

Routine antenatal management later in pregnancy

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Abstract

Routine antenatal care in later pregnancy is designed to detect problems that require specialist input and to reassure the woman that the pregnancy is healthy and progressing well. This review focuses on several different aspects of antenatal care in later pregnancy and specific problems that may arise. The article discusses the recommended assessments and investigations based on current guidelines and evidence.

Keywords routine antenatal care; screening in obstetrics

Introduction

Inadequate utilisation of antenatal services has been shown to be associated with an increased risk of maternal and perinatal death in the UK. The Saving Lives, Improving Mother's Care MBRRACE report from 2018 identified that 12% of the women who died received no antenatal care and amongst the women that did access antenatal care, 71% did not receive the recommended schedule of care. The 2016 MBRRACE Perinatal Mortality Surveillance report highlighted that the mothers of 5.1% of stillbirths and 2.7% of neonatal deaths were documented as poor antenatal attenders.

NICE recommends that for a nulliparous woman with no complications, a schedule of 10 appointments should be adequate. These include: the booking visit, a dating scan between 10 + 0–13 + 6 weeks at which screening for Down's syndrome should also be offered, 16 weeks, 18 + 0–20 + 6 weeks for an anomaly ultrasound scan, 25, 28, 31, 34, 36, 38, 40 and 41 weeks. Seven appointments are recommended for multiparous women with an uncomplicated pregnancy. Women with additional risk factors should be offered a schedule of care tailored to their individual needs.

Monitoring fetal growth

Stillbirth rates in the UK are among the highest in high income countries. The Saving Babies' Lives care bundle identifies four elements of care to reduce this; reducing smoking, raising awareness of fetal movements, effective fetal monitoring during

labour and improving identification of fetal growth restriction. A cohort study of 389 stillbirths found that unrecognised fetal growth restriction is the biggest risk factor for stillbirth.

Small for gestational age (SGA) refers to a baby with a birth weight less than the 10th centile. Symphysis fundal height (SFH) measurement is recommended at every antenatal appointment from 24 weeks' gestation as this improves the detection of an SGA baby. A large study of 2941 women showed SFH measurement to have a sensitivity of 27% and a specificity of 88% for detecting an SGA fetus. Although it has not been shown to be very predictive for an SGA baby, SFH measurement is cheap, requires minimal equipment and is recommended by both NICE and RCOG guidelines. The limitations of SFH measurements include variation between different practitioners, however, taking repeated measurements and serial SFH measurements may improve accuracy. The RCOG guideline for the Investigation and Management of the Small-for-Gestational Age fetus states that SFH measurements should be plotted on a customised growth chart as this may improve prediction of an SGA baby.

Factors such as maternal obesity, abnormal fetal lie, fibroids, polyhydramnios, oligohydramnios and engagement of the head may affect the SFH, and therefore may contribute to the limited predictive value. Women with factors that may make growth surveillance by SFH measurement unreliable, should be offered serial growth ultrasound scans.

All women should be assessed at their antenatal booking appointment for risk factors for an SGA baby. Women with risk factors for an SGA fetus should be offered serial growth ultrasound scans. The RCOG SGA guideline divides risk factors into major and minor (Table 1). Women with one major risk factor should be referred for serial growth scans with umbilical artery Dopplers from 26 to 28 weeks' gestation. Women with three or more minor risk factors should be referred for uterine artery Dopplers between 20 and 24 weeks' gestation. Women with normal uterine artery Dopplers do not require serial growth scans unless they develop specific pregnancy complications but should be offered an additional growth scan with umbilical artery Dopplers during the third trimester. Women with abnormal uterine artery Dopplers should be referred for serial growth scanning with umbilical artery Dopplers from 26 to 28 weeks.

Women should be referred for an ultrasound assessment of fetal size if a single SFH measurement plots below the 10th centile or if serial measurements show slowed or static growth.

Obesity in pregnancy

Obesity in pregnancy is associated with an increased chance of developing both antenatal and intrapartum complications. These include an increased risk of gestational diabetes, pre-eclampsia, venous thromboembolism, prolonged pregnancy and stillbirth. Obese women also have a higher chance of requiring caesarean section, of experiencing a shoulder dystocia or postpartum haemorrhage and needing a neonatal unit admission for the neonate.

