1 Antenatal care and risk assessment

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Introduction

Pregnancy is a physiological process during which most women remain well and require very little medical input. However, some women develop complications with significant morbidity or mortality for their baby and, occasionally, for themselves. Providers of antenatal care must be able to distinguish between these two groups of women and arrange with them an appropriate and personalized plan of care. Such a care plan could range from the simple, with no requirement for complex investigations and care, to the more challenging, requiring substantial medical expertise to enable adequate monitoring of the mother and the fetus. The purpose of antenatal care is to support the pregnant mother through her birth experience and to distinguish the normal from the at-risk pregnancy, identifying pregnancy risk factors and stratifying care to improve the chances of a successful pregnancy culminating in a healthy outcome.

Epidemiological and observational studies have demonstrated that women who receive antenatal care have better pregnancy outcomes, with lower maternal and perinatal mortality, than those who do not. These studies have also demonstrated an association between the number of antenatal visits and pregnancy outcomes after controlling for confounding factors such as the length of gestation.

Patterns and provision of antenatal care have changed enormously in recent years in response to the opinions of consumers, providers and professional associations, and government reports. The Department of Health's *Changing Childbirth* and *Maternity Matters* reports highlighted the need for women to be the focus of maternity care, with an emphasis on providing choice, easy access and continuity of care.[1,2] Pregnant women should be provided with care that enables them to make informed decisions about their options. Good antenatal care should focus on those practices that have been shown to be effective and have a favourable impact on maternal and fetal outcomes.

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What is the purpose of antenatal care?

The aim of antenatal care is to provide support for the pregnant mother and her family, which should culminate in a safe birth and recovery. In order to achieve this, the following care objectives should be met during this period:

- To provide advice, reassurance, education and support for the woman and her family.
- To deal with the minor ailments of pregnancy, such as abdominal discomfort, heartburn, backache, haemorrhoids, nausea and vomiting and varicose veins.
- To screen for, diagnose and manage pre-existing maternal disorders, such as diabetes, heart disease and infection. Screening for such conditions should continue until the end of pregnancy to confirm that women who screen negative at the beginning remain well throughout.
- To promptly identify and treat any new medical or obstetric problems arising in pregnancy, and, where possible, to prevent these from adversely affecting the health of the mother or her baby.
- To plan for labour and delivery, care of the newborn and future general and reproductive health.

Antenatal risk assessment

Defining the risk of adverse pregnancy outcome posed by identifiable clinical factors can help stratify and plan antenatal care for individual women. Risk assessment has underpinned the provision of antenatal care for several decades and can inform categorization into scores that determine clinical care. Applying this concept to antenatal care, Alexander and Keirse evaluated formal antenatal risk scoring for perinatal mortality, preterm delivery, intrauterine growth restriction and low Apgar score at birth.[3] They found that risk scoring performed poorly in identifying women at risk of these conditions. One reason for this observation may have been the well-known fact that screening is more effective in multiparous than nulliparous women, partly attributable to the fact that most risk markers are based on events in previous pregnancies. For risk scoring to be beneficial in antenatal care, the component factors need to have high predictive values for the adverse pregnancy outcome that they are anticipated to predict. If this is not the case, then risk scoring may result in more harm than good. Women who are labelled as being at increased risk of an adverse outcome may suffer unnecessary stress and anxiety and will be exposed to unnecessary investigations and interventions, some of which may be deleterious to the pregnancy at substantial avoidable cost to the taxpayer.

Despite the limitations of pregnancy risk scoring, assessing risk broadly can inform the care plan outlined at the beginning of antenatal care.

Assessing women for clinical risks should happen before pregnancy, throughout pregnancy, and in labour, as risk factors can change at any time during

gestation, sometimes necessitating a change in care plan and intervention to mitigate those risks. One study that evaluated risk scoring during pregnancy showed that while 96% of primigravidae were considered low risk in early pregnancy, only 39% remained low risk by the end of pregnancy, 57% having developed risk factors during pregnancy or labour. Similarly, 74% of multigravidae were categorized as low risk at booking, but by the end of labour only 48% remained low risk.[4] Since unidentified risk factors will arise during pregnancy and the majority of women will have required some form of obstetric input by the time they give birth, the value of formal risk scoring in early pregnancy has been questioned. Nevertheless, risk assessment at the beginning of pregnancy enables those women with risk factors for adverse pregnancy outcome to be identified early for appropriate referrals, so that those without identifiable risk factors can be deemed suitable for midwife/general practitioner antenatal care. For the latter group, locally agreed protocols, informed by national guidance where possible, should be established for the identification, referral and treatment of obstetric complications.

