SUPPORTING INFORMATION

This guideline has been prepared with reference to the following:

NICE. Intrapartum care: care of healthy women and their babies during childbirth. 2017

http://www.nice.org.uk/guidance/CG190

Patterson-Brown S, Howell C. Managing obstetric emergencies and trauma: The MOET course handbook. 3rd ed. 2014

The Association of Anaesthetists of Great Britain and Ireland, Obstetric Anaesthetists' Association. (2013). OAA/AAGBI Guidelines for Obstetric anaesthetic services. 2013

http://www.aagbi.org/sites/default/files/obstetric_anaesthetic_services_2013.pdf

Royal College of Obstetricians and Gynaecologists. Placenta Praevia Accreta and Vasa Praevia: Diagnosis and management. 2011

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg27/

Royal College of Obstetricians and Gynaecologists. Antepartum Haemorrhage. 2011

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg63/

Royal College of Anaesthetists, Royal College of Midwives, Royal College of Obstetricians and Gynaecologists, Royal College of Paediatrics and Child Health. Safer Childbirth: Minimum Standards for the Organisation and Delivery of Care in Labour. 2007

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/safer-childbirth-minimum-standards-for-the-organisation-and-delivery-of-care-in-labour/

Royal College of Obstetricians and Gynaecologists. The Role of Emergency and Elective Interventional Radiology in Postpartum Haemorrhage, Good Practice Guideline No. 6. 2007

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/good-practice-6/

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 Enquires into Maternal deaths in the United Kingdom. 2007

http://www.publichealth.hscni.net/sites/default/files/Saving%20Mothers'%20Lives%202003-05%20.pdf

British Committee for Standards in Haematology. Guidelines on the Management of Massive Blood Loss. British Journal of Haematology. 135. 634-41. 2006

http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2141.2006.06355.x/pdf

Commission for Healthcare Audit and Inspection. Investigation into 10 maternal deaths at, or following delivery at, Northwick Park Hospital, North West London Hospitals NHS Trust, between April 2002 and April 2005. 2006
http://webarchive.nationalarchives.gov.uk/20060502043818/http://healthcarecommission.org.uk/_db/_documents/Northwick_tagged.pdf

Is outpatient care an acceptable alternative for women with major placenta praevia who have refused hospital admission?
A Cochrane systematic review of 3 trials in a total of 114 women (Neilson, 2003) found little evidence of advantages or disadvantages to hospitalisation. Initial outpatient care was associated with reduced

hospital length of stay antenatally: Weighted Mean Difference (WMD) -18.50 days (95% CI -26.83 to -10.17). More research was called for.
Two of the three trials in this review looked specifically at the role of cervical cerclage. The third, a randomised controlled trial in 53 women (Wing, 1996) found only insignificant differences between those randomised to bed rest in hospital (n=27) and those discharged home after >/= 72 hours in hospital (n=26). The authors concluded that outpatient management of selected patients with placenta praevia was an acceptable alternative to hospitalisation.

Neilson JP. Interventions for suspected placenta praevia. Cochrane Database Syst Rev. 2003, Issue 2. Art. No.: CD001998
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD001998/full

Wing DA, Paul RH, Millar LK. Management of the symptomatic placenta previa: a randomized, controlled trial of inpatient versus outpatient expectant management. Am J Obstet Gynecol 1996;175:806-11

Evidence Level: I

Patient Information is available from:
Patient.co.uk Antepartum haemorrhage. 2016
http://www.patient.co.uk/doctor/antepartum-haemorrhage

Last amended March 2017
Last reviewed March 2017

This guideline has been prepared with reference to the following:

NICE. Postnatal care up to 8 weeks after birth. 2015. London. NICE

https://www.nice.org.uk/guidance/cg37

Dougherty L, Lister S. The Royal Marsden Hospital manual of clinical nursing procedures, 8th ed. 2011

Walsall Hospitals NHS Trust, Catheter Care and Maintenance Pathway, 2008

Department Of Health. Urinary catheter care bundle: high Impact Intervention Number 6 from Saving Lives: Reducing infection, delivering clean and safe care. 2007

Prolonged labour, especially prolonged second stage, is a risk factor for postnatal bladder dysfunction?

A case control study from a maternity hospital in Australia of 281 cases and 5277 controls (Buchanan, 2014) found that although the duration of the "active" second stage of labour was associated with an increased risk of postnatal bladder dysfunction (mean duration for cases = 49.9 min, controls = 40.3 min, p=0.008) it was not an "independent" risk factor as determined by regression analysis. Independent risk factors that were identified for postnatal bladder dysfunction included nullparity, birth by caesarean section and 3rd/4th degree perineal trauma.