Consideration should be given to reweighing obese pregnant women during the third trimester to inform plans regarding equipment and staffing requirements during labour and birth. Women with a booking BMI ≥ 40 should have a moving and handling and tissue viability assessment during the third trimester of pregnancy. The tissue viability assessment is

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Risk factors for small for gestational age neonate

	Minor	Major
Maternal Risk Factors		
Age	Age >35	Age >40
Parity	Nulliparous	
Maternal Substance Exposure	Smoker 1–10 cigarettes/day Cocaine	Smoker >10 cigarettes/day
IVF	IVF singleton pregnancy	
Exercise		Daily Vigorous exercise
Diet	Low fruit intake pre-pregnancy	
Previous Pregnancy Risk Factors	Previous pregnancy interval <6 months Pregnancy interval >60 months	Previous SGA baby Previous Stillbirth
Maternal Medical History		SGA Chronic Hypertension Diabetes and Vascular Disease Renal Impairment Antiphospholipid Syndrome Paternal SGA
Paternal History		Paternal SGA

Adapted from Greentop Guideline no 31: The Investigation and Management of the Small-for- Gestational- Age Fetus

Table 1

recommended as a BMI ≥ 40 is a risk factor for developing pressure sores.

Women with a booking BMI ≥ 40 should have an antenatal assessment with an anaesthetist to assess for potential difficulties with venous access, regional and general anaesthesia and to develop an anaesthetic plan for labour and birth.

Obese women should have the opportunity to have a birth planning discussion with an obstetrician. This should incorporate a discussion regarding place of birth, in view of the increased chance of intrapartum interventions and complications. Women with a BMI ≥ 35 should be recommended to give birth within a consultant led unit; however, multiparous obese women who are otherwise low risk may be suitable for birth in an alongside midwifery led unit as their chance of requiring obstetric care in labour may be lower than a low risk first time mother. Women who have had a previous caesarean section should have an individualised discussion regarding mode of birth as obesity is associated with a lower chance of a successful vaginal birth after caesarean section and a BMI ≥ 40 is associated with an increased chance of uterine scar rupture.

Obese pregnant women have an increased chance of having a prolonged pregnancy or a stillbirth. A recent retrospective cohort study suggests that induction of labour at term for

obese women may reduce the chance of requiring caesarean section. In view of these factors, obese women should have an individualised discussion regarding timing of birth.

Detection of hypertensive disorders of pregnancy

Hypertensive disorders in pregnancy are categorised as gestational hypertension or pre-eclampsia. Gestational hypertension is defined as hypertension without proteinuria in which the first onset is during pregnancy and resolves after pregnancy. Pre-eclampsia is a multi-system disorder defined by the first onset of hypertension after 20 weeks' gestation with associated significant proteinuria that resolves after delivery. Pre-eclampsia affects 2–5% of women in pregnancy.

Blood pressure measurement (with an appropriately sized cuff) and urinalysis should be performed at every antenatal contact. Women at high risk of hypertensive disorders should have the frequency of visits tailored to their individual needs. Hypertension in pregnancy is defined as two blood pressure readings of $\geq 140/90$ mmHg taken at least 4 h apart. Women who present with gestational hypertension before 32 weeks' gestation should be offered twice weekly visits. The presence of symptoms of pre-eclampsia, including headache, epigastric pain, vomiting, and visual disturbances, should prompt review and possible admission.

When proteinuria is present on urinalysis with a result of $\geq 1+$ of protein, this should be quantified. This can be by protein:creatinine ratio or a 24-h urine collection. Significant proteinuria is defined as protein:creatinine ratio >30 mg/mmol or a 24-h urine collection with more than 300 mg of protein. Pre-eclampsia may initially present with proteinuria in the absence of hypertension so increased surveillance should be undertaken if detected.

Monitoring and treatment for gestational hypertension and pre-eclampsia are summarised in [Tables 2 and 3](#).

The aim of blood pressure management for all pregnant women should be to keep the blood pressure below 150/100mmHg. The HYPITAT study looked at women with gestational hypertension who were randomised to either induction of labour or expectant management and found that induction of labour was associated with improved maternal outcomes and should be recommended for women with mild hypertensive disease beyond 37 weeks' gestation.

Women with pre-eclampsia should be managed as an inpatient, ideally conservatively until 34 weeks' gestation. Women with pre-eclampsia with severe hypertension should be offered birth after 34 weeks once their blood pressure is controlled. For women who are between 34 and 36 + 6 weeks' gestation with pre-eclampsia and mild to moderate hypertension, decisions regarding timing of birth should be dependent on both maternal and fetal wellbeing. Women diagnosed with pre-eclampsia after 37 weeks should be offered birth within 24–48 h. Women with severe refractory hypertension should be offered birth following a course of corticosteroids (if required). (See also Hypertension in pregnancy. *Obstetrics, Gynaecology & Reproductive Medicine* 2018; **28** (5): 141–147).