The common clinical conditions that are currently screened for during pregnancy are outlined below, in the section on the booking visit. In addition to those conditions for which supportive research evidence for screening exists, there are several pregnancy conditions that are not currently screened for routinely. It could prove reasonable to screen for some of these conditions routinely in the future if supportive research evidence, expert or consensus opinion or favourable cost–benefit considerations evolve.

Who should see women at antenatal visits, and where?

While the first antenatal contact with the pregnant woman should happen at her home or in a primary care facility such as the general practitioner (GP) surgery, and should usually be provided by the designated midwife, the formal booking clinic may be provided at the hospital, when, depending on the presence of any pregnancy risk factors, the woman may require to see an obstetrician as well. Furthermore, a hospital booking visit may enable the simultaneous conduct of ultrasound scan examinations and the performance of antenatal screening tests which may not have been feasible in the community for logistic reasons or because of gestational timing. Pregnancies not associated with any significant identifiable risk factors may then be followed up by community-based visits coordinated by the midwife or GP. Those pregnancies with risk factors that warrant obstetric input may require to be supervised by the obstetrician through regular hospital visits alternating with community-based care by the named designated midwife. Care is optimized when antenatal care is provided by a named group of professionals with whom the pregnant mother develops rapport and trust.

Antenatal interventions which are not routinely recommended

Antenatal care has traditionally involved many routine interventions with little or no research evidence of benefit. Such routine care interventions of no proven benefit include: repeated maternal weighing, breast or pelvic examination, iron or vitamin A supplementation, and routine screening for chlamydia, cytomegalovirus, hepatitis C virus, group B streptococcus, toxoplasmosis and bacterial vaginosis. The routine use of Doppler ultrasound to monitor low-risk uncomplicated pregnancies, ultrasound estimation of fetal size for suspected large-for-gestational-age unborn babies, and screening for gestational diabetes using fasting plasma glucose, random blood glucose, glucose challenge test or urinalysis are of no proven benefit. Similarly, routine fetal-movement counting, auscultation of the fetal heart, antenatal electronic cardiotocography and routine ultrasound scanning after 24 weeks have no supportive evidence of benefit in routine care of uncomplicated pregnancies.

Who should provide antenatal care?

In recent years, there has been much debate concerning the issue of which of the care professionals involved with delivering maternity services should provide antenatal care. A study carried out in Scotland in 1989 showed that obstetricians, general practitioners and midwives working together (shared care) provided 97% of antenatal care.[5] A review of published patterns of care by the National Institute for Health and Care Excellence (NICE) recently concluded that midwife- and GP-led models of care should be offered to women with an uncomplicated pregnancy, highlighting that the routine involvement of obstetricians in the care of these women at scheduled times does not appear to improve perinatal outcomes, compared with involving obstetricians only when complications arise.[6] Care should be provided continuously throughout the antenatal period by a small group of healthcare professionals with whom the woman feels comfortable. However, there should be clear referral paths to appropriate specialist teams for women who require additional care for pregnancy complications, since up to half of those initially categorized as 'low risk' will develop complications during their pregnancy, often of a minor and transient nature requiring only a small degree of medical input under a shared-care philosophy.

Over the last two decades several government working documents have recommended an integrated model of antenatal care aimed at improving continuity, minimizing duplication of effort by reducing the number of antenatal visits, and improving care quality by integrating antenatal education and clinical care in each visit.[1]

Basic principles of antenatal care

The principles that should underpin antenatal care have been summarized in a guidance document published by NICE.[6] They are as follows:

- Midwives and GPs should care for women with an uncomplicated pregnancy, providing continuous care throughout the pregnancy. Obstetricians and specialist teams should be involved where additional care is needed.
- Antenatal appointments should take place in a location that women can easily access. The location should be appropriate to the needs of the woman and her community.
- Maternity records should be national, structured and standardized, and held by the woman.
- In an uncomplicated pregnancy, there should be 10 appointments for nulliparous women and 7 for parous women.
- Each antenatal appointment should have a structure and a focus. Appointments early in pregnancy should be longer, to provide information and time for discussion about screening so that the woman can make informed decisions.
- If possible, routine tests should be incorporated into the appointments to minimize inconvenience to women.
- Women should feel able to discuss sensitive issues and disclose problems. Practitioners should be alert to the symptoms and signs of domestic violence and abuse.