Another case control study from Italy (Pifarotti, 2014) also found that women with postnatal bladder dysfunction were more likely to have experienced a longer second stage of labour than controls (25% vs. 11%, p=0.03), but that this was not an "independent" risk factor.

An earlier ultrasonographic study in 707 women (Yip, 1998) focused on a homogeneous group of 164 with possible risk factors for postpartum urinary retention. The incidence of postpartum urinary retention (> or = 150 ml) was 11% in this homogeneous group. Labour duration longer than or equal to 800 min was associated with a higher incidence of postpartum urinary retention (chi2 test; p < 0.05).

Buchanan J & Beckmann M. Postpartum voiding dysfunction: identifying the risk factors. Australian & New Zealand Journal of Obstetrics & Gynaecology 2014; 54:41-5

Pifarotti, P, Gargasole, C, Folcini C et al. Acute post-partum urinary retention: analysis of risk factors, a case-control study. Archives of Gynecology & Obstetrics 2014;289; 1249-53.

Yip SK, Hin LY, Chung TK. Effect of the duration of labor on postpartum postvoid residual bladder volume. Gynecol Obstet Invest 1998;45:177-80

Evidence Level: IV

Last amended March 2017
Last reviewed March 2017

This guideline has been prepared with reference to the following:

NICE. Caesarean Section. 2011. London. NICE

http://www.nice.org.uk/guidance/cg132

Antibiotic prophylaxis is indicated in women undergoing caesarean section?
A Cochrane systematic review of 95 studies in a total of 15,000 women (Smaill, 2014) found that prophylactic antibiotics substantially reduced the incidence of wound infection (average RR 0.40; 95% CI 0.35 to 0.51, 82 studies, 14,407 women), endometritis (RR 0.38; 95% CI 0.34 to 0.42, 82 studies, 13,548 women) and serious maternal infectious complications (RR 0.31; 95% CI 0.20 to 0.49, 32 studies, 6149 women).
Another Cochrane systematic review (Gyte, 2014) attempted to determine which class of prophylactic antibiotics (penicillins, cephalosporins, fluoroquinolones, tetracyclines and macrolides) were most effective. This study found no statistically significant difference between the different antibiotics; however the authors commented that this inconclusive finding may be due to a lack of good quality data from the existing trials.
A systematic review of RCTs to compare the effectiveness of single verses multiple dose of antibiotic prophylaxis found no strong evidence to suggest that one was preferable to the other (Pinto-Lopes, 2017).
A 2014 systematic review of RCTs found that intravenous prophylactic antibiotics for cesarean administered preoperatively significantly decreases the incidence of composite maternal postpartum infectious morbidity as compared with administration after cord clamp (Mackeen, 2014).

Gyte GM, Dou L,Vazquez JC. Different classes of antibiotics given to women routinely for preventing infection at caesarean section. Cochrane Database Syst Rev. 2014, Issue 11. Art. No.: CD008726
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD008726.pub2/abstract

Mackeen AD; Packard RE, Ota E et al. Timing of intravenous prophylactic antibiotics for preventing postpartum infectious morbidity in women undergoing cesarean delivery. Cochrane Database Syst Rev.; 2014:12. CD009516
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD009516.pub2/full

Smaill FM, Gyte GM. Antibiotic prophylaxis versus no prophylaxis for preventing infection after cesarean section. Cochrane Database Syst Rev. 2014, Issue 10. Art. No.: CD007482
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007482.pub3/full

Pinto-Lopes, R; Sousa-Pinto, B; Azevedo, L F. Single dose versus multiple dose of antibiotic prophylaxis in caesarean section: a systematic review and meta-analysis. BJOG : 2017; 124; 595-605

Evidence Level: I

What is the preferred method used to deliver a deeply impacted fetal head at full dilation?
A systematic review found 12 studies (nine observational studies and three RCTs). The authors concluded that the reverse breech extraction technique for delivery of a deeply impacted fetal head in second-stage caesarean section carries a significantly lower risk of extension of the uterine incision compared with the push method. It is also associated with a lower risk of infection, a lower operative time, and less operative blood loss; however, there is no difference in blood transfusion rate and neonatal outcome. Limited evidence suggests that the Patwardhan method is associated with a lower risk of uterine extension and a lower risk of blood transfusion, with no difference in neonatal outcome. Newer techniques such as the fetal pillow require further supportive evidence before being recommended for routine use.