Screening for gestational diabetes

Up to 5% of pregnant women have pre-existing or gestational diabetes. The incidence of gestational diabetes is increasing due

Management of pregnancy with Gestational Hypertension (no proteinuria)

Degree of hypertension	Mild hypertension (140/90 to 149/99 mmHg)	Moderate hypertension (150/100 to 159/109 mmHg)	Severe hypertension (160/110 mmHg or higher)
Admit to hospital	No	No	Yes (until blood pressure is 159/109 mmHg or lower)
Treat	No	With oral labetalol (as first line) to keep: Diastolic BP between 80 and 100 mmHg, Systolic <150 mmHg	With oral labetalol (as first line) to keep: Diastolic BP between 80 and 100 mmHg, Systolic <150 mmHg
Measure blood pressure	Not more than once a week	Not more than twice a week	At least four times a day
Test for proteinuria	At each visit using automated reagent-strip reading device or urinary protein:creatinine ratio	At each visit using automated reagent-strip reading device or urinary protein:creatinine ratio	Daily using automated reagent-strip reading device or urinary protein:creatinine ratio
Blood tests	Only those for routine antenatal care	Test kidney function, electrolytes, full blood count, transaminases, and bilirubin. Do not carry out further blood tests if no proteinuria at subsequent visits	Test at presentation and then monitor weekly: kidney function, full blood count, transaminases, and bilirubin

Adapted from NICE guideline: Hypertension in pregnancy: diagnosis and management 2011

Table 2

to higher rates of obesity and more pregnancies in older women. Gestational diabetes is associated with macrosomia, shoulder dystocia, stillbirth and neonatal hypoglycaemia if glucose levels are uncontrolled. The 2015 NICE guidelines recommend screening women with the following risk factors:

- BMI >30 kg/m²
- Previous macrosomic baby weighing 4.5 kg or above
- Previous gestational diabetes
- Family history of diabetes (first degree relative)
- Family origin with a high prevalence of diabetes
 - South Asian
 - Black Caribbean
 - Middle Eastern

These women should be offered screening between 24 and 28 weeks. In addition, those with a BMI >40 kg/m² or a previous history of GDM should be screened early in the pregnancy (by 16 weeks). If the result is normal, they should have their screening repeated at 24–28 weeks. Any women who presents with glycosuria 2+ on one occasion or 1+ on more than one occasion, should be offered screening for gestational diabetes.

A 2-h 75 g oral glucose tolerance test or self-monitoring of blood glucose should be carried out. A diagnosis of gestational diabetes is made when women have either.

- A fasting plasma glucose of 5.6 mmol/L or above or
- A 2-h plasma glucose level of 7.8 mmol/L or above.

Prior to testing women should be counselled regarding the following:

- In some women gestational diabetes will respond to diet and exercise; however, the majority of women will require oral blood glucose-lowering agents or insulin therapy

- If gestational diabetes is not detected and treated, there is a small increase in the risk of birth complications such as shoulder dystocia.
- A diagnosis of gestational diabetes will lead to increased monitoring and may lead to increased intervention in pregnancy and labour.
- Good blood glucose control throughout pregnancy, however, will reduce the risk of fetal macrosomia, trauma during birth (for mother and her baby), induction of labour/caesarean section, neonatal hypoglycaemia and perinatal death (See also Gestational diabetes. *Obstetrics, Gynaecology & Reproductive Medicine* 2017; 27 (6): 171–176.)

Red cell antibody screening and prophylactic anti-D

All women should be recommended to have their blood group and rhesus D status determined in early pregnancy. During pregnancy, small amounts of fetal blood can enter the maternal circulation and in women who are rhesus D negative, the presence of fetal rhesus D positive red cells in the maternal circulation can cause the mother to produce antibodies, a process called alloimmunisation. This can happen at any time during the pregnancy but most commonly occurs in the third trimester or at delivery. Isoimmunisation can also occur following events associated with fetomaternal haemorrhage such as medical interventions (i.e. invasive testing and external cephalic version) surgical management of miscarriage, termination of pregnancy, late miscarriages, antepartum haemorrhage and abdominal trauma. These sensitising events do not usually affect the current pregnancy, however, in a subsequent pregnancy the maternal

