bias for some outcomes. Subsequent RCTs have had inconsistent findings, with some confirming reduced prolonged pregnancy in low-risk women (de Miranda et al 2006; Yildirim et al 2010) and others finding no significant effect on pregnancy duration, particularly if performed before 41 weeks (Kashanian et al 2006; Hill et al 2008; Putnam et al 2011).

Membrane sweeping does not appear to increase the risk of maternal or fetal complications (eg infection) (Boulvain et al 2005; de Miranda et al 2006; Yildirim et al 2010) but is associated with discomfort during the procedure and other adverse effects (eg bleeding, irregular contractions) (Boulvain et al 2005).

Recommendation 33 **Grade C**

Consider offering membrane sweeping to women scheduled for formal induction of labour for prolonged pregnancy.

Acupuncture

A systematic review (n=212) (Smith & Crowther 2004) of studies with poor methodological quality, found limited evidence regarding the clinical effectiveness of acupuncture for induction of labour. Four additional small RCTS found that acupuncture was well tolerated but did not have significant clinical effects (Harper et al 2006; Smith et al 2008; Asher et al 2009; Modlock et al 2010).

Surveillance in prolonged pregnancy

Increased fetal and maternal surveillance aims to identify risk of adverse outcomes and ensure timely induction of labour if indicated (eg fetal compromise or oligohydramnios). There is no consensus about optimal fetal surveillance (ACOG 2004) and specialist referral or consultation is likely to be required.

Assessments may include cardiotocography, ultrasound scan to assess amniotic fluid volume, Doppler and/or biophysical profile (Morris et al 2003; Lam et al 2006; Singh et al 2008; Khooshideh et al 2009; Grivell et al 2010). Compared to using amniotic pool depth, using the amniotic fluid index increases the rate of diagnosis of oligohydramnios and the rate of induction of labor, without improvement in peripartum outcomes (Nabhan et al 2009). Cardiotocography or Doppler do not appear to be of significant benefit in predicting outcomes (Singh et al 2008).

Increased antenatal surveillance from 42 weeks gestation is recommended in the United Kingdom (NICE 2008) and the United States (ACOG 2004). For example ultrasound assessment of amniotic fluid volume and cardiotocography are used to evaluate fetal well-being. However, adverse fetal outcome in late pregnancy is not always predicted by these investigations and the relative risks and benefits of further prolonging the pregnancy should be evaluated in each case.

Induction

A recent Cochrane review (Gulmezoglu et al 2012) found that compared with a policy of expectant management, a policy of labour induction was associated with lower rates of (all-cause) perinatal deaths (RR: 0.31; 95%CI: 0.12–0.88), meconium aspiration syndrome (RR: 0.50; 95%CI: 0.34–0.73) and caesarean section (RR: 0.89; 95%CI 0.81–0.97). Most studies adopted a policy of induction at 41 weeks. Another systematic review with considerable overlap in the included studies had similar findings (Hussain et al 2011).

9.2.3 Discussing prolonged pregnancy

Advice is ideally provided from the 38-week antenatal visit onwards, while a woman is still under the care of a primary healthcare provider. This advice should include that:

- most women go into labour spontaneously by 42 weeks;
- the most common reason for a pregnancy becoming 'prolonged' is inaccurate dating;
- there are risks associated with pregnancies that last longer than 42 weeks;

- women with prolonged low-risk pregnancies may be offered membrane sweeping to 'trigger' labour;
- membrane sweeping involves the health professional separating the membranes from the cervix as part of a vaginal examination; it is safe but may cause discomfort and vaginal bleeding; and
- if pregnancy is prolonged, additional surveillance and management plans will be put into place following specialist consultation, to reduce the risk of adverse outcomes; and
- the importance of contacting a health professional promptly if they have any concerns about decreased or absent fetal movements (see Section 6.2.2).

Women should be appropriately counselled in order to make an informed choice between scheduled induction for a prolonged pregnancy or monitoring without induction (or delayed induction) (Gulmezoglu et al 2012).

9.2.4 Practice summary: prolonged pregnancy

When: At antenatal visits from 38 weeks onwards.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker.

- **Discuss the likelihood of prolonged pregnancy:** Explain to the woman that pregnancy beyond 42 weeks is unlikely if dating is accurate.
- **Discuss why interventions may be offered:** Explain that the risk of complications increases from 42 weeks gestation. Decisions about management are made after considering the risks and benefits and taking the woman's preferences into account.
- **Discuss the need for fetal surveillance:** Explain that increased fetal monitoring is necessary from 41 weeks, to ensure that there are no risks to the baby from the pregnancy continuing.
- **Take a holistic approach:** As well as the potential for women to experience anxiety if pregnancy is prolonged, consider practical difficulties (eg when the woman has travelled to give birth or arranged additional support around the estimated date of birth) and provide advice on relevant community supports (eg available financial assistance).

9.2.5 Resources

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Appendices

A Membership of the working committees

Name	Discipline and affiliation/s
Expert Advisory Committee (EAC)	
Professor Caroline Homer Co-Chair	Professor of Midwifery Centre for Midwifery, Child and Family Health, Faculty of Health University of Technology, Sydney
Professor Jeremy Oats Co-Chair	Chair Victorian Consultative Council on Obstetric and Paediatric Mortality and Morbidity Medical Co-Director, Integrated Maternity Services, Northern Territory Professorial Fellow, Melbourne School of Population and Global Health, University of Melbourne
Dr Steve Adair	Director, The Canberra Hospital Obstetric Department
Ann Catchlove[19]	Consumer representative President, Victorian Branch of The Maternity Coalition
Dr Marilyn Clarke	Obstetrician and gynaecologist
Professor Warwick Giles	Senior Staff Specialist, Maternal Fetal Medicine; Conjoint Professor Northern Clinical School University of Sydney Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Dr Jenny Hunt	Public Health Medical Officer Aboriginal Health and Medical Research Council
Professor Sue McDonald	Professor of Midwifery and Women's Health La Trobe University, Victoria
Dr Henry Murray	Fetomaternal Specialist Nepean Clinical School University of Sydney Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Associate Professor Ruth Stewart	Associate Professor Rural Medicine Director Rural Clinical Training and Support, James Cook University School of Medicine and Dentistry Australasian College of Rural and Remote Medicine
Dr Anne Sved Williams	Director, Perinatal and Infant Mental Health, Women's and Children's Health Network, South Australia Australasian and New Zealand College of Psychiatrists
Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care	
Dr Jenny Hunt Co-Chair	Public Health Medical Officer, Aboriginal Health and Medical Research Council
Dr Marilyn Clarke Co-Chair	Obstetrician and gynaecologist
Ms Simone Andy	Koori Maternity Strategy Victorian Aboriginal Community Controlled Health Organisation
Dr Lynore Geia	Adjunct Senior Lecturer (Clinical) School of Nursing, Midwifery & Nutrition James Cook University, Queensland
Ms Sue Hendy	Director of Women's, Children's & Youth Health, Western Sydney and Nepean Blue Mountains Local Health Networks

Name	Discipline and affiliation/s
Professor Sue Kildea	Chair of Midwifery, Australian Catholic University and Mater Mother's Hospital
Ms Leshay Maidment	Branch Manager, Congress Alukura
Associate Professor Katie Panaretto	Population Health Medical Officer, Centre for Indigenous Health, University of Queensland Queensland Aboriginal and Islander Health Council
Ms Gwen Wallenberg	Community Midwife, Thursday Island
Ms Arimaya Yates	Registered Midwife/ Research Officer Victorian Aboriginal Community Controlled Health Organisation
Working Group for Migrant and Refugee Women's Antenatal Care	
Associate Professor Ruth Stewart Chair	Associate Professor Rural Medicine Director Rural Clinical Training and Support James Cook University School of Medicine and Dentistry Australasian College of Rural and Remote Medicine
Dr Daniela Costa	General practitioner Fellow of the Royal Australian College of General Practitioners Member of the Management Committee of the Multicultural Communities Council of South Australia
Ms Andrea Creado	Chief Executive Officer, Ishar Multicultural Women's Health Centre
Dr Adele Murdolo	Executive Director, Multicultural Centre for Women's Health
Ms Natalija Nesvadba	Manager, Multicultural Services, Mercy Hospital for Women
Ms Assina Ntawumenya	Social Worker, Women's & Children's Health Network President of African Women's Federation, SA
Ms Jan Williams	Clinical Services Coordinator, Migrant Health Service South Australia
Project Officers	**Systematic literature reviewers**
Ms Jo Foster	Ms Wendy Cutchie
Ms Julie Hunter	Ms Marlene Eggert
Ms Pippa Robinson	Ms Julie Wheeler
Ms Deb Welsh	Ms Cecilia Xu
Methodological Consultant	
Ms Philippa Middleton	Australian Research Centre for Health of Women and Babies, Robinson Institute, the University of Adelaide
Technical Writers	
Ms Jenny Ramson	Ampersand Health Science Writing
Ms Elizabeth Hall	Ampersand Health Science Writing

B Terms of reference

Expert Advisory Committee

The Expert Advisory Committee will convene to:

1. provide advice, expertise and direction on the appropriateness of the guidelines to promote optimal care for pregnant women across Australia.
2. supervise the parties that are commissioned to:
    a. consult with a number of advisory groups to draft and review evidence-based guidelines as well as national and international literature on antenatal care with specific attention to the health needs of Aboriginal and Torres Strait Islander pregnant women and their families, migrant and refugee women their families and other vulnerable groups;
    b. consult widely to develop evidenced based guidelines that will function as a useful resource for health professionals and will be of interest and relevance to pregnant women and their families in a variety of Australian health care contexts;
    c. undertake analysis of harms and benefits in the Australian context and determine the costs/benefits and cost effectiveness of proposed interventions in accordance with available literature; and
    d. produce a dissemination plan for the implementation and determine a process for ongoing monitoring of clinical uptake of the guidelines; and
3. ensure the guidelines are developed in accordance with the National Health and Medical Research Council (NHMRC) protocols and are approved by the NHMRC.

Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care

The Working Group will:

1. provide advice, expertise and direction on the appropriateness of the Guidelines to promote optimal care for Aboriginal and Torres Strait Islander pregnant women across Australia;
2. review draft evidence-based Guidelines and provide advice to ensure relevance and applicability of the Guidelines to the cultural and health needs of Aboriginal and Torres Strait Islander pregnant women;
3. identify additional questions and appropriate sources of evidence;
4. identify appropriate sources of evidence relevant to guideline topics, additional to those identified in formal literature searches (this may include grey literature and other unpublished sources);
5. provide advice and draft practice points, where relevant;
6. provide advice to the technical writer regarding appropriate terminology and language used throughout the guideline document;
7. in consultation with the technical writer contribute to the drafting of a separate guidance around cultural and other issues relevant to antenatal care for Aboriginal and Torres Strait Islander women;
8. provide advice regarding the implementation of the Guidelines in settings where Aboriginal and Torres Strait Islander women receive pregnancy care;
9. identify areas and topics for future guideline documents; and
10. provide ideas for making guidelines as practical as possible.

Working Group for Migrant and Refugee Women's Antenatal Care

The Working Group will:

1. provide advice, expertise and direction on the appropriateness of the Guidelines to promote optimal care for migrant and refugee pregnant women across Australia;
2. review draft evidence-based Guidelines and provide advice to ensure relevance and applicability of the Guidelines to the cultural and health needs of migrant and refugee pregnant women;
3. identify additional questions and appropriate sources of evidence;
4. identify appropriate sources of evidence relevant to guideline topics, additional to those identified in formal literature searches (this may include grey literature and other unpublished sources);
5. provide advice and draft practice points, where relevant;
6. provide advice to the technical writer regarding appropriate terminology and language used throughout the guideline document;
7. in consultation with the technical writer contribute to the drafting of a separate guidance around cultural and other issues relevant to antenatal care for migrant and refugee women;
8. provide advice regarding the implementation of the Guidelines in settings where migrant and refugee women receive pregnancy care;
9. identify areas and topics for future guideline documents; and
10. provide ideas for making guidelines as practical as possible.

C Process report

Background

The development of national evidence-based antenatal care guidelines was one of four projects to improve child health and wellbeing approved in July 2005 by the Australian Health Ministers' Conference (AHMC) and the Community and Disability Services Ministers' Conference (CDSMC).

During 2006, a National Working Group engaged Women's Hospitals Australasia (WHA) to develop a report on existing antenatal care guidelines and how they might be adapted to Australian circumstances. This work was developed in consultation with key stakeholder groups across Australia. The report was endorsed by AHMC and CDSMC in July 2006. Ministers recognised, however, the need for further work to develop a guideline document that would be suitable for distribution and one that followed the key principles and processes outlined in the then current document *NHMRC Standards and Procedures for Externally Developed Guidelines (2007)*.

At this time the value of high quality antenatal care guidelines was recognised by the Council of Australian Governments (COAG) as an important part of the work undertaken by the COAG Human Capital Reform Agenda and the AHMC Maternity Collaboration project. More recently, antenatal care, and the importance of providing nurturing environments for children, underpins key elements of the productivity focus and work program of COAG, including the National Early Childhood Development Strategy. In addition, antenatal care for Aboriginal and Torres Strait Islander women and their families is a key element of the 'Closing the gap in Indigenous life expectancy' policy platform, being progressed through COAG, via the Indigenous Early Childhood Development National Partnership.

Governance

This project is co-sponsored by the Child Health and Wellbeing Subcommittee (CHWS), a subcommittee of the Australian Population Health Development Principal Committee (APHDPC) and the Maternity Services Inter-Jurisdictional Committee (MSIJC), a subcommittee of the Health Policy Priorities Principal Committee of the Australian Health Ministers' Advisory Council (AHMAC).

Objectives

The key objectives of the Guidelines, as approved by the APHDPC in February 2008 were to:

- undertake a systematic review of national and international literature on antenatal care and antenatal care guidelines to systematically identify and synthesise the best available scientific evidence on antenatal care;
- appraise and collate evidence on antenatal care and apply it to the Australian context;
- consider economic factors in aspects of care, for example cost effectiveness of proposed interventions, and identify future research trends;
- ensure appropriate stakeholder consultation throughout process;
- draft a set of antenatal care guidelines which are approved by the NHMRC; and
- make recommendations for the implementation and ongoing maintenance of the Guidelines.

Consultative principles

The following principles underpinned the project's consultative approach:

- each stage of the project was developed and completed at the direction of the EAC;
- the methodology for each stage of the project was consistent with the approach take in Module I of the Guidelines and a methodologist, Ms Philippa Middleton, provided advice on the evaluation and presentation of the evidence;
- extensive consultation (via email, secure website portal, teleconferences and face-to-face meetings) with key academics and professionals in the field and Aboriginal health workers and health professionals involved in antenatal care informed each element of the Guidelines and the development of consensus-based recommendations (where evidence was weak or lacking) and practice points (for aspects of care beyond the scope of the systematic literature review); and

- implications for implementation, including resource implications, cultural diversity, equity and access to services, informed the Guideline's recommendations to ensure that these can be achieved in a range of care contexts across Australia.

Cultural considerations — migrant and refugee women

With a view to improved health outcomes for migrant and refugee women and babies, a key objective was to ensure that the Guidelines are relevant, appropriate and applicable to migrant and refugee women. To achieve this objective the EAC implemented the following strategies:

- establishment of the Working Group for Migrant and Refugee Women's Antenatal Care to provide advice and guidance to the EAC throughout the guideline development process;
- inclusion of discussion about cultural safety for migrant and refugee women;
- inclusion of specific input/advice relevant to identified characteristics or risk factors for pregnant migrant and refugee women;
- review of the wording and expression of all recommendations to ensure they are inclusive of the needs and experiences of migrant and refugee women;
- consultation on the draft Guidelines with relevant multicultural stakeholders; and
- articulation of implementation issues relevant to migrant and refugee women and those providing antenatal care.