Organization and content of the antenatal visit

It is increasingly recognized that the content of an antenatal visit consultation should be well defined and streamlined, incorporating a combination of clinical assessments and screening tests for which evidence of clinical benefit has been scientifically evaluated. Broadly, the evaluation should incorporate those assessments and tests that seek to identify existing or emerging risks for the mother and the unborn child. Clarification needs to be provided regarding the first point of contact of the pregnant woman with her care professional. Guidelines for care should detail the essential requirements of the booking visit and the core needs for a follow-up consultation visit. To take full advantage of antenatal care, women should ideally book in the first trimester, as it is well recognized that 'late bookers' are at increased risk of adverse pregnancy outcomes. Following the first visit, the frequency and content of subsequent antenatal visits should be explained clearly and simply so that women and all caregivers understand what is required.

FREQUENCY OF ANTENATAL VISITS

The optimum number of antenatal care clinic visits has been the subject of intense discussion. Since the 1920s, when a national system of antenatal clinics with a uniform pattern of visits and procedures was introduced in the UK, the average

number of visits has reduced from up to 14 to as low as 8, with no associated adverse effects in clinical outcome.

In developed countries with well-established maternity services, small reductions in the number of antenatal visits are compatible with good perinatal outcomes. One study in London found that women with more frequent antenatal visits did not demonstrate any clinical benefit but were more likely to be satisfied with their overall care.[7] Data from developing countries is not as clear-cut, but one trial conducted in Zimbabwe suggested that modest reductions in numbers of clinic visits may not adversely affect clinical outcomes in particular settings where the quality of care provided during each visit is good.[8] Taken together, flexible individualized approaches to the provision of psychosocial support and care need not necessitate frequent hospital visits.

A care structure that enables women to contact their care provider by telephone may minimize the need for clinic visits without reducing the quality of care provided. These observations have informed NICE guidance, which stipulates that nulliparous woman with an uncomplicated pregnancy should have about 10 clinic appointments, while a schedule of 7 appointments should suffice for a woman who is parous with an uncomplicated pregnancy.[6] Clearly women who have identified risk factors for adverse pregnancy outcome may benefit from more frequent visits and investigations.

There is often a distinction made between the first contact of the pregnant woman with a health professional and the formal booking visit. It is often the case that the first contact is with the woman's GP or a designated midwife, either at the GP surgery or, more commonly, at the woman's home.

FIRST CONTACT WITH A HEALTHCARE PROFESSIONAL

This should occur soon after pregnancy has been confirmed. It provides an opportunity to obtain clinical information about the woman, provide her with information about pregnancy, and establish basic care pathways. Specific information should be given on:

- folic acid supplements
- food hygiene, including how to reduce the risk of a food-acquired infection
- lifestyle, including smoking cessation, recreational drug use and alcohol consumption
- antenatal screening, including risks, benefits and limitations of the screening tests

THE BOOKING VISIT

This should happen ideally between 8 and 12 weeks gestation and should aim to identify women who may need additional care, and to plan the pattern of care for the pregnancy. It should include the following checks and tests:

- Measure height and weight and calculate body mass index (BMI).
- Measure blood pressure and test urine for proteinuria.
- Determine risk factors for pre-eclampsia and gestational diabetes.
- Offer blood tests to check blood group and rhesus D status, and screen for anaemia, haemoglobinopathies, red-cell alloantibodies, hepatitis B virus, HIV, rubella susceptibility and syphilis.
- Offer screening for asymptomatic bacteriuria.
- Inform women younger than 25 years about the high prevalence of chlamydia infection in their age group, and provide details of their local screening or testing service.
- Offer screening for Down's syndrome. In the UK, screening for Edwards' syndrome and Patau's syndrome is now also routinely offered in the first trimester.[9]
- Offer early ultrasound scan for gestational age assessment, and ultrasound screening for structural anomalies.
- Identify women who have had genital mutilation.
- Ask about any past or present severe mental illness or psychiatric treatment.
- Ask about mood, to identify possible depression.
- Ask about the woman's occupation, to identify potential risks.