Management of pregnancy with pre-eclampsia

Degree of hypertension	Mild Hypertension (140/90–149/99 mmHg)	Moderate Hypertension (150/100–159/109 mmHg)	Severe Hypertension (160/110 mmHg or higher)
Admit to hospital	Yes	Yes	Yes
Treat	No	With oral labetalol (1 st line) to keep: Diastolic BP between 80 and 100 mmHg, Systolic BP < 150 mmHg	With oral labetalol (1 st line) to keep: Diastolic BP between 80 and 100 mmHg, Systolic BP <150 mmHg
Measure blood pressure	At least four times a day	At least four times a day	More than four times a day, depending on clinical circumstances
Test for proteinuria	Do not repeat quantification of proteinuria	Do not repeat quantification of proteinuria	Do not repeat quantification of proteinuria
Blood tests	Monitor using the following tests twice a week: kidney function, electrolytes, full blood count, transaminases, and bilirubin	Monitor using the following tests three times a week: kidney function, electrolytes, full blood count, transaminases, and bilirubin	Monitor using the following tests three times a week: kidney function, electrolytes, full blood count, transaminases, and bilirubin

Adapted from NICE guideline: Hypertension in pregnancy: diagnosis and management 2011

Table 3

immunoglobulin G (IgG) antibodies can cross the placenta and cause haemolytic disease of the fetus and newborn, which can lead to severe fetal anaemia, heart failure, hydrops and intra-uterine death.

Current practice is to routinely offer rhesus D-negative women prophylactic anti-D. This is offered during pregnancy and after delivery (if the baby is rhesus D-positive). Additional anti-D is offered within 72 h of any sensitising events. This has reduced the incidence of sensitisation from 16% to below 2%. Prophylactic anti-D can be given either as 2 doses (500 IU) at 28 weeks and 34 weeks, or as a single dose between 28 and 30 weeks (1500 IU). NICE guidance advises that this should be offered to all pregnant women who are Rh D negative.

All pregnant women should be offered repeat screening for red cell antibodies at 28 weeks' gestation.

Anti-D is produced from the pooled plasma of D-negative people who have had a transfusion of D positive red cells to stimulate the production of D antibodies and is therefore a finite resource. As it is a blood product it is also associated with the same risks as other blood products. Non-invasive prenatal testing (NIPT) is being used in some areas to reduce the demand for prophylactic anti-D. NIPT involves taking a sample of maternal blood and looking for cell-free fetal DNA (small fragments of fetal extracellular DNA shed from the placenta). The possible results obtained from testing are "D-positive", "D-Negative" or "indeterminate – treat as D-positive". Women who have a D-positive or indeterminate result should be offered prophylactic anti-D and anti-D after any potentially sensitising events, in line with current guidelines. Women with a D-negative result do not require prophylactic anti-D during pregnancy or after sensitising events,

thus reducing the woman's exposure to blood products. To reduce sensitisations from missed D-positive fetuses, postpartum cord blood typing can be carried out and anti-D administered if necessary. Widespread adoption of this strategy would result in only three extra sensitisations per 100,000.

Venous thromboembolism prevention

Venous thromboembolism (VTE) remains the leading cause of direct maternal deaths. There has been no significant change in maternal mortality due to venous thromboembolism since 2009 despite RCOG guidance on prevention and treatment of VTE in pregnancy. All women should undergo a documented assessment of risk factors for VTE in early pregnancy and this should be repeated during any antenatal admission and then intrapartum and immediately postpartum. The risk factors are summarised in Table 4. Any woman with two risk factors should be offered low molecular weight heparin (LMWH) for at least 10 days postnatally. Any woman with three risk factors should be offered LMWH from 28 weeks and will usually require prophylaxis for 6 weeks postnatally. If a woman has four or more risk factors, she should be offered LMWH throughout the pregnancy and for 6 weeks postnatally.

Admission to hospital during pregnancy is associated with an 18-fold increased risk of first VTE and in view of this, any woman who is admitted to hospital during pregnancy should usually be offered prophylactic LMWH unless there is a contraindication such as bleeding or risk of labour.

Women who have commenced antenatal LMWH should be advised not to take any further doses if they have any vaginal