Overview of methodology

The methods and tools used in the development of the Guidelines built on the National Working Group report, completed by the WHA in 2006, used the ADAPTE *Manual for Guideline Development Version 1.0* (2007) to identify a reference guideline and thereafter followed the key principles and processes outlined in the document key principles and processes outlined in the document *Procedures and Requirements for Meeting the 2011 NHMRC Standard for Clinical Practice Guidelines*. The key steps in the guideline development process are outlined in Table C1.

Table C1: Key steps in the guideline development process

Module I	
1	Initial detailed scope of the Guidelines identified including topics to be included and research questions
2	Systematic search undertaken for existing antenatal care guidelines in the national and international arena
3	Retrieved guidelines screened to select guidelines for further appraisal
4	AGREE appraisals of selected guidelines completed
5	Guideline(s) to use as a reference determined
6	Reference guideline(s) currency assessed
Modules I and II	
7	Topics and research questions prioritised to finalise scope and cross referenced with questions and recommendations from reference guideline
8	Reference guideline(s) content (recommendations matrices) assessed
9	Systematic literature search and review undertaken to: • answer research questions not covered in the reference guideline; and • update evidence tables (where new evidence exists)
10	Evidence tables prepared using reference guideline evidence and updated evidence (if relevant) following the key principles and processes outlined in the document *Procedures and Requirements for Meeting the 2011 NHMRC Standard for Clinical Practice Guidelines*
11	Topics and questions that require economic evaluation identified and work contracted
12	EAC provided with evidence tables (comprising reference guideline evidence and recommendations and updated evidence) and Evidence Statement/ Matrix (adapted from NHMRC *Levels of Evidence and Grades for Recommendations for Developers of Guidelines* [2009])

13	Evidence tables and evidence statement reviewed by EAC and advice provided on clinical impact and implementation issues, including applicability to the Australian context
14	Where evidence was sufficient to support recommendations, recommendations formulated and graded by EAC
15	Where evidence was weak or lacking, consensus-based recommendations formulated by EAC
16	Where advice was needed but the area was beyond the scope of the literature review, practice points developed by EAC
17	Draft Guidelines, a document that respects the needs of the end users and provides a detailed transparent explanation of the process and with implementation issues considered, prepared
18	Draft Guidelines reviewed by EAC
19	Draft Guidelines reviewed by Working Group for Aboriginal and Torres Strait Islander Care Women's Antenatal Care and additional practice points developed
20	Draft Guidelines reviewed by Working Group for Migrant and Refugee Women's Antenatal Care and additional practice points developed
21	Public consultation

Managing conflict of interest

A robust and transparent system was used to manage conflict of interest throughout the development of the draft Guidelines. All members were asked to complete declaration of interest forms before acceptance onto the EAC, and requested to advise the Chairs of the EAC of any competing interests if these arose during the development of the Guidelines. A review of potential conflicts of interest was undertaken at every committee meeting.

The only conflicts of interest identified involved members being authors of studies included in the evidence base for a recommendation. When this was the case, this was noted and the member did not participate in grading of the evidence.

Process

The development of the draft Guidelines has followed the key principles and processes outlined in the document *Procedures and Requirements for Meeting the 2011 NHMRC Standard for Clinical Practice Guidelines*.

The ADAPTE framework was used to identify and appraise relevant international and national guidelines. Following appraisal of identified guidelines using the Appraisal of Guidelines Research and Evaluation (AGREE) instrument, the NICE (2008) *Antenatal Care. Routine Care for the Healthy Pregnant Woman* were selected as a reference guideline. Following review of the evidence (see Appendix D), the grading of evidence and recommendations followed the NHMRC *Levels of Evidence and Grades for Recommendations for Developers of Guidelines* (NHMRC 2009). Consensus by the EAC on the grading of the systematic literature review evidence was achieved for all items and recorded in detailed summary sheets used to form the basis of the EAC's decisions about which recommendations were appropriate to develop, and the subsequent grading of these recommendations.

Consensus-based recommendations were developed where insufficient evidence was identified to support a recommendation.

Practice points (PPs) were developed to cover areas that were beyond the scope of the systematic literature reviews but where practical advice is needed.

The process of the systematic literature reviews is discussed in more detail in Appendix D.

Public consultation

The draft Guidelines were released for a 30-day public consultation, as required in the *NHMRC Act*, 1992 (as amended), on 3 June 2013. The consultation period was extended until 14 July and 40 submissions were received.

Key themes raised in submission and changes made to incorporate these are listed below.

- *Migrant and refugee women* — Additional practice points included to highlight the importance of using accredited interpreters and involving multicultural health workers.
- *Mental health* — Additional practice points included to highlight the importance of continuity of care and the need for ongoing assessment for emotional/mental health problems throughout the pregnancy.
- *Partner involvement* — Involvement of womens' partners in antenatal education and other aspects of care further emphasised.
- *Parenting education* — Some submissions suggested including a recommendation on antenatal couple education programs. The evidence was reviewed and was not considered strong enough to support a recommendation.
- *Fetal growth assessment* — The section was revised to include more detail on the technique of measuring symphysis-fundal height and information on the use of customised fetal growth charts. A practice point on further investigation when intratuterine growth restriction is suspected was included.
- *Prolonged pregnancy* — The section was reviewed by a small group of EAC members and the text amended to better reflect the available evidence.
- *Diabetes* — A section on screening for diabetes was included.
- *Duplication between modules* — There was comment in some submissions about repetition between Module I and II. Following the release of Module I, the section on migrant and refugee women was revised to include input from a newly formed Working Group for Migrant and Refugee Women's Antenatal Care. The sections on women with mental health disorders and the content of the first antenatal visit were also revised following further input from members of the EAC. For this reason, these sections have been repeated in Module II. Versions from Module II will be included in any future combined volume.

Implementation

The following multidisciplinary team will contribute to the design and execution of strategies aiming to increase the uptake of the Guidelines through liaison with their professional groups and promotion of the recommendations:

- Prof Sue McDonald (Chair) (Professor of Midwifery La Trobe University/ Mercy Hospital for Women);
- Dr Steve Adair (Director, The Canberra Hospital Obstetric Department);
- Dr Andrew Bisits (Lead Clinician, Birthing Services, Royal Hospital for Women, Sydney);
- Ms Ann Catchlove (consumer representative);
- Ms Sue Hendy (Director of Women's, Children's and Youth Health, Nepean Blue Mountains and Western Sydney Local Health Networks);
- Assoc Prof Danielle Mazza, Department of General Practice, Monash University;
- Ms Philippa Middleton (methodological adviser); and
- Assoc Prof Ruth Stewart (Director Parallel Rural Community Curriculum, School of Medicine Deakin University, Australian College of Rural & Remote Medicine Representative).

Professor Jeremy Oats (Chair Victorian Consultative Council on Obstetric and Paediatric Mortality and Morbidity, Medical Co-Director Integrated Maternity Services, Northern Territory) and Professor Caroline Homer (Professor of Midwifery, Child and Family Health University of Technology, Sydney) will act as *ex officio* members. Members of the Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care and the Working Group for Migrant and Refugee Women's Antenatal Care will contribute to the implementation plan for the Guidelines, because of the need to specifically consider

and develop strategies for implementation in the full range of specific settings and contexts where Aboriginal and Torres Strait Islander women receive care.

The EAC includes a number of members in positions of influence within various organisations and government departments. Similarly, the Maternity Services Inter-jurisdictional Committee and Child Health and Wellbeing Subcommittee are well-placed to effect change in clinical and regulatory environments.

Key messages for dissemination and implementation

Central to the dissemination and implementation plan is the identification of key messages resulting from the Guidelines, which will be prioritised for communication and implementation. High priority will be given to recommendations that have:

- strong evidence underpinning the recommendation;
- an identified gap or need for a change to current practice;
- an identified burden of care including the number of women and babies likely to be affected by implementation of the recommendation; or
- cost implications.

Key priorities for the Australian context will be based on identified gaps in current practice and where wide variations in clinical practice currently exist.

Dissemination

There will be a web-based approach to dissemination whereby the Guidelines are published on the DoHA website.

Implementation strategies: facilitating uptake of the disseminated Guidelines

A range of strategies, harnessing the multidisciplinary team of opinion leaders involved in the development of the Guidelines, will be employed, informed in some cases by an assessment of the likely barriers to uptake of the prioritised recommendations. Potential implementation strategies include:

- education through meetings, conferences and presentations;
- outreach education; and
- opinion leaders — EAC endorsement.

Key messages from the Guidelines may also be implemented through a number of existing initiatives.

Monitoring uptake of the Guidelines

The extent to which the Guidelines have influenced practice and policy may be monitored in a number of ways. Selected indicators are reported on annually by all States and Territories, through the National Policy Response to the Children's Headline Indicators.

- The *Headline Indicators for Children's Health, Development and Wellbeing* of the AHMC, the CDSMC and the Australian Education, Early Childhood Development and Youth Affairs Senior Officials Committee provides measurements suitable for defining the current situation. Indicators related to antenatal care are: smoking in pregnancy; low birth weight; and infant mortality (noting that this indicator measures the number of deaths of live-born infants less than one year of age).
- The Australian Institute of Health and Welfare also publishes a number of indicators in this area (eg infant mortality rate).
- The COAG "Closing the Gap" initiative provides indicators relevant to antenatal care for Aboriginal and Torres Strait Islander people.

D Review of the evidence

The NICE 2008 guidelines *Antenatal Care. Routine Care for the Healthy Pregnant Woman* were used as the reference guidelines for this project based on their quality as assessed using the AGREE instrument. The review methodology employed by NICE is outlined in Section 1.6 of the NICE guidelines (see also http://guidance.nice.org.uk/CG/WaveR/57). For these Guidelines, separate systematic literature reviews were conducted for each clinical chapter. For most clinical areas relevant research questions had been considered in the NICE guidelines. The studies identified by NICE were included in the evidence tables and regraded according to the NHMRC *Levels of Evidence and Grades for Recommendations for Developers of Guidelines* (2009). Searches were then conducted to bring the literature review up to date. This appendix provides a brief summary of this process.

Process of the systematic literature reviews

Research questions

For each clinical topic, research questions were developed by the EAC based on the relevant research questions used in the NICE guidelines. The groups contracted to undertake reviews of the evidence related to these questions used a systematic method of literature searching and selection.

Search strategies

Searches were conducted in Medline, EMBASE, PsycInfo, Informit, Australian Medical Index and the Cochrane Database of Systematic Reviews. Search terms were searched for as keywords, exploded where possible, and as free text within the title and/or abstract, in the EMBASE and Medline databases, with modifications to suit the keywords and descriptors of other search platforms. The reference lists of included papers were reviewed to identify any peer-reviewed evidence that may have been missed in the literature search.

Appraisal of the evidence

Abstracts of studies within the review period and in English were reviewed. Exclusion criteria included:

- already included in NICE guidelines;
- not specific to target population (eg specific to non-pregnant women or high-risk women only);
- does not answer research question;
- does not meet criteria for grading (eg no outcomes reported or high risk of bias); and
- narrative review or opinion paper (editorial, letter, comment).

Evidence included in the reviews was graded as per NHMRC designations (see Table D1).

Table D1: Designations of levels of evidence according to type of research question

Level	Intervention	Diagnostic accuracy	Prognosis	Aetiology	Screening intervention
I	Systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies
II	A randomised controlled trial	A study of test accuracy with an independent, blinded comparison with a valid reference standard, among consecutive persons with a defined clinical presentation	A prospective cohort study	A prospective cohort study	A randomised controlled trial
III-1	Pseudorandomised trial	A study of test accuracy with independent, blinded comparison with a valid reference standard, among non-consecutive persons with a defined clinical presentation	All or none	All or none	Pseudorandomised controlled trial (ie alternate allocation or some other method)
III-2	A comparative study with concurrent controls: • Non-randomised experimental trial • Cohort study • Case-control study • Interrupted time series with control group	A comparison with reference standard that does not meet the criteria required for Level II and III-1 evidence	Analysis of prognostic factors amongst persons in a single arm of a randomised controlled trial	A retrospective cohort study	A comparative study with concurrent controls: ▪ Non-randomised, experimental trial ▪ Cohort study ▪ Case-control study
III-3	A comparative study without concurrent controls: ▪ Historical control study ▪ Two or more single arm study ▪ Interrupted time series without parallel control	Diagnostic case-control study	A retrospective cohort study	A case-control study	A comparative study without concurrent controls: Historical control study Two or more single arm study
IV	Case series with either post-test or pre-test/post-test outcomes	Study of diagnostic yield (no reference standard)	Case series, or cohort study of persons at different stages of disease	A cross-sectional study or case series	Case series

Source: *NHMRC Levels of Evidence and Grades of Recommendations for Developers of Guidelines* (NHMRC 2009).

Grading of the evidence

Grading of the body of evidence involved:

- review of the evidence base, including the number of studies, level of evidence and quality of studies (eg risk of bias), and consistency across studies;
- examination of the effect size, the relevance of the evidence base to the research question and whether the risks and benefits had been considered in terms of clinical impact; and
- judgement by members of the EAC of the generalisability of the body of evidence to the target population for the Guidelines and the applicability of the body of evidence to the Australian healthcare context, taking into account feasibility issues (workforce, geographical distance, cost) and existing health care systems.

The Evidence Statement Form/Matrix (adapted from *NHMRC Levels of Evidence and Grades for Recommendations for Developers of Guidelines* [2009]) was used for each research question addressed. The form was used as the basis of discussion regarding the key components, which were rated according to the matrix shown in Table D2. Conflicts of interest (eg where an EAC member was author of evidence under consideration) were declared at the commencement of discussion of each topic. Barriers to implementing the recommendations and support required for successful uptake of the Guidelines, were noted on the Form.

Table D2: Components of body of evidence considered when grading each recommendation

Evidence base	**A**	One or more level I studies with a low risk of bias or several level II studies with low risk of bias
	B	One or two level II studies with a low risk of bias or systematic review/several level III studies with a low risk of bias
	C	One or two level III studies with a low risk of bias or level I or II studies with a moderate risk of bias
	D	Level IV studies or level I to III studies/systematic review with a high risk of bias
Consistency	**A**	All studies consistent
	B	Most studies consistent and inconsistency can be explained
	C	Some inconsistency, reflecting genuine uncertainty around question
	D	Evidence in inconsistent
	NA	Not Applicable – one study only
Clinical Impact	**A**	Very large
	B	Moderate
	C	Slight
	D	Restricted
	UD	Unable to be determined
Generalisability	**A**	Evidence directly generalisable to target population
	B	Evidence directly generalisable to target population with some caveats
	C	Evidence not directly generalisable to target population but could be sensibly applied
	D	Evidence not directly generalisable to target population and hard to judge whether it is sensible to apply
Applicability	**A**	Evidence directly applicable to Australian healthcare context
	B	Evidence applicable to Australian healthcare context with few caveats
	C	Evidence probably applicable to Australian healthcare context with some caveats
	D	Evidence not applicable to Australian healthcare context

Source: *NHMRC Levels of Evidence and Grades of Recommendations for Developers of Guidelines* (NHMRC 2009).