Evidence Level: IV

Jeve YB, Navti OB & Konje JC. Comparison of techniques used to deliver a deeply impacted fetal head at full dilation: a systematic review and meta-analysis. BJOG. 2016;123:337-45

Urinary catheter should be removed once woman is mobile, but not <12 hr after regional anaesthesia has been discontinued?

2011 NICE guidance states that “Removal of the urinary bladder catheter should be carried out once a woman is mobile after a regional anaesthetic and not sooner than 12 hours after the last
epidural 'top up' dose (NICE, 2011).
A 2014 RCT compared immediate and 12h postoperative removal of urinary catheter after elective cesarean section (El-Mazny, 2014). The incidence of postoperative significant bacteruria (p=0.020), dysuria (p=0.030), burning on micturition (p=0.016), urinary frequency (p=0.031), and urgency (p=0.011) were significantly lower in the immediate removal group compared with those in the 12 hr group. The mean postoperative ambulation time (p<0.001), time till the first voiding (p<0.001), and length of hospital stay (p<0.001) were also significantly shorter in the immediate removal group. There were no significant differences between the two groups in the incidence of urinary retention necessitating recatheterization (p=0.371). The study authors therefore concluded that immediate removal of urinary catheter after elective cesarean section is associated with lower risk of urinary infection and earlier postoperative ambulation. An earlier RCT by Onile TG et al came to the same conclusion (2008).

El-Mazny A, El-Sharkawy M & Hassan A. A prospective randomized clinical trial comparing immediate versus delayed removal of urinary catheter following elective cesarean section. Eur J Obstet Gynecol Reprod Biol. 2014;181:111-4

NICE. Caesarean Section. 2011. London: NICE
http://www.nice.org.uk/guidance/cg132

Onile TG, Kuti O, Orji EO et al. A prospective randomized clinical trial of urethral catheter removal following elective cesarean delivery. Int J Gynaecol Obstet. 2008;102:267-70

Evidence Level: II

Patient Information is available from:
NHS Choices. Caesarean Section. 2016. London: NHS.
http://www.nhs.uk/conditions/Caesarean-section/Pages/Introduction.aspx

Last amended March 2017
Last reviewed March 2017

This guideline has been prepared with reference to the following:

Resuscitation Council UK. Resuscitation and support of transition of babies at birth, 2015

https://www.resus.org.uk/resuscitation-guidelines/resuscitation-and-support-of-transition-of-babies-at-birth/

Jeejeebhoy FM, Zelop CM, Windrim R, et al. Management of cardiac arrest in pregnancy: a systematic review. Resuscitation 2011;82:801-9

Caesarean section delivery should begin within 4 minutes of cardiac arrest and be accomplished within 5 minutes?
An evidence-based review of the literature (Suresh, 2010) states that: "Caesarean delivery should be performed no later than 4min after initial maternal cardiac arrest. A foetus delivered within 5min has the best chance of survival."
A 2016 literature review of case reports found that both maternal and neonatal injury free survival rates diminished steadily as the time interval from maternal arrest to birth increased and that there was no evidence for any specific survival threshold at 4 minutes (Benson, 2016). The reviewers concluded that once a decision to deliver is made, care providers should proceed directly to caesarean birth during maternal cardiac arrest in the third trimester rather than waiting for 4 minutes for restoration of the maternal pulse.

Benson MD, Padovano A, Bourjeily G et al. Maternal collapse: Challenging the four-minute rule. EBioMedicine. 2016;6:253-7
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4856753/

Suresh MS, LaToya Mason C, Munnur U. Cardiopulmonary resuscitation and the parturient. Best Pract Res Clin Obstet Gynaecol 2010;24:383-400

Evidence Level: V

Last amended March 2017
Last reviewed March 2017

NB – As for Neonatal guideline "Examination of the newborn".

This guideline has been prepared with reference to the following:

NICE. Intrapartum care: care of healthy women and their babies during childbirth. 2017. London. NICE

http://www.nice.org.uk/guidance/CG190

NICE. Postnatal care. 2014. London NICE

https://www.nice.org.uk/guidance/cg37

UNICEF UK Baby Friendly Initiative. Guidance on the development of policies and guidelines for the prevention and management of: Hypoglycaemia of the Newborn. 2013

https://353ld710iigr2n4po7k4kgvv-wpengine.netdna-ssl.com/babyfriendly/wp-content/uploads/sites/2/2010/10/hypo_policy.pdf

NHS Quality Improvement Scotland. Routine Examination of the Newborn: Best Practice Statement. 2008. NHS

http://www.healthcareimprovementscotland.org/previous_resources/best_practice_statement/examination_of_the_newborn.aspx

Royal College of Anaesthetists, Royal College of Midwives, Royal College of Obstetricians and Gynaecologists, Royal College of Paediatrics and Child Health. Safer Childbirth: Minimum Standards for the Organisation and Delivery of Care in Labour. 2007.