Specific information should be given, both verbally and through specially designed information, on:

- how the baby develops during pregnancy
- nutrition and diet, including vitamin D supplements
- exercise, including pelvic floor exercises
- antenatal screening, including risks and benefits of the screening tests
- the pregnancy care pathway
- planning place of birth
- breastfeeding, including workshops
- participant-led antenatal classes
- maternity benefits

FOLLOW-UP VISITS

- A visit at 16 weeks provides an opportunity to review, discuss and record the results of screening tests performed earlier, measure blood pressure and test urine for proteinuria, and offer additional investigations and iron supplementation if the maternal haemoglobin level is below 11 g/dL. Specific information regarding the routine anomaly scan should also be provided and the scan should be offered.
- If the woman elects to have an anomaly ultrasound scan to screen for structural anomalies, this should be performed between 18 and 21 weeks. For a woman

whose placenta extends across the internal cervical os, another scan should be offered at 32 weeks to exclude placenta praevia.

- At 28 weeks gestation all women should be seen for additional checks and tests. Blood pressure should be measured and the urine tested for proteinuria. Women should be offered a second screening test for anaemia and atypical red-cell alloantibodies. A haemoglobin level below 10.5 g/dL should be investigated and iron supplementation considered. Anti-D prophylaxis should be offered to women who are rhesus D (RhD) negative. Uterine size should be plotted as the symphysis–fundal height.
- For nulliparous women, a further visit at approximately 32 weeks enables documentation and discussion of the results of screening tests undertaken at 28 weeks, as well as routine measurement of blood pressure, urinalysis for proteinuria, and symphysis–fundal height assessment.
- At 34 weeks, the results of screening tests undertaken at 28 weeks should be reviewed and discussed, blood pressure and urinalysis determined, and a second dose of anti-D prophylaxis given to women who are RhD negative according to institutional guidelines. Specific information should be given regarding preparation for labour and birth, including the birth plan, recognizing active labour and coping with pain.
- In addition to routine assessments, the finding of breech presentation at 36 weeks should mandate a discussion of external cephalic version. Advice regarding breastfeeding, care of the new baby, vitamin K prophylaxis and newborn screening tests, as well as an awareness of the features of postnatal depression, should be offered. It is customary to arrange elective indicated abdominal delivery at 36 weeks for a date and time that would depend on the indication for such operative delivery.
- Subsequent antenatal visits should happen at 38, 40 and 41 weeks. These should include routine assessments with additional emphasis aimed at planning for the imminent birth of the baby. Particular attention should be paid at these visits to fetal size and presentation, and emphasis should be placed on deciding the timing of the delivery. If spontaneous labour is planned, a decision regarding the timing of labour initiation should be made at one of these later visits, depending on the presence of any risk factors for late fetal demise or maternal medical deterioration. For women who have not given birth by 41 weeks, a membrane sweep should also be offered. Induction of labour should also be discussed and offered

GENERAL LIFESTYLE ADVICE DURING PREGNANCY

During the course of pregnancy, care providers should make every effort to provide relevant advice and support to pregnant women regarding lifestyle issues and habits about which they may feel ignorant. While there is a dearth of evidence

regarding the risks of some lifestyle issues and practices during pregnancy, the safety and impact of many are well established. Advice should therefore routinely cover these lifestyle issues, as well as educating women about practices which are best avoided and those which promote good health during pregnancy. Table 1.1 summarizes the common areas such as work, sex, nutrition, exercise and the intake of food supplements about which advice should be given during antenatal care.