Formulating and grading of recommendations

The systematic reviewers provided grades for the evidence base and consistency of the evidence. EAC members then applied grades for the clinical impact, generalisability and applicability of the evidence. The overall grade of the evidence was then determined, based on a summation of the rating for each individual component of the body of evidence. Where NICE recommendations were used, these were adapted to the Australian context and language used in the Guidelines. If there was no NICE recommendation or recent evidence required a change to the recommendation, these were formulated by EAC members. Initial wording of recommendations was agreed by a quorum of the EAC and recommendations were then circulated to all members and further discussed at a teleconference. All recommendations were then reviewed by the Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care and the Working Group for Migrant and Refugee Women's Antenatal Care.

Consensus-based recommendations

Consensus-based recommendations were formulated when a systematic review of the evidence was conducted but no good quality evidence identified. Initial wording of consensus-based recommendations was agreed by a quorum of the EAC and recommendations were then circulated to all members and further discussed at a teleconference. All recommendations were then reviewed by the Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care and the Working Group for Migrant and Refugee Women's Antenatal Care.

Practice points

Practice points were developed to cover areas that were beyond the scope of the systematic reviews but where it was determined by the EAC that practical advice is needed. The formulation of practice points involved a process of:

- identifying areas where advice was required or practice points were needed as adjuncts/corollaries of recommendations and/or other practice points; and
- discussion of a practice point by members of the EAC, the Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care and the Working Group for Migrant and Refugee Women's Antenatal Care until consensus on the wording was reached.

Limitations of the review methodology

This review used a structured approach to reviewing the literature. However, all types of study are subject to bias, with systematic reviews being subject to the same biases seen in the original studies they include, as well as to biases specifically related to the systematic review process. Reporting biases are a particular problem related to systematic reviews and include publication bias, time-lag bias, multiple publication bias, language bias and outcome reporting bias (see Glossary).

Some of these biases are potentially present in these reviews. Only data published in peer-reviewed journals were included. Unpublished material was not included as such material typically has insufficient information upon which to base quality assessment, and it has not been subject to the peer-review process. In addition, the search was limited to English-language publications only, so language bias is also a potential problem. Outcome reporting bias and inclusion criteria bias are unlikely as the methodology used in the review and the scope of the review was defined in advance.

The studies were initially selected by examining the abstracts of these articles. Therefore, it is possible that some studies were inappropriately excluded prior to examination of the full text article. However, where detail was lacking, ambiguous papers were retrieved as full text to minimise this possibility.

Summary of systematic literature reviews

The following tables provide a summary of the NICE recommendation (where relevant), the research questions, search strategy and findings of each review, recommendations and their supporting references, and consensus-based recommendations where these were developed.

Core practices in antenatal care

Antenatal visits

NICE recommendation
A schedule of antenatal appointments should be determined by the function of the appointments. For a woman who is nulliparous with an uncomplicated pregnancy, a schedule of ten appointments should be adequate. For a woman who is parous with an uncomplicated pregnancy, a schedule of seven appointments should be adequate. [B] Each antenatal appointment should be structured and have focused content. Longer appointments are needed early in pregnancy to allow comprehensive assessment and discussion. Wherever possible, appointments should incorporate routine tests and investigations to minimise inconvenience to women. [D]
Research question
1. What is the content and timing of antenatal visits after the first trimester? [Informed narrative]

Search strategy

Date of search: 12 October 2012
Publication date range: 2003–2012
Databases searched: Medline, Embase, CINHAL
Search terms: schedule, visits, timing, frequency, checks, tests, content, screening, safety, second trimester, third trimester, advice, outcomes, expectations, anxiety, satisfaction, Aboriginal, Indigenous, population specific
Limits: English
Final number of references included: 27

Review findings

Recommendations on antenatal visits included in Module I. Insufficient evidence to support additional recommendations.

Preparing for pregnancy, childbirth and parenthood

NICE recommendation

Pregnant women should be offered opportunities to attend participant-led antenatal classes, including breastfeeding workshops.

Research questions

1. What is the effectiveness of antenatal classes as preparation for pregnancy, childbirth and parenting? [Informed Recommendations 1 and 2]
2. What formal antenatal education strategies are most effective? [Informed narrative]

Search strategy

Date of search: 5 December 2012
Publication date range: 2003–2012
Databases searched: Medline (OVID), Embase, CINHAL (EBSCOHost), Scholar
Search terms: Generic search terms: "evidence based"; pregnan*; antenatal*; prenatal*; perinatal*; "socio-economic"; Topic specific terms: Childbirth education; Antenatal education; Mothers; Fathers; Psychosocial factors; Pregnancy; Physician; Childcare; Natural Childbirth; Psychoprophylaxis; Active birth; Teaching; Didactic; Experiential; Multicultural; Non-English speaking, Migrant; Transcultural; Low income; Vision impaired; Hearing impaired; conventional; Computer assisted, Internet based; Indigenous; Aboriginal; Torres Strait Islander; Effectiveness; Maternal role transition; Midwives; Empowerment; Health education; Health literacy; Depression; Coping strategies
Limits: English
Number of references included: 33

Review findings

Antenatal education may have an effect on knowledge and the experience of birth but does not influence birth outcomes.
Antenatal education that includes a psychological component may reduce the risk of postnatal depression at 6 weeks.

EAC recommendation 1

Advise parents that antenatal education programs are effective in providing information about pregnancy, childbirth and parenting but do not influence mode of birth.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
A	B	C	B	B	**B**

Supporting evidence (see Section 0)

Maestas 2003; Escott et al 2005; Fabian et al 2005; Gagnon & Sandall 2007; Ahmadian heris et al 2009; Bergstrom et al 2009; Ip et al 2009; Lauzon & Hodnett 2009; Phipps et al 2009; Artieta-Pinedo et al 2010; Maimberg et al 2010; Mirmolai et al 2010; Simpson et al 2010; Lumluk & Kovavisarach 2011; Ferguson et al 2012; Hesselink et al 2012

EAC recommendation 2

Include psychological preparation for parenthood as part of antenatal care as this has a positive effect on women's mental health postnatally.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
B	B	C	B	B	**B**

Supporting evidence (see Section 0)

Ngai et al 2009; Matthey et al 2004; Goa et al 2010; Kozinszky et al 2012

Preparing for breastfeeding

NICE recommendation

There is evidence from RCTs that breastfeeding initiation rates and, in some instances, breastfeeding duration can be improved by antenatal breastfeeding education, particularly if this is interactive and takes place in small informal groups. One-to-one counselling and peer support antenatally are also effective. [Evidence summary]

Research questions

1. What impact does the provision of information during pregnancy have on the initiation and duration of breastfeeding? [Informed Recommendation 3]
2. What impact do different models of antenatal care and/or education have on breastfeeding? [Informed narrative]
3. What breastfeeding advice should women receive and when should this be given? [Informed narrative]

Search strategy

Date of search: 13 March, 2012
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: Perinatal Care; Prenatal Care ;Pregnancy Trimesters; Pregnancy Trimester, Third; Pregnancy Trimester, Second; Pregnancy; Breastfeeding initiat*; Breastfeeding preparation; Health advice/ education /information/ counselling on antenatal/prenatal breastfeeding; Models of prenatal/antenatal care, continuity care/carer; Inverted nipples, antenatal expressing, Colostrum; Indigenous/Aboriginal
Number of references included: 34
Date of top-up search: 29 October 2012
Number of additional references included: 3

Review findings

Antenatal breastfeeding promotion can be effective in increasing initiation rates and duration of breastfeeding.

EAC recommendation 3

Routinely offer education about breastfeeding as part of antenatal care.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
A	C	B	B	B	**C**

Supporting evidence (see Section 4.3.6)

Dyson et al 2005; Renfrew et al 2005; Chung et al 2008; Lumbiganon et al 2011

Lifestyle considerations

Nutrition

NICE recommendations

Iron supplementation should not be offered routinely to all pregnant women. It does not benefit the mother's or fetus's health and may have unpleasant maternal side effects. [A]
Pregnant women should be informed that vitamin A supplementation (intake greater than 700 micrograms) might be teratogenic and therefore it should be avoided. Pregnant women should be informed that, as liver and liver products may also contain high levels of vitamin A, consumption of these products should also be avoided. [C]
Pregnant women should be offered information on how to reduce the risk of listeriosis [D]
Pregnant women should be offered information on how to reduce the risk of salmonella infection. [D]

Research questions

1. What dietary advice should be provided to women in pregnancy, including population specific groups? [Informed Recommendations 4 and 5 and narrative]
2. Which foods should be avoided during pregnancy? [Informed Recommendation 4 and narrative]

Search strategy

Date of search: 31 July 2012
Publication date range: 2003–2012
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: diet, dietary intake, safe food, unsafe food, nutrition, supplements, nutrients, balanced diet, cheese, pate, liver, salami, cured meat, raw shellfish, fish, mercury, listeriosis, salmonella
Date of top-up search: 21 December 2012
Number of references included: 38

Review findings

There is insufficient evidence to confirm or refute the effectiveness of caffeine avoidance on birth weight or other pregnancy outcomes.
Daily or intermittent iron supplementation reduces the risk of iron deficiency, with fewer side effects associated with intermittent supplementation.
There is insufficient evidence that supplements of vitamins A, C and E are beneficial during pregnancy and some evidence that they cause harm.

EAC recommendation 4

Reassure women that small to moderate amounts of caffeine are unlikely to harm the pregnancy.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
C	C	C	B	B	**C**

Evidence supporting recommendation (see Section 5.1.6)

Jahanfar & Sharifah 2009; Milne et al 2011

EAC recommendation 5

Advise women with low dietary iron intake that intermittent supplementation is as effective as daily supplementation in preventing iron-deficiency anaemia, with fewer side effects.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
A	B	B	B	B	**B**

Evidence supporting recommendation (see Section 5.1.6)

Pena-Rosas et al 2012a; 2012b

Physical activity

NICE recommendations

Pregnant women should be informed that beginning or continuing a moderate course of exercise during pregnancy is not associated with adverse outcomes [A].

Pregnant women should be informed of the potential dangers of certain activities during pregnancy, for example, contact sports, high-impact sports and vigorous racquet sports that may involve the risk of abdominal trauma, falls or excessive joint stress, and scuba diving, which may result in fetal birth defects and fetal decompression disease [D].

Research questions

1. What exercises are of benefit during pregnancy? [Informed Recommendation 6]
2. What exercises are associated with adverse maternal and perinatal outcomes? [Informed narrative]
3. What advice should women be given in relation to exercise during pregnancy? [Informed narrative]

Search strategy

Date of search: 16 September 2011
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: pregnancy/pregnancy trimesters/MH pregnancy trimester, second/MH pregnancy trimester, third/ MH pregnancy trimesters/ MH prenatal care/pregnancy, prolonged/MH perinatal care, physical activity/fitness/performance, high impact/contact/aquatic/endurance/extreme sports/sports+, abdominal/upper extremity/aerobic exercises, muscle strengthening, dance/dancing, yoga, pilates, etc
Number of references included: 74
Date of top-up search: 19 October 2012
Number of additional references included: 21

Review findings

There is high level evidence that physical activity during pregnancy improves or maintains physical fitness, improves health-related quality of life.

There is mixed evidence on the role of physical activity in preventing excessive gestational weight gain, with a greater effect among women who are overweight or obese or when physical activity is combined with dietary intervention.

EAC recommendation 6

Advise women that low to moderate-intensity physical activity during pregnancy is associated with a range of health benefits and is not associated with adverse outcomes.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
A	B	B	A	A	**B**

Evidence supporting recommendation (see Section 5.2.5)

Kramer & McDonald 2006; Montoya Arizabaleta et al 2010; Barakat et al 2011; Ramírez-Vélez et al 2011; Robledo-Colonia et al 2012

Sexual activity

NICE recommendation

Pregnant woman should be informed that sexual intercourse in pregnancy is not known to be associated with any adverse outcomes. [B]

Research questions

1. What are benefits or risks associated with sexual activity during pregnancy? [Informed Recommendation 7]
2. What advice should women receive regarding sexual activity during pregnancy? [Informed narrative]

Search strategy

Date of search: 27 September 2011
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: Perinatal Care; Prenatal Care ;Pregnancy Trimesters; Pregnancy Trimester, Third; Pregnancy Trimester, Second; Pregnancy; postcoital/ post-coital/ post coital; pelvic circulat*; nipple stimulat*; sexually arous*; sexual arous*; sexual enjoy*; sex* desire; Orgasm; Sexual Behavior; Coitus; Masturbation; Sexual Abstinence; Sexuality; Coitus Interruptus ; Anal Intercourse; Oral Sex; Sexual Satisfaction; sexual intercourse (human); female orgasm; anus intercourse; copulation; fisting (sex); mating; oral sexual contact; sexual intercourse; sexual satisfaction
Number of references included: 13
Date of top-up search: 19 October 2012
Number of additional references included: 0

Review findings

Sexual activity during pregnancy is not associated with adverse outcomes.

EAC recommendation 7

Advise pregnant women without complications that sexual activity in pregnancy is not known to be associated with any adverse outcomes.

Evidence Grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
B	B	C	B	B	**B**

Evidence supporting recommendation (see Section 5.3.5)

Sayle et al 2001; Schaffir 2006; Yost et al 2006; Tan et al 2009; Kontoyannis et al 2011

Travel

NICE recommendations

Pregnant women should be informed about the correct use of seatbelts (that is, three-point seatbelts "above and below the bump, not over it"). [B]
Pregnant women should be informed that long-haul air travel is associated with an increased risk of venous thrombosis, although whether or not there is additional risk during pregnancy is unclear. In the general population, wearing correctly fitted compression stockings is effective at reducing the risk. [B]
Pregnant women should be informed that, if they are planning to travel abroad, they should discuss considerations such as flying, vaccinations and travel insurance with their midwife or doctor. [Good practice point]

Research questions

1. What are the risks for long haul air travel during pregnancy? [Informed Recommendation 9]
2. What are the risks for car travel during pregnancy? [Informed Recommendation 8]
3. What advice should pregnant women receive who are planning to travel abroad during pregnancy? [Informed Recommendation 10]

Search strategy

Date of search: 20 June 2012
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cinahl.
Search terms: Transportation, automobile, driving, trauma, seatbelts, airbags, accidents, traffic, car safety, Vaccines, immunisation, malaria
Number of references included: 23
Date of top-up search: 10 January 2013
Number of additional references included: 4

Review findings

New evidence supports the NICE guidance on seat belts and long-distance air travel during pregnancy. There is evidence of low levels of knowledge about correct use of seat belts and risks associated with long-distance air travel. There is evidence to support the use of insecticide-treated bed nets to prevent malaria.

EAC recommendation 8

Inform pregnant women about the correct use of seat belts — that is, three-point seat belts 'above and below the bump, not over it'.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
D	C	B	A	A	**B**

Evidence supporting recommendation (see Section 5.4.5)

Hyde 2003; McGwin et al 2004a; 2004b; Beck et al 2005; Jamjute et al 2005; Taylor et al 2005; Sirin et al 2007; Klinich et al 2008; Motozawa et al 2010

EAC recommendation 9

Inform pregnant women that long-distance air travel is associated with an increased risk of venous thrombosis, although it is unclear whether or not there is additional risk during pregnancy.

Evidence Grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
D	C	C	A	A	**C**

Evidence supporting recommendation (see Section 5.4.5)

Kingman & Economides 2003; Voss et al 2004

EAC recommendation 10

If pregnant women cannot defer travel to malaria-endemic areas, advise them to use insecticide-treated bed nets.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
A	NA	B	A	A	**B**

Evidence supporting recommendation (see Section 5.4.5)

Gamble et al 2006; Jacquerioz & Croft 2009

Clinical assessments

Fetal development and anatomy

NICE recommendation

Ultrasound screening for fetal anomalies should be routinely offered, normally between 18 weeks 0 days and 20 weeks 6 days.