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/safer-childbirth-minimum-standards-for-the-organisation-and-delivery-of-care-in-labour/

Department of Health. Maternity Standard, National Service Framework for Children, Young People and Maternity Services. 2004

https://www.gov.uk/government/publications/national-service-framework-children-young-people-and-maternity-services

Should routine examination be carried out at 24-48 hours of age by paediatricians/nurse practitioners?

Less than 30% of congenital heart defects or hip abnormalities are detected during the examination, although it is regarded as a core component of child health surveillance and expected by parents (Wolke, 2002).

The Maternity Services Advisory Committee recommended a routine neonatal discharge examination in 1985, although the joint Working Party on Child Health Surveillance recommended only a repeat examination of hip stability on discharge or within 10 days after birth (Cartlidge, 1992).

An audit of second (discharge) examinations, performed on 97.3% of 1795 newborn infants, was done on the day of discharge in 1428 infants (79.6%) (Moss,1991). Because of early discharge, 38.5% of babies were examined on or before day 2, the median time of the discharge examination being 4 days of age. This second examination revealed previously undiscovered problems in 63 infants (3.6%). Only 7 of these, however, were considered to be important or significant (0.5%). The study concluded that full second examinations could not be justified, but that a test for hip stability should be performed.

A postal questionnaire sent to all maternity units in England, and having an 86% response rate (Hayes, 2003) revealed that routine neonatal examination was usually (83%) carried out by senior house officers. Although 44% of units had at least one midwife qualified to carry out the examination,

only 2% of babies nationally were examined by a midwife. Initial examinations were carried out between 6-48 hours of age and 12% of units carried out a second examination prior to discharge.
A randomised trial of 826 mother and baby pairs (Wolke, 2002) found that more mothers were satisfied by neonatal examinations carried out by midwives than by SHOs (OR 0.54, 95% CI 0.39-0.75, p<0.001), largely because midwives were more likely to discuss general healthcare issues and were able to provide continuity of care. This was also one of the findings of the EMREN study (Townsend, 2004).
A prospective study in 527 infants (Lee, 2001) compared the ability of SHOs in detecting abnormalities compared to advanced neonatal nurse practitioners (ANNPs). ANNPs displayed greater sensitivity than SHOs at detecting hip abnormalities (96% vs 74%; p<0.05) and eye abnormalities (100% vs 33%; p<0.05). There were no significant differences between the two groups in terms of positive predictive values or effectiveness in detecting cardiac abnormalities.
A prospective study in 14,572 infants (Patton, 2006) concluded that effectiveness of the clinical examination in detection of congenital heart disease was more dependent on experience and the existence of a clear, structured, referral pathway than on staff having a medical vs a nursing background.

Cartlidge PH. Routine discharge examination of babies: is it necessary? Arch Dis Child 1992;67:1421-2
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1793965/pdf/archdisch00631-0011.pdf

Hayes J, Dave S, Rogers C, et al. A national survey in England of the routine examination of the newborn baby. Midwifery 2003;19:277-84

Lee TW, Skelton RE, Skene C. Routine neonatal examination: effectiveness of trainee paediatrician compared with advanced neonatal nurse practitioner. Arch Dis Child Fetal Neonatal Ed 2001;85:F100-4
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1721315/pdf/v085p0F100.pdf

Moss GD, Cartlidge PH, Speidel BD, et al. Routine examination in the neonatal period. BMJ 1991;302:878-9
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1669235/

Patton C, Hey E. How effectively can clinical examination pick up congenital heart disease at birth? Arch Dis Child Fetal Neonatal Ed 2006;91:F263-7
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2672726/

Townsend J, Wolke D, Hayes J, et al. Routine examination of the newborn: the EMREN study. Evaluation of an extension of the midwife role including a randomised controlled trial of appropriately trained midwives and paediatric senior house officers. Health Technol Assess 2004;8:14

Wolke D, Dave S, Hayes J, et al. Routine examination of the newborn and maternal satisfaction: a randomised controlled trial. Arch Dis Child Fetal Neonatal Ed 2002;86:F155-60
http://fn.bmj.com/content/86/3/F155.long

Evidence Level: II

Last amended March 2017
Last reviewed March 2017

CELL SALVAGE
Supporting information

This guideline has been prepared with reference to the following:

NICE. Blood transfusion. 2015. London. NICE

https://www.nice.org.uk/guidance/ng24

Association of Anaesthetists of Great Britain and Ireland. Blood Transfusion and the Anaesthetist Intra-operative Cell Salvage - AAGBI SAFETY GUIDELINE. 2009

http://www.aagbi.org/sites/default/files/cell%20_salvage_2009_amended.pdf

NICE. Intraoperative blood cell salvage in obstetrics. 2005. London. NICE

http://www.nice.org.uk/guidance/ipg144

Last amended March 2017
Last reviewed March 2017

COLLAPSE (INCLUDING AMNIOTIC FLUID EMBOLISM)
Supporting information

This guideline has been prepared with reference to the following:

Resuscitation Council (UK). 2010 Resuscitation Guidelines. 2015

http://www.resus.org.uk/pages/guide.htm

Royal College of Obstetricians and Gynaecologists. Maternal collapse in pregnancy and the puerperium (Green Top guideline no.56). 2011

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg56/

Amniotic fluid embolism (AFE) is rare and often fatal?
A population-based cohort study and nested case-control analysis, using the UK Obstetric Surveillance System, identified 60 cases of amniotic fluid embolism in the UK between February 2005 and February 2009 (Knight, 2010); an estimated incidence of 2.0 per 100,000 deliveries (95% CI 1.5-2.5). Cases were significantly associated with induction of labour (adjusted OR 3.86, 95% CI 2.04-7.31) and multiple pregnancy (adjusted OR 10.9, 95% CI 2.81-42.7). An increased risk also was noted in older, ethnic-minority women (adjusted OR 9.85, 95% CI 3.57-27.2). Cesarean delivery was associated with postnatal amniotic-fluid embolism (adjusted OR 8.84, 95% CI 3.70-21.1). Twelve women died (case fatality 20%, 95% CI 11-32%); 5 of 37 newborns of women with antenatal amniotic-fluid embolism died (perinatal mortality 135 per 1,000 total births, 95% CI 45-288). Women who died were significantly more likely to be from ethnic-minority groups (adjusted OR 11.8, 95% CI 1.40-99.5).

Knight M, Tuffnell D, Brocklehurst P, et al. Incidence and risk factors for amniotic-fluid embolism. Obstet Gynecol 2010;115:910-7

Evidence Level: III

Cardiac causes of collapse are becoming more common?
A 2014 Confidential Enquiry report (CEMCH) states that “cardiac disease remains the largest single cause of indirect maternal deaths. There was no significant change in the maternal mortality rate from cardiac disease between 2006–08 and 2010–12; the rate remains significantly higher than the rate in 1985–87. This reflects the growing incidence of acquired heart disease in younger women related to less healthy diets, smoking, alcohol and the growing epidemic of obesity.

Confidential Enquiry into Maternal and Child Health. Saving Lives, Improving Mothers’ Care: Lessons learned to inform future maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009-2012. 2014
http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2010.02847.x/pdf

Evidence Level: IV

Last amended March 2017
Last reviewed March 2017

This guideline has been prepared with reference to the following:

NICE. Intrapartum care: care of healthy women and their babies during childbirth. 2017. London. NICE

http://www.nice.org.uk/guidance/CG190

Does early use of amniotomy and oxytocin result in improved outcome of delayed labour during the first stage?

A Cochrane review of 14 trials in 8,033 women (Wei, 2013) found that early intervention with amniotomy and oxytocin was associated with a reduction in the risk of caesarean section; however, this result was not statistically significant (RR 0.89; 95% CI 0.79 to 1.01; 14 trials; 8033 women). In prevention trials, early augmentation was associated with a modest reduction in the number of caesarean births (RR 0.87; 95% CI 0.77 to 0.99; 11 trials; 7753). A policy of early amniotomy and early oxytocin was associated with a shortened duration of labour (average mean difference (MD) -1.28 hours; 95% CI -1.97 to -0.59; eight trials; 4816 women). Sensitivity analyses excluding four trials with a full package of active management did not substantially affect the point estimate for risk of caesarean section (RR 0.87; 95% CI 0.73 to 1.05; 10 trials; 5165 women).

A Cochrane review of 8 trials in 1338 women (Bugg, 2011) concluded that: “For women making slow progress in spontaneous labour, treatment with oxytocin as compared with no treatment or delayed oxytocin treatment did not result in any discernable difference in the number of caesarean sections performed. In addition there were no detectable adverse effects for mother or baby. The use of oxytocin was associated with a reduction in the time to delivery of approximately two hours which might be important to some women. However, if the primary goal of this treatment is to reduce caesarean section rates, then doctors and midwives may have to look for alternative options.”