Table 1.1 Advice during antenatal care regarding risks associated with lifestyle choices (adapted from NICE Clinical Guideline 62, *Antenatal Care: Routine Care for the Healthy Pregnant Woman*[6])

Complementary therapies	Few complementary therapies have been proven to be safe and effective during pregnancy.
Exercise	No risk associated with moderate exercise. Avoid sports that may cause abdominal trauma, falls and excessive joint stress.
Sexual intercourse	Intercourse thought to be safe during uncomplicated pregnancy.
Alcohol	The safest approach is not to drink alcohol at all when pregnant or planning a pregnancy.[10] If women choose to drink, drink no more than 1–2 UK units once or twice a week (1 unit equals half a pint of ordinary-strength lager or beer, or one shot [25 mL] of spirits. One small [125 mL] glass of wine is equal to 1.5 UK units). Advise women to avoid getting drunk and to avoid binge drinking.
Smoking	Discuss smoking status and give information about risks during pregnancy. Give information, advice and support to stop smoking during pregnancy. Refer to appropriate stop-smoking services and pregnancy smoking helplines. Discuss nicotine replacement therapy (NRT).
Work	Usually safe to continue working for most occupations. Refer to the Health and Safety Executive for more information. Inform about maternity rights and benefits.
Nutritional supplements	Recommend supplementation with folic acid before conception and throughout the first 12 weeks (400 μg per day). Advise of importance of vitamin D intake during pregnancy and breastfeeding (10 μg per day). Ensure women at risk of deficiency are following this advice. Routine iron supplementation not recommended. Advise of risk of birth defects with vitamin A, and to avoid vitamin A supplementation and liver products.
Avoiding infection	Advise how to reduce the risk of listeriosis and salmonella, and how to avoid toxoplasmosis infection.
Medicines	Prescribe as few medicines as possible, and only in circumstances where the benefit outweighs the risk. Advise avoidance of over-the-counter medicines.
Cannabis	Discourage women from using cannabis.
Air travel	Long-haul air travel is associated with an increased risk of venous thrombosis. Advise compression stockings to reduce the risk.
Car travel	Seatbelt should go 'above and below the bump, not over it'.
Travel abroad	Advise women to discuss flying, vaccinations and travel insurance with their midwife or doctor.

PRE-PREGNANCY COUNSELLING AND CARE

For women with specific problems, such as a history of fetal abnormality or a medical condition such as epilepsy or thrombophilia, pre-pregnancy care is required. Many of the factors operating to associate such conditions with adverse obstetric outcome can only be addressed adequately before pregnancy. Such care will not only prevent or modify the risk of adverse outcome, but will also allow the woman to make an informed choice as to whether to proceed with a pregnancy, to time it optimally, and to obtain appropriate information and advice on the management of any pregnancy. Choices made at this time are preferable to difficult decisions when problems are encountered antenatally.

Key summary points

- Antenatal care is crucial for optimizing pregnancy outcomes for both high-risk and low-risk pregnancies.
- Identification and management of risk is a cardinal aim of antenatal care.
- Early first attendance for care is associated with better pregnancy outcomes than late booking and poor engagement in regular care.
- The midwife and GP should provide the majority of care for women at low risk of pregnancy complications, while a consultant obstetrician should provide major input into the care for women with medical, social or gestational risks. It may be necessary to organize services such that specialist clinics have an input into the care of women with medical or obstetric complications.
- Pre-pregnancy care and counselling should be readily accessible to all women of childbearing age to enable careful planning so that women become pregnant in the best possible health. Such care should include ready access to appropriate contraception.

References

1. Department of Health. *Changing Childbirth: Report of the Expert Maternity Group*. London: HMSO, 1993.
2. Department of Health. *Maternity Matters: Choice, Access and Continuity of Care in a Safe Service*. London: HMSO, 2007.
3. Alexander S, Keirse MJNC. Formal risk scoring in pregnancy. In Chalmers I, Enkin M, Keirse MJNC, eds. *Effective Care in Pregnancy and Childbirth*. Oxford: Oxford University Press, 1989, pp. 345–65.
4. Cole S, McIlwaine G. The use of risk factors in predicting possible consequences of changing patterns of care in pregnancy. In Chamberlain G, Patel N, eds. *The Future of Maternity Services*. London: RCOG Press, 1994, pp. 65–72.
5. Tucker JS, Hall MH, Howie PW, *et al.* Should obstetricians see women with normal pregnancies? A multicentre randomised controlled trial of routine antenatal care by general practitioners and midwives compared with shared care led by obstetricians. *BMJ* 1996; 312: 554–9.