Research questions

1. What is the diagnostic value and effectiveness of performing the 18–20 week ultrasound scan? [Informed Recommendation 11]
2. What are the additional needs of population specific groups? [Informed narrative]

Search strategy

Date of search: December 2011
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cinahl.
Search terms: ultrasound, amniotic fluid, uterine artery, placenta, abnormalities, congenital, fetal development, predictive, sensitivity, specificity
Number of references included: 27
Date of top-up search: 9 January 2013
Number of additional references included: 7

Review findings

The 18–20 week ultrasound scan is effective in assessing growth, detecting fetal abnormalities and identifying placental location.

EAC recommendation 11

Offer pregnant women ultrasound screening to assess fetal development and anatomy between 18 and 20 weeks gestation.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
B	B	C	A	A	**B**

Supporting evidence (see Section 6.1.6)

Cristina et al 2005; Norem et al 2005; Perri et al 2005; Del Bianco et al 2006; Saltvedt et al 2006; Westin et al 2006; Cargill et al 2009; Fadda et al 2009; Kfir et al 2009; Stalberg et al 2009; Hildebrand et al 2010; Whitworth et al 2010

Fetal growth and wellbeing

NICE recommendations

There is a lack of good-quality evidence on the diagnostic value of clinical examination/abdominal palpation. The available evidence indicates that clinical examination/abdominal palpation does not have good diagnostic value for predicting SGA babies. [Evidence summary]

Routine formal fetal-movement counting should not be offered. [A]

Auscultation of the fetal heart may confirm that the fetus is alive but is unlikely to have any predictive value and routine listening is therefore not recommended. However, when requested by the mother, auscultation of the fetal heart may provide reassurance. [D]

The evidence does not support the routine use of antenatal electronic fetal heart rate monitoring (cardiotocography) for fetal assessment in women with an uncomplicated pregnancy and therefore it should not be offered. [A]

Research questions

Fetal growth (Abdominal palpation)

1. What is the predictive and diagnostic accuracy of performing abdominal palpation for determining fetal growth and wellbeing? [Informed narrative]
2. What are the benefits and risks of performing an abdominal palpation at each antenatal visit? [Informed narrative]
3. At what gestation is abdominal palpation effective and/or accurate? [Informed narrative and Recommendation 31]

Fetal movements

1. What is considered to be a normal fetal movement pattern? [Informed narrative]
2. What is the diagnostic accuracy of using a fetal kick chart? [Informed narrative]
3. What advice should be provided to women who report a change in fetal movement pattern? [Informed narrative]

Fetal heart rate (Routine auscultation)

1. What is the definition of routine auscultation? [No evidence identified]
2. What is the predictive and diagnostic accuracy of performing auscultations? [Informed narrative]
3. When is it appropriate to perform routine auscultation? [Informed narrative]

Search strategies

Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl
Limits: English language

Abdominal palpation

Date of search: 29 August 2012
Publication date range: 2003–2012
Search terms/key words: Perinatal Care; Prenatal Care; Pregnancy Trimesters; Pregnancy Trimester, Third; Pregnancy Trimester, Second; Pregnancy; Abdominal palpation; Abdominal pain; Abdomen examination; Fetal/foetal presentation; Fetal/foetal position; Fetal/foetal lie; Fetal/foetal growth; Fetal/foetal wellbeing; Engagement; Symphyseal fundal height (SFH)
Number of references included: 11
Date of top-up search: 6 November 2012
Number of additional references included: 0

Fetal movements

Date of search: 19 April 2012
Publication date range: 2003–2012
Search terms/key words: Perinatal Care; Prenatal Care; Pregnancy Trimesters; Pregnancy Trimester, Third; Pregnancy Trimester, Second; Pregnancy; Kick child; Movement; Activity; Pattern; Kick-chart; Movement chart; Excessive/ reduced fetal movement; Kicks; Advice; BPP (Biophysical Profile)
Number of references included: 19
Date of top-up search: 25 October 2012
Number of additional references included: 1

Routine auscultation

Date of search: 16 August 2012
Publication date range: 2003–2011
Search terms/key words: Auscultation, heart, fetal, pregnancy, antenatal, prenatal, pregnancy, disease, cardiotoco*, CTG
Number of references included: 3
Date of top-up search: 15 January 2013 (no additional references)

Review findings

Insufficient evidence to support recommendations.

Consensus-based recommendations

i Offer women assessment of fetal growth (abdominal palpation and/or symphysis-fundal height measurement) at each antenatal visit to detect small- or large-for-gestational-age infants.

ii Advise women to be aware of the normal pattern of movement for their baby and to contact their health care professional promptly if they have any concerns about decreased or absent movements.

iii If auscultation of the fetal heart rate is performed, a Doppler may be used from 12 weeks and a Pinard stethoscope from 28 weeks.

iv Routine use of antenatal electronic fetal heart rate monitoring (cardiotocography) for fetal assessment in women with an uncomplicated pregnancy is not supported by evidence.

Risk of pre-eclampsia

NICE recommendations

Pregnant women should be made aware of the need to seek immediate advice from a healthcare professional if they experience symptoms of pre-eclampsia.

Advise women at high risk of pre-eclampsia to take 75 mg of aspirin daily from 12 weeks until the birth of the baby. Women at high risk are those with any of the following:

• hypertensive disease during a previous pregnancy • chronic kidney disease • autoimmune disease such as systemic lupus erythematosis or antiphospholipid syndrome • type 1 or type 2 diabetes • chronic hypertension.

Advise women with more than one moderate risk factor for pre-eclampsia to take 75 mg of aspirin daily from 12 weeks until the birth of the baby. Factors indicating moderate risk are:

• first pregnancy • age 40 years or older • pregnancy interval of more than 10 years • body mass index (BMI) of 35 kg/m^2 or more at first visit • family history of pre-eclampsia • multiple pregnancy.

Whenever blood pressure is measured in pregnancy, a urine sample should be tested for proteinuria. [C]

Research questions

1. What is the prevalence and incidence of pre-eclampsia, including population specific groups? [Informed narrative]
2. What are the risk factors for developing pre-eclampsia? [Informed narrative]
3. What is the predictive and diagnostic test accuracy of screening for pre-eclampsia? [Informed narrative]
4. What are the harms of not screening for pre-eclampsia? [Informed narrative]
5. What are the maternal and/or fetal benefits of screening for pre-eclampsia? [Informed narrative]
6. When in pregnancy should screening for pre-eclampsia be carried out? [No evidence identified]
7. What advice should women receive who are at risk of developing pre-eclampsia? [Informed Recommendations 12–14]
8. Should every woman be tested for proteinuria at every antenatal visit if blood pressure remains normal? [Informed Recommendation 15]

Search strategy

Databases searched: Medline, Embase, Cinahl

Date of search: 16 September 2012

Publication date range: 2003–2011

Search terms: evidence based, pregnan*, antenatal*, prenatal*, perinatal*, predictive, preventive, social economic, BMI, obesity, GDM, (gestational diabetes) Type 1 diabetes, Type 2 diabetes, antiphospholipid, "new partner", "multiple pregnancy", "maternal age", "renal disease", hypertension, chronic, essential, blood pressure, PIH, (pregnancy induced hypertention) toxaemia, pre-eclampsia, proteinuria, LFT's (liver function tests), platelets, "Albumin creatinine ratio", serum, urine, 24 hour urine, uric acid, urea, creatinine, hyper-reflexia, biophysical profile, eclampsia, IUGR, (intrauterine growth restriction), oligohydramnios, abruption, seizures, stroke, DIC (disseminated intravascular coagulation), HELLP (haemolysis, elevated liver enzymes, low platelets), visual disturbances, nausea, vomiting, headache, epigastric pain, oedema, swelling, aspirin, calcium, Vitamins, supplements.

Number of references included: 71

Date of search for additional question (Q8): 8 May 2012

Search terms: proteinuria, preg*, antenatal, blood pressure, routine, normotensive, urinalysis

Number of additional references included: 2

Date of top-up search: 4 January 2013

Search terms: fetal growth retardation/ or *eclampsia/ or *oligohydramnios/ or *abruptio placentae/ or *HELLP syndrome/ or *abdominal pain/ or *nausea/ or *vomiting/ or *headache or exp *vision disorders/ or *seizures/ or *stroke/ or *edema/ or *disseminated intravascular coagulation/*liver function tests/ or *urinalysis/ or *early diagnosis/ or *blood pressure monitoring, ambulatory/ or *blood pressure determination

Number of additional references included: 21

Review findings

Risk of pre-eclampsia among women at risk is reduced by low-dose aspirin from early in pregnancy.

Calcium supplementation reduces the risk of pre-eclampsia among women at risk if dietary intake is low.

Antioxidants (vitamins C and E) are not of benefit in preventing pre-eclampsia.

Routine testing for proteinuria is not helpful in predicting pre-eclampsia and should be confined to women with increased blood pressure or acute weight gain.

Consensus-based recommendation

v Routinely measure blood pressure to identify new onset hypertension.

EAC recommendation 12

Advise women at high risk of developing pre-eclampsia that calcium supplementation is beneficial if dietary intake is low.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
A	A	A	A	A	**A**

Supporting evidence (see Section 6.3.6)

Hofmeyr et al 2010; Patrelli et al 2012

EAC recommendation 13

Advise women at moderate–high risk of pre-eclampsia that low-dose aspirin from early pregnancy (preferably before 20 weeks) may be of benefit in its prevention.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
A	B	C	A	A	**B**

Supporting evidence (see Section 6.3.6)

Duley et al 2007; Bujold et al 2010; Trivedi 2011; Roberge et al 2012

EAC recommendation 14

Advise women that vitamins are not of benefit in preventing pre-eclampsia.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
A	B	B	B	B	**B**

Supporting evidence (see Section 6.3.6)

Beazley et al 2005; Rumbold & Crowther 2005; Neugebauer et al 2006; Poston et al 2006; Rumbold et al 2006; Polyzos et al 2007; Spinnato et al 2007; Klemmensen et al 2009; Rahimini et al 2009; Basaran et al 2010; Xu et al 2010; Conde-Agudelo et al 2011; Rossi & Mullin 2011; Salles et al 2012

EAC recommendation 15

Offer testing for proteinuria if a woman has risk factors for, or clinical indications of, pre-eclampsia; in particular raised blood pressure.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
C	C	B	A	A	**C**

Supporting evidence (see Section 6.3.6)

Alto 2005; Rhode et al 2007

Risk of preterm birth

NICE recommendations

Routine vaginal examination to assess the cervix is not an effective method of predicting preterm birth and should not be offered. [A]

Although cervical shortening identified by transvaginal sonography (TVS) and increased levels of fetal fibronectin (FFN) are associated with an increased risk of preterm birth, the evidence does not indicate that this information improves outcomes; therefore neither TVS nor FFN should be used to predict preterm birth in healthy pregnant women. [B]

Research questions

1. What is the definition of pre-term labour? [No evidence identified]
2. What is the prevalence and incidence of pre-term labour? [Informed narrative]
3. What are the risk factors for developing pre-term labour? [Informed Recommendation 16]
4. What advice should be provided to women who are at risk of developing pre-term labour? [Informed narrative]

Search strategy

Date of search: April 2011
Publication date range: 2003–2011
Databases searched: Medline, Embase, PsychINFO, Cinahl.
Search terms: Premature labour (labor), aetiology, prevention, control, prevalence, incidence, Aborigine, Australia, systematic review, clinical trial, comparative study, meta-analysis practice guideline
Number of references included: 120
Date of top-up search: 7 January 2013
Number of additional references included: 11

Review findings

There is a significant association between preterm birth and social disadvantage, urogenital infections, alcohol consumption, smoking during pregnancy, pre-existing diabetes or hypertension and depression.

Leisure-time physical activity during pregnancy is associated with reduced risk of preterm birth.

EAC recommendation 16

Advise women at risk of giving birth preterm about risk and protective factors.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
B	B	C	B	A	**B**

Supporting evidence (see Section 6.4.5)

Vreeburg et al 2004; Kyrklund-Blomberg et al 2005; Dayan et al 2006; Fantuzzi et al 2007; Sokol et al 2007; DeFranco et al 2008; Gray et al 2008; Hegaard et al 2008; Juhl et al 2008; Wills & Coory 2008; Domingues et al 2009; Freak-Poli et al 2009; Aliyu et al 2010; Grote et al 2010; Kock et al 2010; Avalos et al 2011; Fransson et al 2011; Patra et al 2011; Bickerstaff et al 2012; Owe et al 2012

Common conditions during pregnancy

Reflux

NICE recommendations

Women who present with symptoms of heartburn in pregnancy should be offered information regarding lifestyle and diet modification. [Good practice point]

Antacids may be offered to women whose heartburn remains troublesome despite lifestyle and diet modification. [A]

Research questions

1. What is the prevalence and incidence of heartburn in pregnancy, including population specific groups? [Informed narrative]
2. What interventions or treatments for heartburn are effective and safe in pregnancy? [Informed Recommendation 17]
3. What advice should women receive who are experiencing heartburn? [Narrative reviews informed consensus-based recommendation]

Search strategy

Date of search: 31 August 2012
Publication date range: 2003–2012
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: Premature labour (labor), aetiology, prevention, control, prevalence, incidence, Aborigine, Australia, systematic review, clinical trial, comparative study, meta-analysis practice guideline
Number of references included: 18
Date of top-up search: 5 November 2012 [No additional studies identified]

Review findings

There is limited evidence on the effectiveness of treatments to relieve reflux in pregnancy and low-level evidence on its safety.

EAC recommendation 17

Give women who have persistent reflux, information about treatments.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
C	B	D	B	B	**C**

Supporting evidence (see Section 7.1.5)

Tytgat et al 2003; Diav-Citrin et al 2005; Richter 2005; Dowswell & Neilson 2008; da Silva et al 2009; Gill et al 2009a; Gill et al 2009b; Pasternak & Hviid 2010; Majithia & Johnson 2012; Matok et al 2012

Consensus-based recommendation

vi Offer women experiencing mild symptoms of heartburn advice on lifestyle modifications and avoiding foods that cause symptoms on repeated occasions.

Haemorrhoids

NICE recommendation

In the absence of evidence for the effectiveness of treatments for haemorrhoids in pregnancy, women should be offered information concerning diet modification. If clinical symptoms remain troublesome, standard haemorrhoid creams should be considered. [Good practice point]

Research questions

1. What is the prevalence and incidence of haemorrhoids in pregnancy? [No evidence identified]
2. What advice should women receive on how to prevent haemorrhoids? [No evidence identified]
3. What interventions or treatments for haemorrhoids are effective and safe in pregnancy? [Informed narrative]
4. What advice should women receive who are diagnosed with haemorrhoids? [No evidence identified]

Search strategy

Date of search: 21 September 2011
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: pregnancy/pregnancy trimesters/MH pregnancy trimester, second/MH pregnancy trimester, third/ MH pregnancy trimesters/ MH prenatal care/pregnancy, prolonged/MH perinatal care/MH hemorrhoids/MH fissure in ano/anal bleed*/rectal bleed*/rectal pain*/MH constipation stool soft*/cathartics/MH laxatives/haemorrhoid*
Number of references included: 1
Date of top-up search: 5 November 2012
Number of additional studies included: 1

Review findings

Insufficient evidence to support recommendations.

Consensus-based recommendation

vii Offer women who have haemorrhoids information about increasing dietary fibre and fluid intake. If clinical symptoms remain, advise women that they can consider using standard haemorrhoid creams.