Bugg GJ, Siddiqui F, Thornton JG. Oxytocin versus no treatment or delayed treatment for slow progress in the first stage of spontaneous labour. Cochrane Database Syst Rev. 2011, 7. CD007123
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007123.pub3/full

Wei S, Wo BL, Qi HP et al. Early amniotomy and early oxytocin for prevention of, or therapy for, delay in first stage spontaneous labour compared with routine care. Cochrane Database Syst Rev. 2013, 8. CD006794
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD006794.pub4/full

Evidence Level: I

Last amended March 2017
Last reviewed March 2017

This guideline has been prepared with reference to the following:

NICE. Diabetes in pregnancy: management from preconception to the postnatal period. 2015. London. NICE

https://www.nice.org.uk/guidance/ng3

Kitzmiller JL, Block JM, Brown FM, et al. Managing pre-existing diabetes for pregnancy: summary of evidence and consensus recommendations for care. Diabetes Care 2008;31:1060-79

http://care.diabetesjournals.org/content/31/5/1060.full

Rates of congenital malformation, perinatal mortality and stillbirth are increased when the mother is diabetic?

A 2015 review found that patients with pregestational diabetes (types 1 and 2) have a fivefold increased risk of stillbirth compared to women who do not have diabetes (Starikov, 2015). The same review reports that the question as to whether gestational diabetes is associated with higher levels of stillbirths is less clear, although the weight of evidence indicates an increased risk but not as great as with pregestational diabetes.

A couple of nationwide population-based studies conducted in Scandinavia revealed a doubling of the risk of congenital abnormalities in mothers with type 1 diabetes (Eidem, 2010 & Persson, 2009).

Data from the Confidential Enquiry in Maternal and Child Health (CEMACH) has shown a ten-fold increase in congenital malformations, a four to seven-fold increase in perinatal mortality and a five-fold increase in stillbirth to diabetic mothers (Kapoor, 2007).

Eidem I, Stene LC, Henriksen T et al. Congenital anomalies in newborns of women with type 1 diabetes: nationwide population-based study in Norway, 1999–2004. Acta Obstet Gynecol Scand. 2010;89:1403–11

Kapoor N, Sankaran S, Hyer S, et al. Diabetes in pregnancy: a review of current evidence. Curr Opin Obstet Gynecol 2007;19:586-90

Persson M, Norman M, Hanson U. Obstetric and perinatal outcomes in type 1 diabetic pregnancies: A large, population-based study. Diabetes Care. 2009;32:2005–9
http://europepmc.org/articles/PMC2768194/

Starikov R, Dudley D, Reddy UM. Stillbirth in the pregnancy complicated by diabetes. Curr Diab Rep. 2015;15:11

Evidence Level: II

What percentage of pregnancies are complicated by i.Gestational diabetes, ii.Type 1 or iii.Type 3?

A 2015 review reported that pregestational diabetes currently complicates 4% of pregnancies, while gestational diabetes complicates approximately 8% of pregnancies (Starikov, 2015).

A review of gestational diabetes in Europe (Buckley 2012) also notes that prevalence is most often reported as 2-6% of pregnancies blaming a lack of universally accepted diagnostic criteria for the variations.

Buckley, B. S., Harreiter, J., Damm, P., Corcoy, R., Chico, A., Simmons, D., Vellinga, A., Dunne, F. and on behalf of the DALI Core Investigator Group. Gestational diabetes mellitus in Europe: prevalence, current screening practice and barriers to screening. A review. Diabetic Medicine. 2012, 29: 844–854

Starikov R, Dudley D, Reddy UM. Stillbirth in the pregnancy complicated by diabetes. Curr Diab Rep. 2015;15:11

Evidence Level: II

In preterm labour can we suggest dexamethasone as the steroid?

A 2015 systematic review found no associations between mothers' use of topical steroids of any potency and type of delivery, birth defects, premature births, or low Apgar score (Chi, 2015).

Some evidence was found indicating a relation between low birth weight and maternal use of potent or very potent topical steroids, especially when high doses are used in pregnancy, and this may warrant more research. On the other hand, maternal use of mild or moderate topical corticosteroids was not related to low birth weight. The review even found that mild or moderately potent topical steroids protect against death of the baby, but this was not seen when the mothers used potent or very potent topical steroids.