Risk factors for Venous Thromboembolism in Pregnancy

Pre-existing	<p>Previous VTE Thrombophilia</p> <p>Medical co-morbidities e.g. cancer, heart failure, active SLE, inflammatory polyarthropathy or IBD, nephrotic syndrome, type 1 diabetes with nephropathy, sickle cell disease, current intravenous drug user</p> <p>Age >35</p> <p>Obesity (BMI ≥ 35) either pre-pregnancy or in early pregnancy</p> <p>Parity ≥ 3</p> <p>Smoking</p> <p>Gross varicose veins (symptomatic or above knee or with associated phlebitis, oedema/skin changes)</p> <p>Paraplegia</p>	<p><i>Heritable</i></p> <p>Antithrombin Deficiency</p> <p>Protein C deficiency</p> <p>Protein S deficiency</p> <p>Factor V Leiden</p> <p>Prothrombin gene mutation</p> <p><i>Acquired</i></p> <p>Antiphospholipid antibodies</p> <p>Persistent Lupus Anticoagulant and/or persistent moderate/high titre anticardiolipin antibodies and/or β_2- glycoprotein 1 antibodies</p>
Obstetric Risk factors	<p>Multiple pregnancy</p> <p>Current Pre-eclampsia</p>	
New onset/transient	<p>Any surgical procedure in pregnancy except immediate repair of perineum e.g. appendicectomy</p> <p>Bone fracture</p> <p>Hyperemesis, dehydration</p> <p>Ovarian hyperstimulation syndrome (1st trimester only)</p> <p>Admission or immobility (≥ 3 days bed rest)</p> <p>Current systemic illness (requiring intravenous antibiotics or admission to hospital)</p> <p>Long distance travel >4 h</p>	<p>Assisted reproduction technology, in vitro fertilisation</p> <p>e.g. pelvic girdle pain restricting mobility</p> <p>e.g. pneumonia, pyelonephritis</p>

Adapted from Greentop Guideline 37a: Reducing the Risk of Venous Thromboembolism during Pregnancy and the Puerperium April 2015

Table 4

bleeding or labour begins, until they have been assessed on admission to hospital. They should also be counselled that regional anaesthesia should be avoided for at least 12 h after prophylactic LMWH. If a woman has had therapeutic LMWH, regional anaesthesia should be avoided for at least 24 h (See also Venous thromboembolism in pregnancy. *Obstetrics, Gynaecology & Reproductive Medicine*, 2018; **28** (11/12); 360–365.).

Exercise in pregnancy

Moderate exercise of 150 min a week is advised for all pregnant women; women should be advised that beginning or continuing a moderate course of exercise during pregnancy is not associated with adverse outcomes. A 2015 Cochrane review identified a

number of potential benefits from exercise and dietary advice, including a reduction in excessive gestational weight gain. The review also identified that there may be benefits such as a lower chance of requiring caesarean delivery, and reduced risks of macrosomia, gestational hypertension and neonatal respiratory morbidity, particularly for high risk women.

Vaccination in pregnancy

The seasonal flu vaccine should be offered to every pregnant woman during the flu season (September to May) to reduce maternal morbidity and mortality from flu. There was a significant decrease in indirect maternal deaths between the 2010-2012 and 2013-2015 trienniums due to the decrease in influenza. The

MBRRACE Maternal Mortality report 2017 looked at sepsis specifically and stressed that increasing immunisation rates must remain a public health priority.

Pertussis (whooping cough) is a highly infectious disease characterised by intense, heavy coughing. Pregnant women who receive the pertussis vaccine produce antibodies to the virus that cross the placenta to their baby, offering a degree of passive protection to the baby after birth. This passive protection is important as babies under the age of one who catch Pertussis are at a greater risk of developing complications such as pneumonia. Women should be offered vaccination ideally by 32 weeks' gestation; vaccination can be offered after 32 weeks but there may not be as high a level of passive protection to the baby.

Assessing fetal presentation

Abdominal palpation to assess the fetal presentation is recommended from 36 weeks' gestation when the presentation of the fetus is likely to influence the plans made for birth. When a malpresentation is suspected, the presentation of the fetus should be confirmed by ultrasound scan. When a breech or other malpresentation is confirmed, management options should be discussed with the woman.

Induction of labour

NICE guidance recommends offering induction of labour between 41 and 42 weeks' gestation for prolonged pregnancy. At the 38 week appointment, the risks of pregnancy beyond 42 weeks should be discussed and options given. These include: membrane sweep, induction of labour and expectant management. Inducing labour after 41 weeks reduces the risk of stillbirth, meconium aspiration and Caesarean delivery. If a woman chooses expectant management beyond 42 weeks, they should be offered increased monitoring consisting of twice weekly CTG and ultrasound scans.

A Cochrane review in 2018 that looked at 30 trials including over 12,000 women found that offering induction of labour compared with expectant management is associated with fewer deaths of babies and fewer Caesarean sections but increased assisted vaginal deliveries. However, the best time to offer induction of labour at or after term was not clear and the authors stated that this needed further investigation. ◆

Practice points

- Inadequate utilisation of antenatal services has been shown to be associated with an increased risk of maternal and perinatal death in the UK
- All women should undergo a documented assessment of risk factors for VTE in early pregnancy and at every admission as VTE remains the leading cause of direct maternal deaths.
- Unrecognised fetal growth restriction is the biggest risk factor for stillbirth therefore all women should be assessed at their antenatal booking appointment for risk factors SGA baby and those with risk factors should be offered serial growth scans.

FURTHER READING

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