Varicose veins

NICE recommendation

Women should be informed that varicose veins are a common symptom of pregnancy that will not cause harm and that compression stockings can improve the symptoms but will not prevent varicose veins from emerging. [A]

Research questions

1. What advice should women receive on how to prevent varicose veins? [No evidence identified]
2. What interventions or treatments for varicose veins are effective and safe in pregnancy? [Informed narrative]
3. What advice should women receive who are diagnosed with varicose veins? [Informed narrative]

Search strategy

Date of search: 22 November 2011
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: pregnancy/pregnancy trimesters/MH pregnancy trimester, second/MH pregnancy trimester, third/ MH pregnancy trimesters/ MH prenatal care/pregnancy, prolonged/MH perinatal care/ varicose veins/varicose vein*/varicosit*/varices/ venous insufficiency/ vulvar/vulval/ leg pain/ leg oedema/edema/ compression stockings/ thrombophlebitis/ anti-embolism/ sclerotherapy/ prevention/ treatment/ advice management
Number of references included: 5
Date of top-up search: 19 October 2012 [No additional studies identified]

Review findings

Insufficient evidence to support recommendations.

Consensus-based recommendation

viii Advise women that varicose veins are common during pregnancy, vary in severity, will not generally cause harm and usually improve after the birth. Correctly fitted compression stockings may be helpful.

Pelvic girdle pain

NICE recommendation

More research on effective treatments for symphysis pubis dysfunction is needed. [Evidence summary]

Research questions

1. What is the prevalence and incidence of symphysis pubis dysfunction in pregnancy, including population specific groups? [Informed narrative]
2. What interventions or treatments for symphysis pubis dysfunction are effective and safe in pregnancy? [Informed Recommendation 18]
3. What advice should women receive who are diagnosed with symphysis pubis dysfunction? [Informed narrative]

Search strategy

Date of search: 26 October 2011
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: pregnancy/pregnancy trimesters/MH pregnancy trimester, second/MH pregnancy trimester, third/ MH pregnancy trimesters/ MH prenatal care/pregnancy, prolonged/MH perinatal care/ symphysis pubis dysfunction/SPD/symphysis pubis pain/pelvic pain/pubic pain/pelvic girdle pain/pelvic instability/diastasis/physiotherapy/brace/prevalence/incidence/treatment/intervention
Number of references included: 26
Date of top-up search: 26 October 2012
Number of additional references included: 6

Review findings

Exercises, physiotherapy, acupuncture or using a support garment may be effective in relieving pelvic girdle pain.

EAC recommendation 18

Advise women experiencing pelvic girdle pain that pregnancy-specific exercises, physiotherapy, acupuncture or using a support garment may provide some pain relief.

Evidence supporting recommendation (see Section 7.4.5)

Pennick & Young 2007; Ee et al 2008; Ekdahl & Petersson 2010; Richards et al 2012; Schiff Boissonnault et al 2012

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
C	C	B	A	B	**C**

Carpal tunnel syndrome

NICE recommendation

There is a lack of research evaluating effective interventions for carpal tunnel syndrome. [Evidence summary]

Research questions

1. What is the prevalence and incidence of carpal tunnel syndrome in pregnancy? [Informed narrative]
2. What interventions or treatments for carpal tunnel syndrome are effective and safe in pregnancy? [Informed narrative]
3. What advice should women receive who are diagnosed with carpal tunnel syndrome? [Informed narrative]

Search strategy

Date of search: 23 September 2011
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: pregnancy/pregnancy trimesters/MH pregnancy trimester, second/MH pregnancy trimester, third/ MH pregnancy trimesters/ MH prenatal care/pregnancy, prolonged/MH perinatal care/ carpal tunnel syndrome/ulnar nerve compression syndrome/repetitive strain injury/cumulative trauma disorder/steroid injections/splints/obesity/diabetes mellitus/ peripheral neuropathy/
Number of references included: 10
Date of top-up search: 9 April 2013. No additional studies identified.

Review findings

Insufficient evidence to support recommendations.

Consensus-based recommendation

ix Advise women who are experiencing symptoms of carpal tunnel syndrome that the evidence to support either splinting or steroid injections is limited.

Maternal health screening

Anaemia

NICE recommendations

Pregnant women should be offered screening for anaemia. Screening should take place early in pregnancy (at the first appointment) and at 28 weeks, when other blood screening tests are being performed. This allows enough time for treatment if anaemia is detected. [B]
Haemoglobin levels outside the normal UK range for pregnancy (that is, 11 g/dl at first contact and 10.5 g/dl at 28 weeks) should be investigated and iron supplementation considered if indicated. [A]

Research questions

1. What is the prevalence and incidence of anaemia, including population specific groups? [Informed narrative]
2. What are the risk factors for developing anaemia? [Informed narrative]
3. What is the diagnostic test accuracy of screening for anaemia? [No evidence identified]
4. What are the maternal and/or fetal benefits and risks of screening for anaemia? [No evidence identified]
5. When in pregnancy should screening for anaemia be carried out? [No evidence identified]
6. What advice should be provided to women to prevent developing anaemia in pregnancy? [Informed narrative on iron as a nutritional supplement]
7. What interventions or treatments for anaemia are effective and safe in pregnancy, and what advice should women receive? [Informed Recommendations 19 and 20]

Search strategy

Date of search: 30 January 2012
Publication date range: 2003–2012
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: pregnancy/pregnancy trimesters/MH pregnancy trimester, second/MH pregnancy trimester, third/ MH pregnancy trimesters/ MH prenatal care/pregnancy, prolonged/MH perinatal care, "social economic", anaemia / anemia, prevalence, incidence, risk factors, risks, diagnos*, screening, advice, iron deficiency, ferritin, iron stud*, Fe, diet, iron source/supplements, haemoglobin/haemoglobin, iron stores
Number of references included: 47
Date of top-up search: 20 December 2012
Number of additional references included: 10

Review findings

Iron supplementation improves maternal haemoglobin concentrations.
Iron supplements that are low dose or taken less often than daily appear to be effective in treating anaemia in pregnancy with fewer gastrointestinal side effects compared with high-dose or daily supplements

EAC recommendation 19

Advise iron supplementation for women identified as having iron-deficiency anaemia.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
B	B	C	A	A	**B**

Evidence supporting recommendation (see Section 8.1.7)

Reveiz et al 2011

EAC recommendation 20

Advise women with iron-deficiency anaemia that low-dose iron supplementation is as effective as high dose, with fewer side effects.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
A	B	B	A	A	**B**

Evidence supporting recommendation (see Section 8.1.7)

de Souza et al 2004; Sharma et al 2004; Zhou et al 2009; Reveiz et al 2011

Consensus-based recommendation

x Routinely offer testing for haemoglobin concentration to pregnant women early in pregnancy (at the first visit) and at 28 weeks gestation.

Diabetes

NICE recommendations

Screening for gestational diabetes using risk factors is recommended in a healthy population.

At the booking appointment, the following risk factors for gestational diabetes should be determined: body mass index above 30 kg/m², previous macrosomic baby weighing 4.5 kg or above, previous gestational diabetes (refer to 'Diabetes in pregnancy' [NICE clinical guideline 63], available from www.nice.org.uk/CG063), family history of diabetes (first-degree relative with diabetes), family origin with a high prevalence of diabetes (South Asian [specifically women whose country of family origin is India, Pakistan or Bangladesh], black Caribbean, Middle Eastern [specifically women whose country of family origin is Saudi Arabia, United Arab Emirates, Iraq, Jordan, Syria, Oman, Qatar, Kuwait, Lebanon or Egypt].

Women with any one of these risk factors should be offered testing for gestational diabetes (refer to Diabetes in pregnancy' [NICE clinical guideline 63], available from www.nice.org.uk/CG063).

In order to make an informed decision about screening and testing for gestational diabetes, women should be informed that: in most women, gestational diabetes will respond to changes in diet and exercise; some women (between 10% and 20%) will need oral hypoglycaemic agents or insulin therapy if diet and exercise are not effective in controlling gestational diabetes; if gestational diabetes is not detected and controlled there is a small risk of birth complications such as shoulder dystocia; a diagnosis of gestational diabetes may lead to increased monitoring and interventions during both pregnancy and labour.

Screening for gestational diabetes using fasting plasma glucose, random blood glucose, glucose challenge test and urinalysis for glucose should not be undertaken.

Research questions

1. Who should be screened for hyperglycaemia in pregnancy? [Informed narrative]
2. Should all women less than 20 weeks gestation be offered HbA1c to diagnose type 2 diabetes? [No direct evidence identified]
3. What thresholds should be used to diagnose type 2 diabetes in pregnant women less than 20 weeks gestation? [No direct evidence identified]
4. What risk factors are associated with increased risk of gestational diabetes? [Informed Recommendation 21]
5. How effective are lifestyle interventions for prevention of gestational diabetes (pre-conception and during pregnancy)? [Informed Recommendation 22]
6. What is the diagnostic accuracy of commonly used screening and diagnostic test for gestational diabetes? [No direct evidence identified]
7. What is the optimal diagnostic threshold for diagnosing gestational diabetes? [Insufficient evidence identified]
8. Which screening/diagnostic regimen is optimal for maternal and infant outcomes? [Insufficient evidence identified]
9. What is the cost effectiveness of commonly using screening/diagnostic strategies? [Informed narrative]
10. What is the prevalence and incidence of gestational diabetes, including population specific groups? [Informed narrative]
11. What advice should be provided to women to prevent developing gestational diabetes in pregnancy? [Informed narrative]

Review strategy

A full text assessment of evidence identified for the New Zealand Ministry of Health clinical guidelines for the diagnosis, treatment and management of gestational diabetes in New Zealand was conducted in November–December 2013.

Number of references included: 102

Review findings

There is a considerable body of evidence to support an independent association between risk of gestational diabetes and a range of factors (see Recommendation 21).

There is good evidence that combined physical activity and healthy eating prevent excessive weight gain (but do not directly reduce the risk of gestational diabetes).

There is currently no universally accepted screening or diagnostic regimen for gestational diabetes.

EAC recommendation 21

At the first antenatal visit, assess a woman's risk of hyperglycaemia — including her age, BMI, previous gestational diabetes, previous high birth weight baby, family history of diabetes, and family origin.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
B	B	C	B	B	**B**

Evidence supporting recommendation (see Section 8.2.7)

Ishak & Petocz 2003; McLean et al 2006; Gonzalez-Clemente et al 2007; Iqbal et al 2007; Rudra et al 2007; Cypryk et al 2008; Kwak et al 2008; Radesky et al 2008; Karcaaltincaba et al 2009; Torloni et al 2009; Yang et al 2009; Getahun et al 2010; Hedderson et al 2010a; 2010b; Ogonowski & Miazgowski 2010; Waugh et al 2010; Yogev et al 2010; Gagnon et al 2011; Ismail et al 2011; Nanda et al 2011; Schneider et al 2011; Teede et al 2011; Teh et al 2011; Carreno et al 2012; Far et al 2012; Gibson et al 2012; Hartling et al 2012; Hedderson et al 2012; Heude et al 2012; Makgoba et al 2012; Mao et al 2012; Porter et al 2012; Ramos-Levi et al 2012; Singh et al 2012

EAC recommendation 22

Advise women at risk of hyperglycaemia that physical activity and healthy eating help to prevent excessive weight gain.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
A	A	C	A	A	**A**

Evidence supporting recommendation (see Section 8.2.7)

Korpi-Hyovalti et al 2011; Han et al 2012; Hui et al 2012; Walsh et al 2012; Barakat et al 2013

Consensus-based recommendations

xi Offer early testing for hyperglycaemia to women with risk factors for type 2 diabetes.

xii Offer testing for hyperglycaemia to all women between 24 and 28 weeks gestation.

Haemoglobin disorders

NICE recommendations

Preconception counselling (supportive listening, advice giving and information) and carrier testing should be available to all women who are identified as being at higher risk of haemoglobinopathies, using the Family Origin Questionnaire from the NHS Antenatal and Newborn Screening Programme.

Information about screening for sickle cell diseases and thalassaemias, including carrier status and the implications of these, should be given to pregnant women at the first contact with a healthcare professional.

Screening for sickle cell diseases and thalassaemias should be offered to all women as early as possible in pregnancy (ideally by 10 weeks). The type of screening depends upon the prevalence and can be carried out in either primary or secondary care.

Where prevalence of sickle cell disease is high (fetal prevalence above 1.5 cases per 10,000 pregnancies), laboratory screening (preferably high-performance liquid chromatography) should be offered to all pregnant women to identify carriers of sickle cell disease and/or thalassaemia.

Where prevalence of sickle cell disease is low (fetal prevalence 1.5 cases per 10,000 pregnancies or below), all pregnant women should be offered screening for haemoglobinopathies using the Family Origin Questionnaire.

If the woman is identified as a carrier of a clinically significant haemoglobinopathy then the father of the baby should be offered counselling and appropriate screening without delay.

Research questions

1. What is the prevalence and incidence of haemoglobinopathies among pregnant women, including in population specific groups? [Informed narrative]
2. What is the diagnostic test accuracy of screening for haemoglobinopathies in pregnancy? [Informed narrative]
3. When should women be screened for haemoglobinopathies in pregnancy? [Informed narrative]
4. What are the benefits and risks of screening for haemoglobinopathies in pregnancy? [Informed narrative]
5. What is the cost effectiveness of universal screening for haemoglobinopathies in pregnancy? [Informed narrative]
6. What advice should women receive who have haemoglobinopathies in pregnancy? [Informed narrative]

Search strategy

Date of search: 4 July 2012

Publication date range: 2003–2012

Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.

Search terms: pregnancy/pregnancy trimesters/MH pregnancy trimester, second/MH pregnancy trimester, third/ MH pregnancy trimesters/ MH prenatal care/pregnancy, prolonged/MH perinatal care, "social economic", haemoglobinopath* / hemoglobinopath*, thalassaemia / thalassaemia, sickle cell, Incidence, prevalence, screen*, cost effectiveness

Number of references included: 27

Date of top-up search: 7 November 2012

Number of additional references included: 3

Review findings

Insufficient evidence to support recommendations.

Consensus-based recommendation

xiii As early as possible in pregnancy, routinely provide information about haemoglobin disorders and offer screening (full blood count).

Gonorrhoea

NICE recommendation

There is no NICE recommendation for gonorrhoea in pregnancy.

Research questions

1. What is the prevalence and incidence of gonorrhoea in pregnancy, including in population specific groups? [Informed narrative]
2. What is the diagnostic test accuracy of screening for gonorrhoea? [Informed narrative]
3. What is the cost effectiveness of screening for gonorrhoea? [No evidence identified]
4. What are the harms of not screening for gonorrhoea? [No evidence identified]
5. When should pregnant women be screened for gonorrhoea? [Informed narrative]
6. What are the additional needs of population specific groups? [No evidence identified]
7. What are the maternal and/or fetal benefits of screening for gonorrhoea? [No evidence identified]
8. What interventions or treatments for gonorrhoea are effective and safe in pregnancy; and what advice should women receive? [Informed narrative]

Search strategy

Date of search: 24 November 2011
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: gonoccocal ophthalmia; gonorrhea+;Neisseria gonorrhoeae; Ophthalmia Neonatorum; gonococcal conjunctivitis; newborn ophthalmia; pregnancy; pregnant woman; second trimester pregnancy; third trimester pregnancy; prenatal care; prenatal period; Pregnancy Trimesters ; Perinatal Care
Number of references included: 15
Date of top-up search: 23 October 2012 [No additional studies identified]

Review findings

Insufficient evidence to support recommendations.

Consensus-based recommendation

xiv Do not routinely offer gonorrhoea testing to all women as part of antenatal care.
Offer gonorrhoea testing to pregnant women who have known risk factors or live in or come from areas where prevalence is high. Consider repeat testing for sexually transmitted infections in the third trimester for women at continued risk.