Chi CC, Lee CW, Wojnarowska F et al. Safety of topical corticosteroids in pregnancy. Cochrane Database of Systematic Reviews 2015
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007346.pub3/full

Evidence Level: I

Does elective induction of labour reduce the incidence of babies with macrosomia?
A Cochrane review of a single trial in 200 insulin-dependent pregnant women (Boulvain, 2001) compared active induction of labour at 38 completed weeks of pregnancy to expectant management until 42 weeks. The risk of caesarean section was not statistically different between groups (RR 0.81, 95% CI 0.52 - 1.26). The risk of macrosomia was reduced in the active induction group (RR 0.56, 95% CI 0.32 - 0.98). Three cases of mild shoulder dystocia were reported in the expectant management group. No other perinatal morbidity was reported.

Boulvain M, Stan CM, Irion O. Elective delivery in diabetic pregnant women. Cochrane Database of Systematic Reviews 2001, Issue 2. Art. No.: CD001997.
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD001997/full

Evidence Level: I

Does continuous glucose monitoring reduce the risk of macrosomia?
A 2014 systematic review of RCTs found that pregnant women with Type 1 or Type 2 diabetes with tight to moderate glycaemic control had significantly lower risks for macrosomia but that the evidence base for the relative effectiveness of monitoring techniques is inconclusive (Moy, 2014).
A prospective, open label randomised controlled trial in 71 women (46 with type 1 and 25 with type 2 diabetes) randomised 38 to continuous glucose monitoring and 33 to standard antenatal care (Murphy, 2008). The infants of women in the intervention group had a reduced risk of macrosomia (OR 0.36, 95% CI 0.13 – 0.98).

Murphy HR, Rayman G, Lewis K, et al. Effectiveness of continuous glucose monitoring in pregnant women with diabetes: randomised clinical trial. BMJ 2008;337:a1680.
http://www.bmj.com/content/337/bmj.a1680

Moy FM, Ray A, Buckley BS. Techniques of monitoring blood glucose during pregnancy for women with pre-existing diabetes. Cochrane Database Syst Rev. 2014:CD009613
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD009613.pub2/full

Evidence Level: II

Patient information is available from:
NICE. Information for the public: Diabetes in pregnancy: management from preconception to the postnatal period. 2015. London: NICE
https://www.nice.org.uk/guidance/ng3/ifp/chapter/About-this-information

Patient.co.uk. Diabetes in pregnancy. 2016
http://www.patient.co.uk/doctor/diabetes-in-pregnancy

Last amended March 2017
Last reviewed March 2017

This guideline has been prepared with reference to the following:

Mangesi L, Hofmeyr GJ, Smith V et al. Fetal movement counting for assessment of fetal wellbeing. Cochrane Database Syst Rev. 2015;15;:CD004909

http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004909.pub3/full

NICE. Intrapartum care: care of healthy women and their babies during childbirth. 2014

http://www.nice.org.uk/guidance/CG190

Royal College of Obstetricians & Gynaecologists. Reduced fetal movements. Green-top Guideline 57. 2011. London, RCOG

http://www.rcog.org.uk/womens-health/clinical-guidance/reduced-fetal-movements-green-top-57

Heazell, A.E.P. and Froen. J.F. Methods of fetal movement counting and the detection of fetal compromise. J Obstet Gynaecol. 2008;28:147-54

Heazell, A.E.P. et al. What investigation is appropriate following maternal perception of reduced fetal movements? J Obstet Gynaecol. 2005;25:648-50.

DFM may help identify the at-risk fetus?

The perception of reduced fetal movement (RFM) is an important marker of fetal wellbeing and is associated with poor perinatal outcome (such as intra-uterine death). A prospective study of women presenting with RFM over 28 weeks' gestation to a tertiary-level maternity hospital (McCarthy, 2016). Outcomes were compared with a retrospectively collected control group delivering contemporaneously. In total, 275 presentations were analysed in the RFM group, with 264 in the control group. Women with RFM were more likely to be nulliparous ($p = 0.002$) and have an induction of labour ($p = 0.0011$). 26.5 % ($n = 73$) of cases were admitted following presentation with RFM, and 79.4 % ($n = 58$) delivered on primary presentation. Overall, 15.2 % ($n = 42$) women were induced for RFM specifically.

A case-control study in 180 women (90 cases and 90 controls) found that DFM was associated with a 0.11 (95% CI = 0.05-0.17) risk of intrauterine growth restriction compared with a risk of 0.00 amongst controls (Sinha, 2007).

A study in 435 women (Harrington, 1998) found DFM associated with low 5 minute Apgar score 0.03 vs. 0.05 expected (95% CI = 0.01-0.05), SCBU admission, 0.06 vs. 0.07 (95% CI 0.04-0.08), preterm delivery, 0.08 vs. 0.11 (95% CI 0.05-0.10) and caesarean section for fetal compromise, 0.07 vs. 0.053 (95% CI 0.050-0.096).