Trichomoniasis

NICE recommendation

Not covered in NICE guidelines.

Research questions

1. What is the prevalence and incidence of trichomoniasis, including population specific groups? [Informed narrative]
2. What are the risk factors for developing trichomoniasis? [Informed narrative]
3. What is the predictive and diagnostic test accuracy of screening for trichomoniasis? [Informed narrative]
4. What are the benefits and risks of screening for trichomoniasis? [No evidence identified]
5. When in pregnancy should screening for trichomoniasis be carried out? [Informed narrative]
6. What treatment/s for trichomoniasis is effective and safe in pregnancy? (Informed Recommendation 23]
7. What advice should be provided to women to prevent developing trichomoniasis in pregnancy? [Informed narrative]

Search strategy

Date of search: 23 May 2012
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: pregnancy/pregnancy trimesters/MH pregnancy trimester, second/MH pregnancy trimester, third/ MH pregnancy trimesters/ MH prenatal care/pregnancy, prolonged/MH perinatal care/ Trichomonas/ Trichomoniasis/T. vaginalis/ prevalence/ incidence/diagnosis/risk factor*/ cost-effective*/cost-benefit analysis/screening/interventions/treatment/antibiotic*/advice/vaginal swab /high vaginal swab/maternal transmission/vertical transmission/placental transmission/ neonatal infection/rupture of membranes/prolonged rupture of membranes
Number of references included: 46
Date of top-up search: 10 April 2013. No additional studies identified.

Review findings

The benefits of screening for trichomoniasis are limited by uncertainties about the effect of treatments during pregnancy. Treatment of asymptomatic pregnant women is not recommended.

EAC recommendation 23

Offer testing to women who have symptoms of trichomoniasis, but not to asymptomatic women, during pregnancy

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
A	B	B	C	C	**B**

Evidence supporting recommendation (see Section 8.5.6)

Carey & Klebanoff 2003; Owen & Clenney 2004; Riggs & Klebanoff 2004; Fung & Doan 2005; Okun et al 2005; Hay & Czeizel 2007; Johnson et al 2007; Wendel & Workowski 2007; Mann et al 2009; Stringer et al 2010; Workowski & Berman 2010; Gülmezoglu & Azhar 2011

Group B streptococcus

NICE recommendation

Pregnant women should not be offered routine antenatal screening for Group B streptococcus (GBS) because evidence of its clinical effectiveness and cost effectiveness remains uncertain. [C]

Research questions

1. What is the prevalence and incidence of GBS in pregnancy, including population specific groups? [Informed narrative]
2. What is the diagnostic test accuracy of screening for GBS? [Informed Recommendation 26]
3. What is the cost effectiveness of screening for GBS? [Informed narrative]
4. When should pregnant women be screened for GBS? [Informed Recommendation 25]
5. What are the benefits and risk of screening for GBS? [Informed Recommendation 24]
6. What interventions or treatments for GBS are effective and safe in pregnancy, and what advice should women receive? [Informed narrative]

Search strategy

Date of search: 27 January 2012
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: pregnancy/pregnancy trimesters/MH pregnancy trimester, second/MH pregnancy trimester, third/ MH pregnancy trimesters/ MH prenatal care/pregnancy, prolonged/MH perinatal care/ Group B streptococcus/high vaginal swab/GBS/anorectal swab/prevalence/maternal transmission/incidence/vertical transmission/diagnosis/placental transmission/cost-effective*/neonatal infection/cost-benefit analysis/rupture of membranes/screening/prolonged rupture of membranes/interventions/treatment/antibiotic*/advice/urine/mid-stream urine/vaginal swab
Number of references included: 75
Date of top-up search: 6 February 2013
Number of additional references included: 9

Review findings

The incidence of early onset Group B streptococcus infection in the newborn is reduced by preventive approaches that include intrapartum antibiotic treatment.
The diagnostic accuracy of culture-based testing is highest late in pregnancy.
Vaginal-rectal swabs provide collection yields whether collected by the woman or health professional.

EAC recommendation 24

Offer either routine antenatal screening for Group B streptococcus colonisation or a risk factor-based approach to prevention, depending on organisational policy.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
C	B	B	A	A	**C**

Evidence supporting recommendation (see Section 8.6.6)

Angstetra et al 2007; Chen et al 2005; Eberly & Rajnik, 2009; Phares et al 2008; Puopolo et al 2005; Trijbels-Smeulders et al 2007

EAC recommendation 25

If offering antenatal screening, arrange for testing to take place at 35–37 weeks gestation.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
B	B	B	A	B	**B**

Evidence supporting recommendation (see Section 8.6.6)

Hiller et al 2005; Towers et al 2010; Valkenburg-van den Berg et al 2010

EAC recommendation 26

Encourage women to self-collect vaginal-rectal specimens for culture testing for Group B streptococcus and offer information about how to do this.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
C	B	B	A	A	**C**

Evidence supporting recommendation (see Section 8.6.6)

Price et al 2006; Kovavisarach et al 2007; Arya et al 2008; Daniels et al 2009; Hicks & Diaz-Perez 2009

Toxoplasmosis

NICE recommendations

Routine antenatal serological screening for toxoplasmosis should not be offered because the risks of screening may outweigh the potential benefits. [B]

Pregnant women should be informed of primary prevention measures to avoid toxoplasmosis infection, such as:

- washing hands before handling food
- thoroughly washing all fruit and vegetables, including ready-prepared salads, before eating
- thoroughly cooking raw meats and ready-prepared chilled meals
- wearing gloves and thoroughly washing hands after handling soil and gardening
- avoiding cat faeces in cat litter or in soil. [C]

Research questions

1. What is the prevalence and incidence of toxoplasmosis in pregnancy, including population specific groups? [Informed narrative]
2. What is the predictive and diagnostic test accuracy of screening for toxoplasmosis? [Informed Recommendation 18]
3. What is the cost effectiveness of screening for toxoplasmosis? [No evidence identified]
4. What are the harms of not screening for toxoplasmosis? [Informed Recommendation 27]
5. When should pregnant women be screened for toxoplasmosis? [Informed narrative]
6. What are the maternal and/or fetal benefits of screening for toxoplasmosis? [Informed Recommendation 27]
7. What advice should be provided to women to prevent developing toxoplasmosis in pregnancy? [Informed Recommendation 28]
8. What interventions or treatments for toxoplasmosis are effective and safe in pregnancy? [Informed narrative]

Search strategy

Date of search: 29 November 2011
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: oocysts;toxoplasma;toxoplasmosis; toxoplasmosis, cerebral; toxoplasmosis, congenital; toxoplasmosis, ocular ; toxoplasma gondii; toxoplasma; toxoplasma gondii vaccine; perinatal care; prenatal care; pregnancy trimesters; pregnancy; pregnancy trimester, second; pregnancy trimester, third; mass screening; health screening; newborn screening; screening; prenatal screening ; infectious disease transmission, vertical; vertical transmission ; spiramycin; clindamycin; sulfadiazine; pyrimethamine; trimethoprim-sulfamethoxazole combination; immunity; immunity, maternally-acquired; antibodies; parasites; faeces; soil; litter; pork; cat diseases; cats; torch
Number of references included: 44
Date of top-up search: 14 January 2013
Number of additional references included: 2

Review findings

The evidence on the benefits to women and babies of screening for toxoplasmosis is limited and inconclusive.
There is suggestive evidence that women may have low levels of knowledge about the risks associated with *T. gondii* and that health education approaches may help reduce risk of congenital toxoplasmosis.

EAC recommendation 27

Do not routinely offer screening for toxoplasmosis to pregnant women.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
B	C	C	B	C	**C**

Evidence supporting recommendation (see Section 8.7.6)

Petersen et al 2005; Thalib et al 2005; Flori et al 2008; Bobic et al 2009; Kasper et al 2009; Lachaud et al 2009; Elyasi et al 2010; Wallon et al 2010; Jost et al 2011; Lesle et al 2011; Robert-Gangneux et al 2011; Yamada et al 2011

EAC recommendation 28

Advise pregnant women about measures to avoid toxoplasmosis infection such as:

- washing hands before handling food;
- thoroughly washing all fruit and vegetables, including ready-prepared salads, before eating;
- thoroughly cooking raw meat and ready-prepared chilled meals;
- wearing gloves and thoroughly washing hands after handling soil and gardening; and
- avoiding cat faeces in cat litter or in soil.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
D	C	C	B	B	**C**

Evidence supporting recommendation (see Section 8.7.6)

Gollub et al 2008; Ferguson et al 2011

Cytomegalovirus

NICE recommendation

The available evidence does not support routine cytomegalovirus screening in pregnant women and it should not be offered. [B]

Research questions

1. What is the prevalence and incidence of cytomegalovirus in pregnancy, including population specific groups? [Informed narrative]
2. What is the diagnostic test accuracy of screening for cytomegalovirus? [Informed narrative]
3. What is the cost effectiveness of screening for cytomegalovirus? [Informed narrative]
4. What are the benefits and risks of screening for cytomegalovirus? [Informed narrative]
5. When should pregnant women be screened for cytomegalovirus? [Informed narrative]
6. What advice should be provided to women to prevent developing cytomegalovirus in pregnancy? [Informed narrative]
7. What interventions or treatments for cytomegalovirus are effective and safe in pregnancy, and what advice should women receive? [Informed narrative]

Search strategy

Date of search: 25 November 2011
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: pregnancy/pregnancy trimesters/MH pregnancy trimester, second/MH pregnancy trimester, third/ MH pregnancy trimesters/ MH prenatal care/pregnancy, prolonged/MH perinatal care/ cytomegalovirus/CMV/maternal transmission/vertical transmission/in-utero/neonatal infection/fetal, foetal/infection/prevalence/incidence/screening/diagnosis/treatment/prevention/intervention/antibodies/ antibiotic
Number of references included: 26
Date of top-up search: 8 April 2013
Number of additional references included: 15

Review findings

Insufficient evidence to support recommendations.

Consensus-based recommendations

xv Only offer screening for cytomegalovirus to pregnant women if they come into frequent contact with large numbers of very young children (eg child care workers).

xvi Advise pregnant women about hygiene measures to prevent cytomegalovirus infection such as frequent hand washing, particularly after exposure to a child's saliva or urine.

Cervical abnormalities

NICE recommendation

Not covered in NICE guidelines.

Research questions

1. What are the indications for performing a cervical smear during pregnancy? [Informed narrative]
2. What are the benefits and risks of performing a cervical smear during pregnancy? [Informed narrative]
3. When in pregnancy should a cervical smear be performed? [Informed narrative]
4. What is the prevalence and incidence of abnormal cervical smear results in pregnancy, including in population specific groups? [Informed narrative]
5. What is the diagnostic test accuracy of cervical smear in pregnancy? [Informed narrative]
6. What advice should be provided to women who have abnormal cervical smear results in pregnancy? [Informed narrative]

Search strategy

Date of search: 10 July 2012
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: evidence based, pregnan*, antenatal*, prenatal*, perinatal*, "social economic", cervical screening, Pap smear, Papanicolaou, dysplasia, cervical intraepithelial neoplasia (cin), endocervical, hyperdysplasia, cervical cytology, colposcopy, neoplasm, carcinoma, epithelial, wedge excision
Number of references included: 14
Date of top-up search: 24 October 2012
Number of additional references included: 1

Review findings

Insufficient evidence to support recommendations.

Consensus-based recommendation

xvii Offer women cervical screening as specified by the National Cervical Screening Program.

Thyroid dysfunction

NICE recommendation

Not covered in NICE guidelines.

Research questions

1. What is the prevalence and incidence of thyroid dysfunction in pregnancy, including population specific groups? [Informed narrative]
2. What is the diagnostic test accuracy of screening for thyroid dysfunction? [Informed narrative]
3. What are the benefits and harms of routine screening for thyroid dysfunction? [Informed Recommendations 29 and 30]
4. When should pregnant women be screened for thyroid dysfunction? [Informed narrative]
5. What interventions or treatments for thyroid dysfunction are effective and safe in pregnancy, and what advice should women receive [Informed narrative]
6. What is the cost effectiveness of universal screening in pregnancy for hypothyroidism? [Informed narrative]

Search strategy

Date of search: 27 February 2012
Publication date range: 2003–2012
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: thyroid disease, screening, incidence, function tests, hormones, gland, thyrotropine, iodine, autoantibodies, thyroxine
Number of references included: 30
Date of top-up search: 8 January 2013
Number of additional references included: 4

Review findings

There is insufficient evidence to support routine universal screening for subclinical hypothyroidism.
Women who are symptomatic or who are high risk for thyroid dysfunction (eg diabetes, personal or family history of autoimmune disease) should be screened from early in pregnancy.

EAC recommendation 29

Do not routinely offer pregnant women thyroid function screening.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
B	B	B	A	A	**B**

Evidence supporting recommendation (see Section 8.10.6)

Negro et al 2010; van den Boogaard et al 2011; Lazarus et al 2012

EAC recommendation 30

Offer screening to pregnant women who have symptoms or high risk of thyroid dysfunction.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
B	B	C	A	A	**B**

Evidence supporting recommendation (see Section 8.10.6)

Abalovich et al 2007; Negro et al 2010

Clinical care in late pregnancy

Fetal presentation

NICE recommendations

Fetal presentation should be assessed by abdominal palpation at 36 weeks or later, when presentation is likely to influence the plans for the birth. Routine assessment of presentation by abdominal palpation should not be offered before 36 weeks because it is not always accurate and may be uncomfortable. [C]
Suspected fetal malpresentation should be confirmed by an ultrasound assessment. [Good practice point]
All women who have an uncomplicated singleton breech pregnancy at 36 weeks of gestation should be offered external cephalic version (ECV). Exceptions include women in labour and women with a uterine scar or abnormality, fetal compromise, ruptured membranes, vaginal bleeding and medical conditions. [A]
Where it is not possible to schedule an appointment for ECV at 37 weeks of gestation, it should be scheduled at 36 weeks. [Good practice point]

Research questions

Abdominal palpation

1. What are the predictive and diagnostic accuracy of performing abdominal palpation for determining fetal growth and wellbeing? (Informed narrative on fetal growth and wellbeing; Section 6.2.1]
2. What are the benefits and risks of performing an abdominal palpation at each antenatal visit? (Informed narrative on fetal growth and wellbeing; Section 6.2.1]
3. At what gestation is abdominal palpation effective and/or accurate? [Informed Recommendation 31]

Breech presentation

1. What is the prevalence of breech presentation at term? [Informed narrative]
2. What is the optimal gestation to discuss management plans with women who have a breech presentation? [No evidence identified]
3. What are the risks of breech presentation at term? [Informed narrative]
4. How effective is ECV, and what are the risks and benefits? [Informed Recommendation 32]
5. Other than ECV, what options are available that are effective and safe for women who have a breech presentation nearing term? [Informed narrative]

Search strategy

Abdominal palpation

Date of search: 29 August 2012
Publication date range: 2003–2012
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: perinatal care; prenatal care; pregnancy trimesters; pregnancy trimester, third; pregnancy trimester, second; pregnancy; abdominal palpation; abdominal pain; abdomen examination; fetal/foetal presentation; fetal/foetal position; fetal/foetal lie; fetal/foetal growth; fetal/foetal wellbeing; engagement; symphyseal fundal height (SFH)
Number of references included: 11
Date of top-up search: 6 November 2012
Number of additional references included: 0

Breech presentation

Date of search: 6 July 2012
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: pregnancy/pregnancy trimesters/MH pregnancy trimester, second/MH pregnancy trimester, third/ MH pregnancy trimesters/ MH prenatal care/pregnancy, prolonged/MH perinatal care/ breech/breech presentation/ incidence/ prevalence/ intervention/ management/ options/ risks/ maternal risks/fetal risks/ external cephalic version/ moxibustion/ acupuncture/position/ posture/ vaginal delivery/ caesarean section
Number of references included: 89
Date of top-up search: 2 February 2013
Number of additional references included: 10

Review findings

There is no evidence to refute the current NICE recommendation that presentation be assessed by abdominal palpation at 36 weeks or later.
There is no evidence to refute the current NICE recommendation that all women who have an uncomplicated singleton breech pregnancy at 36 weeks of gestation should be offered ECV. Exceptions include women in labour and women with a uterine scar or abnormality, fetal compromise, ruptured membranes, vaginal bleeding and medical conditions.

EAC recommendation 31

Assess fetal presentation by abdominal palpation at 36 weeks or later, when presentation is likely to influence the plans for the birth.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
C	C	C	A	A	**C**

Evidence supporting recommendation (see Section 9.1.7)

Webb et al 2011

EAC recommendation 32

Offer external cephalic version to women with uncomplicated singleton breech pregnancy after 37 weeks of gestation.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
A	B	B	B	A	**B**

Evidence supporting recommendation (see Section 9.1.7)

Hutton et al 2003; Fok et al 2005; Nor Azlin et al 2005; Nassar et al 2006; El-Toukhy et al 2007; Weiniger et al 2007; Grootscholten et al 2008; Kok et al 2008c; Rijnders et al 2010; Buhimschi et al 2011; Burgos et al 2011; Gottvall & Ginstman 2011; Obeidat et al 2011; Bogner et al 2012; Cho et al 2012; Cluver et al 2012; Reinhard et al 2013

Consensus-based recommendation

xviii Relative contraindications for external cephalic version include a previous caesarean section, uterine anomaly, vaginal bleeding, ruptured membranes or labour, oligohydramnios, placenta praevia and fetal anomalies or compromise.

Prolonged pregnancy

NICE recommendations

Prior to formal induction of labour, women should be offered a vaginal examination for membrane sweeping [A].
Women with uncomplicated pregnancies should be offered induction of labour beyond 41 weeks [A].
From 42 weeks, women who decline induction of labour should be offered increased antenatal monitoring consisting of at least twice-weekly cardiotocography and ultrasound estimation of maximum amniotic pool depth [Good practice point].

Research questions

1. What is the definition of post-dates pregnancy? [Informed narrative]
2. What are the maternal risks and/or benefits associated with post-dates pregnancy? [Informed narrative]
3. What are the fetal risks and/or benefits associated with post-dates pregnancy? [Informed narrative]
4. What options are available for women to prevent post-dates pregnancy? [Informed Recommendation 33]
5. What advice should be provided to women who have a post-dates pregnancy? [Informed narrative]

Search strategy

Date of search: 16 April 2012
Publication date range: 2003–2011
Databases searched: Medline, Embase, Cochrane, PsychINFO, Cinahl.
Search terms: pregnancy/pregnancy trimesters/MH pregnancy trimester, second/MH pregnancy trimester, third/ MH pregnancy trimesters/ MH prenatal care/pregnancy, prolonged/MH perinatal care/ post term/post dates/ overdue/ cardiotocograph/CTG/biophysical profile/induction/ advice /risk /stillbirth/adverse outcome/intervention/ monitoring /fetal wellbeing/fetal movement
Number of references included: 24
Date of top-up search: 24 October 2012
Number of additional references included: 2

Review findings

There is sufficient evidence to support the current NICE recommendation that prior to formal induction of labour, women should be offered a vaginal examination for membrane sweeping.
There is insufficient evidence to recommend acupuncture or shiatsu to prevent post-dates pregnancy.

EAC recommendation 33

Consider offering membrane sweeping to women scheduled for formal induction of labour.

Evidence grading

Evidence base	*Consistency*	*Clinical impact*	*Generalisability*	*Applicability*	*Recommendation*
B	C	C	A	A	**C**

Evidence supporting recommendation (see Section)

Boulvain et al 2005; de Miranda et al 2006; Yildirim et al 2010

E Economic analyses

This appendix provides a brief summary of the economic analyses commissioned from the Centre for International Economics (CIE) to inform the development of these Guidelines.

Ultrasound assessment of fetal anatomy

Purpose of the analysis

The Guidelines recommend routine offering of a fetal development and anatomy ultrasound scan to pregnant women between 18 and 20 weeks gestation. The scan is primarily recommended for the detection of structural abnormalities.

This screen is already current practice in Australia and in many advanced economies, reflecting the fact that ultrasound screening for structural abnormalities at 18–20 weeks is clinically effective and sufficiently early to enable women to choose to terminate their pregnancy following the detection of a lethal or severe congenital abnormality. While popular with women, its cost-effectiveness has not been comprehensively appraised in an Australian context.

In this report, the cost-effectiveness of the universal offering of the scan is assessed, with respect to a theoretical alternative to not offer screening at 18–20 weeks. A risk-based approach to screening for structural abnormalities has not been used due to the lack of clinically identifiable risk factors. This review assesses the validity/transferability of findings and data from the international literature, and develops a probabilistic model of clinical outcomes and associated costs and benefits that flow from the information provided through screening.

Clinical outcomes from routine screening limited to reduced perinatal mortality

Antenatal detection of congenital abnormalities is only rarely associated with improved survival, such as for a small number of cases of babies with congenital heart disease (Yates 2004). There is also insufficient evidence that routine screening at 18–20 weeks improves outcomes for babies or leads to less health service use by mothers and babies (Whitworth et al 2010).

Romano and Waitzman (1998) found that the cost-effectiveness of screening was driven by the specificity of ultrasound (rate of true negative) and the women's willingness to pay for reassurance of a normal scan. A comprehensive review of women's views of pregnancy by Garcia et al (2002) highlighted the positive impact of second trimester scanning through the reassurance that mothers experience. The 18–20 week scan may provide stress and anxiety relief through providing visual confirmation of fetal development, which may improve maternal-fetal bonding (Garcia et al 2002), and through confirmation from the sonographer of normal fetal structure. This may have the effect of reducing stress, anxiety and depression during pregnancy, providing a further important benefit given the linkages between untreated anxiety and depression in pregnancy and risks to fetal wellbeing (see, for example, Pearlstein, 2008).

More recent analysis by DiPietro (2010) found that dispositional levels of maternal stress and anxiety are modestly associated with aspects of fetal heart rate and motor activity.

However, it is acknowledged in the literature (see Davalos et al 2012) that antenatal depression and negative outcomes in offspring are understudied compared to empirical papers on the effects of postnatal depression. This has produced ongoing debate on the effects of antenatal depression on a developing fetus and later in infancy and early childhood.

Due to the paucity of data/estimates on the utility or value of reassurance from the routine scan, including in terms of psychological wellbeing, these benefits are not well integrated into cost-effectiveness studies.

The literature does show that screening leads to a significant reduction in additional lifetime medical and developmental costs associated with morbidity resulting only from an increase in the rate of pregnancy termination for fetuses with lethal or severe abnormalities.

Hence, this economic evaluation is limited to assessing the potential benefits of routine screening through the inclusion of the potential avoided costs of care associated with higher rates of termination of fetuses with lethal or severe congenital abnormalities.

It also does not take into account other clinical pathways and benefits of screening at 18–20 weeks from the detection of placental problems such as low-lying placenta that is diagnosed at the 18–20 week scan.

Transferability of international literature is limited

Eleven economic studies were included in the literature review, although their transferability to an Australian context is generally limited. Two of the cost-effectiveness studies identified were randomised control trials.

- The Routine Antenatal Diagnostic Imaging with Ultrasound (RADIUS) trial — due to the low detection rates of major malformations and therefore minimal impact on perinatal mortality, the RADIUS trial did not strongly support the cost-effectiveness of routine screening, as did the Helsinki trial (Whitworth et al 2012).
- The Helsinki trial — demonstrated that routine screening improved the detection of fetal abnormalities, resulting in an increase in the termination of pregnancies.

Roberts et al (1998), Bricker et al (2000), and Ritchie et al (2005) focus on the value of second trimester screening for congenital abnormalities, with respect to screening at other stages. The literature supports the conclusion that screening at the second trimester is the preferred strategy for screening for structural abnormalities.

Several studies identify the cost of screening relative to the avoided cost of care:

Long and Sprigg (1998) conclude that the financial benefit of pregnancies, due to the avoided cost of caring for malformed fetuses, exceed the cost of routine screening;

- Vintzileos et al (2000) suggest that the benefit cost ratio is dependent on the rate of detection, with a negative benefit cost ratio found when applying detection rates achieved in non-tertiary centres which are associated with poor rates of sensitivity; and
- Waitzman and Romano (1998) conclude that the sensitivity of ultrasound in detecting congenital abnormalities would need to be at least 0.5 to make routine screening viable.

Caution should be applied in transferring the results of these studies to the Australian context. The rates of ultrasound sensitivity and underpinning cost assumptions determine cost-effectiveness outcomes when measured in terms of the cost per anomaly detected or in terms of avoided costs through termination, and need to be relevant to the Australian context.

Modelling results

Due to the limitations in the transferability of data from the literature, particularly on the cost side, it is desirable to use local data in the appraisal of the cost-effectiveness of routine screening in Australia.

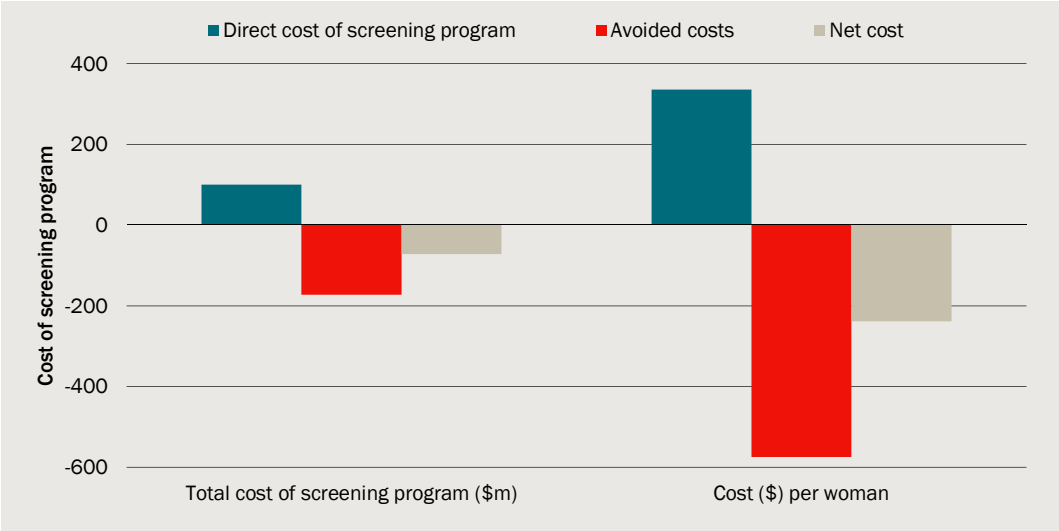
However, the availability of Australian data is poor, particularly around the cost of care associated with severe or lethal congenital abnormalities, and several assumptions have been required to be made.

Notwithstanding data limitations, the results of modelling undertaken for this review show that ultrasound screening at 18–20 weeks for the detection of fetal congenital abnormalities is cost-effective under a range of assumptions.

- Avoided costs (benefits) associated with the scan exceed costs by 2.4 to 1.3 (see Figure E1), demonstrating a small positive result overall. The cost per anomaly detected is estimated to be approximately $46,619 per anomaly, or $68,389 per major anomaly.
- Additional unquantified outcomes include from the utility or psychological value of the information and benefits from the detection of placental problems and confirmation of gestational age.
    - Importantly, reassurance is received in approximately 98.2% of cases where the fetus is scanned and correctly diagnosed as normal(or for the parents of around 285,624 fetuses each year).

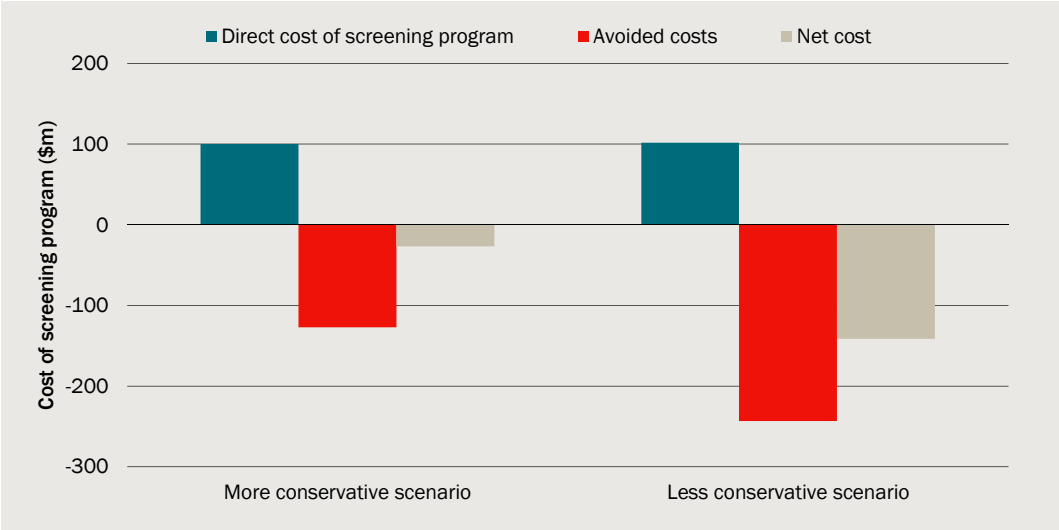
- A scenario analysis to test variance in results based on variation in the rate of prevalence, rate of detection and probability of termination shows that the ratio of avoided costs to costs from screening for congenital abnormalities at 18–20 weeks ranges from 1.27:1 to 2.39:1 (see Figure E2). Hence, using the more conservative (but plausible) assumptions, benefits exceed costs by a small amount, and using more bullish assumptions, benefits exceed costs but still by a relatively modest amount.
- Ultimately, the results of the economic evaluation is that screening for congenital abnormalities at 18–20 weeks is most likely to be moderately cost-effective, but without generating substantive risks or benefits.
- There are additional, unquantified impacts from the positive psychological value of the information particularly for mothers, which may be associated with improvements in fetal wellbeing, and benefits from the detection of placental problems and confirmation of gestational age.

Figure E1: Estimated costs of screening program in Australia



Data source: The CIE.

Figure E2: Scenario testing — more and less conservative scenarios



Data source: The CIE.

Key findings

- The routine offering of a fetal development and anatomy ultrasound scan to pregnant women between 18 and 20 weeks gestation is current practice in Australia, although there is no previously published cost-effectiveness evidence to support this.
- International studies are of limited significance to Australia and economic modelling has required various assumptions to be made, which are supported by the evidence that exists.
- The results of this economic evaluation is that screening for congenital abnormalities at 18–20 weeks is moderately cost-effective, without generating significant risks, although without driving substantive benefits. Costs are estimated at $100.7 million annually (approximately $46,000 – $68,000 per fetal abnormality detected depending on severity) with benefits (avoided costs) of $172.4 million. Hence benefits exceed costs by 1.71:1.
- This excludes the positive psychological value of the information, which may be associated with improvements in fetal wellbeing, and benefits from the detection of placental problems and confirmation of gestational age, making these estimates fairly conservative.

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Screening for Group B streptococcus

Purpose of the analysis

In 2002, the Centre for Disease Control and Prevention recommended routine screening of all pregnant women to prevent early-onset group B streptococcus disease in newborns.

In Australia today, most institutions adopt either a:

- risk-factor approach to screening, whereby women with certain risk-factors are given intrapartum antibiotic prophylaxis (IAP) to prevent transmission; or
- routine screening approach where women are tested for GBS colonisation at 35–37 weeks — women who are preterm and have not been screened will be given IAP and women with fever will be given IAP regardless of colonisation status.

This economic evaluation assesses the cost-effectiveness of these prevention strategies to support national evidence-based antenatal care guidelines.

Clinical outcomes largely relate to early onset group B streptococcus disease cases avoided

The principle measured health outcome adopted in international studies is the cost of early onset group B streptococcus disease cases avoided.

Other outcomes that could be examined have proved difficult to quantify under the screening strategy, such as the increased use of antibiotics, restriction of birthing options and maternal stress associated with test results.

Modelling results

Economic analysis of screening (with or without providing IAP in the presence of risk factors) does not support the cost effectiveness of intervention to prevent early onset group B streptococcus disease.

This is because of the relatively low number of neonates affected and the absence of valid data on severe/long-term health effects in the event of infection.

Of the three strategies examined, economic modelling shows that routine screening only is slightly more cost-effective than routine screening with treatment for certain risk factors when the comparator is 'doing nothing'.

- Routine screening has an incremental cost-effectiveness ratio (ICER) of $71,600 per early onset group B streptococcus disease case avoided while routine screening with IAP for certain risk factors has an ICER of $73,500 per early onset group B streptococcus disease case avoided compared to the 'do nothing' alternative.
- When comparing total benefits and total costs, the benefit cost ratio ranges from 0.15–0.21 across the strategies. That is, costs are considerably higher than the benefits across all strategies examined. This reflects the low proportion of neonates that have colonisation, and the (only) partial effectiveness of IAP in preventing transmission.
- However, the economic analysis excludes any long-term costs associated with disability from early onset group B streptococcus disease due to the lack of consistent clinical evidence on disability impacts. If evidence of long effects emerged, these results would need to be revisited.
- Sensitivity testing to reflect the range of costs in the literature changes the order of magnitude of the results, but does not change the ultimate finding that quantifiable costs outweigh quantifiable benefits.

Key findings

- Economic analysis of screening (in some cases in conjunction with providing intrapartum antibiotic prophylaxis) to prevent early onset group B streptococcus disease does not provide support for broad-based intervention measures.
- Based on measurable benefits, none of the strategies examined are cost effective relative to 'doing nothing' — that is, the benefits do not outweigh the costs involved. This is because of the relatively low number of newborns affected and the absence of robust data on severe/long-term health effects in the event of infection.
- That said, it is acknowledged that the low number of newborns affected could be the product of screening practices, and without screening this could possibly change over time.
- Of the three strategies examined, routine screening (and to a lesser extent screening and treatment for risk factors) appears to be most cost effective, however, the result is not necessarily definitive enough to guide clinical choice.

Screening for thyroid dysfunction

Purpose of the analysis

This report provides the groundwork for evaluating the strategies in light of the current evidence. It highlights the main data gaps that need to be filled before a more comprehensive economic evaluation can be performed.

Available clinical evidence

The potential clinical outcomes and impact of subclinical thyroid dysfunction during pregnancy have been the subject of much debate.

Where (limited) evidence exists, adverse clinical outcomes are limited to hyperthyroidism and hypothyroidism if overt, or subclinical when thyroid peroxidase antibodies are present.

At this stage, there is not enough clinical evidence so show that treatment reduces adverse obstetrical and neonatal outcomes, and there are no economic evaluations relevant to Australia that enable an assessment of the impact of a potential routine screening program for thyroid dysfunction to detect women with hypothyroidism that have not already been diagnosed.

The additional clinical evidence required for a complete economic evaluation includes adverse outcomes caused by subclinical hypothyroidism, the effectiveness of thyroxine replacement therapy in improving these outcomes, and the accuracy of the tests.

There needs to be robust evidence that treatment works, and that any benefits can be attributed to the screening in order for a complete economic evaluation to be undertaken.

Key findings

- There are no relevant Australian economic evaluations in the literature that are directly relevant to this review
- There is uncertainty surrounding key parameters that must be addressed before a robust economic evaluation can be performed
- The clinical evidence required for a comprehensive economic evaluation includes data on:
  - adverse outcomes caused by subclinical hypothyroidism and adverse obstetrical and neonatal outcomes
  - the effectiveness of thyroxine replacement therapy in improving on hypothyroid pregnant women and the associated reduction in adverse obstetrical and neonatal outcomes; and
  - the accuracy of the tests that use pregnancy-specific ranges relevant to the population that may be influenced by iodine deficiency on the population

Acronyms and abbreviations

25-OHD	25-hydroxyvitamin D
AACR	Australasian Association of Cancer Registries
AAFP	American Academy of Family Physicians
AAOS	American Academy of Orthopaedic Surgeons
AAP	American Academy of Pediatrics
ABS	Australian Bureau of Statistics
ACOG	American College of Obstetricians and Gynecologists
AFI	amniotic fluid index
AGREE	Appraisal of Guidelines Research and Evaluation
AHMAC	Australian Health Ministers' Advisory Council
AHMC	Australian Health Ministers' Conference
AIFS	Australian Institute of Family Studies
AIHW	Australian Institute of Health and Welfare
ANZSA	Australian and New Zealand Stillbirth Association
APA	American Psychiatric Association
APHDPC	Australian Population Health Development Principal Committee
ATAPS	Access to Allied Psychological Services
BMI	body mass index
CBR	consensus-based recommendation
CDC	Centers for Disease Control and Prevention (United States)
CDSMC	Community and Disability Services Ministers' Conference
CEH	Centre for Culture Ethnicity and Health
CER	Centre for Epidemiology and Research
CGE	Centre for Genetics Education (NSW Health)
CI	confidence interval
COAG	Council of Australian Governments
CRL	crown–rump length
CTFPHE	Canadian Task Force on the Periodic Health Examination
DNA	deoxyribonucleic acid
DoHA	Department of Health and Ageing
EAC	Expert Advisory Committee
ECCI	European Congenital Cytomegalovirus Initiative
ECV	external cephalic version
EIA	enzyme immunoassay
EPDS	Edinburgh Postnatal Depression Scale
FGM	female genital mutilation
FSANZ	Food Standards Australia and New Zealand
GORD	gastro-oesophageal reflux disorder
GP	general practitioner
HAPO	Hyperglycemia and Adverse Pregnancy Outcome Study
HIV	human immunodeficiency virus

HoRSCHA	House of Representatives Standing Committee on Health and Ageing
HPV	human papilloma virus
IARC	International Agency for Research on Cancer
IOM	Institute of Medicine (United States)
MCH	mean corpuscular haemoglobin
MCV	mean corpuscular volume
mmHg	millimetres of mercury
MSIJC	Maternity Services Inter-Jurisdictional Committee
NAAT	nucleic acid amplification test
NAATI	National Association of Accreditation for Translators and Interpreters
NACCHO	National Aboriginal Community Controlled Health Organisation
NCHECR	National Centre for HIV Epidemiology and Clinical Research
NCSP	National Cervical Screening Program
NHMRC	National Health and Medical Research Council
NICE	National Institute for Health and Clinical Excellence
NNDSS	National Notifiable Diseases Surveillance System
NPS	National Prescribing Service (UK)
NT DHCS	Northern Territory Department of Health and Community Services
NZCM	New Zealand College of Midwives
OR	odds ratio
PAPP-A	pregnancy-associated placental protein-A
PCR	polymerase chain reaction
PHAC	Public Health Agency of Canada
PP	practice point
RACGP	Royal Australian College of General Practitioners
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
RCOG	Royal College of Obstetricians and Gynaecologists (United Kingdom)
RCT	randomised controlled trial
RNA	ribonucleic acid
RR	relative risk
SIDS	sudden infant death syndrome
SOGC	Society of Obstetricians and Gynaecologists of Canada
TGA	Therapeutic Goods Administration
TSH	thyroid-stimulating hormone
USPFTS	United States Preventive Services Task Force
WHA	Women's Hospitals Australasia
WHO	World Health Organization
β-hCG	beta-human chorionic gonadotrophin

Glossary

Aboriginal and Torres Strait Islander peoples: It is recognised that there is no single Aboriginal or Torres Strait Islander culture or group, but numerous groupings, languages, kinships, and tribes, as well as ways of living. Furthermore, Aboriginal and Torres Strait Islander peoples may currently live in urban, rural or remote settings, in urbanised, traditional or other lifestyles, and frequently move between these ways of living.

Amniocentesis: A diagnostic test for chromosomal abnormalities, such as trisomy 21 (Down syndrome), where an ultrasound guided needle is used to extract a sample of the amniotic fluid.

Amniotic fluid volume:

Antiretroviral treatment: the use of medicines to reduce growth of retroviruses, primarily HIV.

Cardiotocography:

Chorionic villus sampling (CVS): diagnostic test for chromosomal abnormalities such as trisomy 21 (Down syndrome) where an ultrasound guided needle is used to extract a sample of the placenta.

Cleft lip and/or palate: variations of a congenital abnormality caused by non-fusion of embryonic facial lobes.

Cognitive-behavioural therapy: Psychological therapy based on the assumption that faulty thinking patterns, maladaptive behaviours and "negative" emotions are all inter-related. Treatment focuses on changing an individual's thoughts (cognitive patterns) or maladaptive behaviours in order to change emotional states. Cognitive-behavioural therapy integrates the cognitive restructuring approach of cognitive therapy with the behavioural modification techniques of behavioural therapy.

Migrant and refugee women: Applies to women whose first language is one other than English, or whose family background involves migration from a non-English speaking country. It can refer to new arrivals to Australia as immigrants or refugees from non-English speaking countries as well as the children of migrant parents.

Ectopic pregnancy: a pregnancy in which implantation of the fertilised egg takes place outside the uterus, usually in a fallopian tube. Ectopic pregnancies usually result in miscarriage but can cause rupture of the fallopian tube and severe internal bleeding.

Edinburgh Postnatal Depression Scale (EPDS): The EPDS was developed and validated as a screening tool for depression in the postnatal period. It has subsequently been validated for use in pregnant women and is therefore appropriate for use throughout the perinatal period.

First antenatal visit – The first visit specifically for antenatal care following confirmation of the pregnancy.

Herbal medicines: Preparations such as tablets, tinctures and infusions that are made from plant parts. These preparations are usually formulated based on traditional uses of Western or Chinese herbs.

Induction of labour: A procedure to artificially start the process of labour by way of medical, surgical or medical and surgical means.

Low birth weight: Birth weight of less than 2500g.

Maternal serum screening: A blood test performed during pregnancy to detect markers of chromosomal abnormality, such as trisomy 21 (Down syndrome).

Miscarriage: the spontaneous end of a pregnancy at a stage where the embryo or fetus is incapable of surviving independently, generally defined in humans as before 20 weeks.

Nuchal translucency thickness assessment: An ultrasound scan performed between 11 and 13 weeks of pregnancy that measures the thickness of the nuchal fold behind the baby's neck – a marker of chromosomal abnormality, such as trisomy 21 (Down syndrome).

Oligohydramnios:

Passive smoking: The inhalation of smoke, called second-hand smoke or environmental tobacco smoke, from tobacco products used by others.

Perinatal period: For the purposes of these guidelines, 'perinatal' is defined as the period covering pregnancy and the first year following pregnancy or birth. It is acknowledged that other definitions of this term are used for data collection and analysis. The definition used here broadens the scope of the term perinatal in line with understanding of mental health in pregnancy and following birth.

Pernicious anaemia: An autoimmune condition that results in an inability to absorb vitamin B_{12}.

Placenta praevia: An obstetric complication in which the placenta is attached to the uterine wall close to or covering the cervix.

Placental abruption: A potentially life-threatening obstetric complication in which the placental lining separates from the uterus of the mother.

Preterm birth*:* Birth at less that 37 weeks gestation.

Proteinuria:

Psychological:

Psychosocial:

Pyelonephritis: an ascending urinary tract infection that has reached the pyelum (pelvis) of the kidney.

Stillbirth: The birth of a baby that has died in the uterus after 20 weeks of pregnancy or reaching a weight of more than 400g if gestational age is unknown.

Sudden infant death syndrome: a syndrome marked by the sudden death of an infant that is unexpected by history and remains unexplained after a thorough forensic autopsy and a detailed death scene investigation.

Woman-focused communication skills: These involve techniques and attitudes that indicate respect for the woman, a willingness to listen to her perspectives, values and current life circumstances around antenatal concerns, and not direct the woman into any particular course of action. Woman-centred communication skills can include giving appropriate information, but always includes communication that views the woman as a capable and responsible person, and creates a respectful, supportive and effective alliance between the woman and the health professional.

Methodological terms

ADAPTE framework: A systematic approach to aid in the adaptation of guidelines produced in one setting to be used in a different cultural and/or organisational context.

AGREE: A framework for assessing the quality of clinical practice guidelines, including that the potential biases of guideline development have been addressed adequately and that the recommendations are both internally and externally valid, and are feasible for practice. This process involves taking into account the benefits, harms and costs of the recommendations, as well as the practical issues attached to them. Therefore, the assessment includes judgements about the methods used for developing the guidelines, the content of the final recommendations, and the factors linked to their uptake.

Citation bias: The citation or non-citation of research. Citing of trials in publications is not objective so retrieving studies using this method alone may result in biased results. Unsupported studies tend to be cited often which may also bias results.

Consensus-based recommendation: Recommendations based on systematic review of the literature where evidence is found to be limited or lacking.

Language bias: The publication of research findings in a particular language. Significant results are more likely to be published in English so a search limited to English-language journals may result in an overestimation of effect.

Multiple publication bias— The multiple or singular publication of research findings. Studies with significant results tend to be published multiple times which increases the chance of duplication of the same data and may bias the results of a review.

Odds ratio: the ratio of the likelihood of an event occurring in one group to that of it occurring in another group. An odds ratio of 1 indicates that the condition or event under study is equally likely to occur in both groups. An odds ratio greater than 1 indicates that the condition or event is more likely to occur in the first group and an odds ratio less than 1 indicates that the condition or event is less likely to occur in the first group.

Outcome reporting bias: The selective reporting of some outcomes but not others. Outcomes with favourable findings may be reported more. For example, adverse events have been found to be reported more often in unpublished studies. This may result in more favourable results for published studies.

Practice point: For the purposes of these Guidelines, these cover areas of antenatal care that were beyond the scope of the literature reviews but where the EAC or Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care determined there was a need for advice. These points are based on best practice clinical judgement.

Publication bias: The publication or non-publication of research findings. Small, negative trials tend not to be published and this may lead to an overestimate of results of a review if only published studies are included.

Randomised controlled trial: A study in which participants are allocated at random to receive one of several clinical interventions. One of these interventions is the standard of comparison or control. The control may be a standard practice, a placebo or no intervention at all.

Recommendation: Evidence-based action statement developed through systematic review of the literature and graded based on consideration of the evidence base, consistency of the evidence, clinical impact of the proposed recommendation and generalisability and applicability of the evidence.

Relative risk: The ratio of the risk (rate) of an outcome in an exposed group (eg to a specific medicine) to the risk (rate) of the outcome in an unexposed group in a specified time period.

Sensitivity: The proportion of people with the condition who have a positive test result.

Specificity: The proportion of people without the condition who have a negative test result.

Systematic literature review: A systematic review of evidence focused on a research question(s) that aims to identify, appraise, select and synthesise all high quality research evidence relevant to that question.

Time-lag bias: The rapid or delayed publication of research findings. Studies with positive results tend to be published sooner than studies with negative findings and hence results may be overestimated until the negative studies 'catch up'.