Harrington K, Thompson O, Jordan L, et al. Obstetric outcome in women who present with a reduction in fetal movements in the third trimester of pregnancy. J Perinat Med 1998;26:77-82

McCarthy C, Meaney S & O'Donoghue K. Perinatal outcomes of reduced fetal movements: a cohort study. BMC Pregnancy Childbirth. 2016; 16: 169.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4950725/

Sinha D, Sharma A, Nallaswamy V et al. Obstetric outcome in women complaining of reduced fetal movements. J Obstet Gynaecol. 2007;27:41-3

Evidence Level: IV

The evidence that intervention can improve the outcome is "less convincing"?

A Cochrane systematic review (Hofmeyr, 2012) failed to identify any suitable RCTs and concluded that "There are insufficient data from randomised trials to guide practice regarding the management of DFM. Based on the results of other systematic reviews of management strategies for women whose

babies are thought to be at risk of compromise for various reasons, the following strategies show promise and may be prioritised for further research: Doppler ultrasound studies, computerised cardiotocography, and fetal arousal to facilitate cardiotocography."

Hofmeyr GJ, Novikova N. Management of reported decreased fetal movements for improving pregnancy outcomes. Cochrane Database of Systematic Reviews 2012, Issue 4. Art. No.: CD009148 http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD009148.pub2/full

Evidence Level: I

Last amended March 2017
Last reviewed March 2017

ELECTRONIC FETAL MONITORING (EFM)
Supporting information

This guideline has been prepared with reference to the following:

NICE. Intrapartum care for healthy women and babies. 2017. London. NICE

http://www.nice.org.uk/guidance/CG190

Royal College of Anaesthetists, Royal College of Midwives, Royal College of Obstetricians and Gynaecologists, Royal College of Paediatrics and Child Health. Safer Childbirth: Minimum Standards for the Organisation and Delivery of Care in Labour. 2007

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/safer-childbirth-minimum-standards-for-the-organisation-and-delivery-of-care-in-labour/

Gibb D, Arulkumaran S. Fetal Monitoring in Practice (3rd ed.). 2007. Churchill Livingstone. Edinburgh.

Tuffnell D, Haw,WL, Wilkinson,K. How long does a fetal scalp blood sample take? BJOG 2006:113; 332-4

Does EFM improve the rate of positive neonatal outcomes?
A Cochrane systematic review of 13 trials in over 37,000 women (Alfirevic, 2013) found that, compared to intermittent auscultation, continuous cardiotocography showed no significant difference in overall perinatal death rate (RR 0.86, 95% CI 0.59 to 1.23, n = 33,513, 11 trials), but was associated with a halving of neonatal seizures (RR 0.50, 95% CI 0.31 to 0.80, n = 32,386, nine trials). No significant difference was detected in cerebral palsy (RR 1.74, 95% CI 0.97 to 3.11, n = 13,252, two trials). There was a significant increase in caesarean sections associated with continuous cardiotocography (RR 1.63, 95% CI 1.29 to 2.07, n =18,861, 11 trials). Women were also more likely to have an instrumental vaginal birth (RR 1.15, 95% CI 1.01 to 1.33, n = 18,615, ten trials).
An earlier review article (Steer, 2008) suggested that “Computerised expert systems for the analysis of FHR patterns may be more successful at avoiding poor outcomes”.

Alfirevic Z, Devane D, Gyte GM. Continuous cardiotocography (CTG) as a form of electronic fetal monitoring (EFM) for fetal assessment during labour. Cochrane Database Syst Rev.2013, Issue 5. Art. No.: CD006066 http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD006066.pub2/full

Steer PJ. Has electronic fetal heart rate monitoring made a difference. Semin Fetal Neonat Med, 2008;13:2-7

Evidence Level: I

Patient information is available from:
NICE. Intrapartum care for healthy women and babies. 2017. London: NICE.
https://www.nice.org.uk/guidance/cg190/ifp/chapter/Care-of-women-and-their-babies-during-labour-and-birth

Last amended March 2017
Last reviewed March 2017

EPIDURAL ANALGESIA
Supporting information

This guideline has been prepared with reference to the following:

Knight M, Kenyon S, Brocklehurst P et al. on behalf of MBRRACEUK. Saving Lives, Improving Mothers' Care - Lessons learned to inform future maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009–12. Oxford. University of Oxford. 2014

https://www.npeu.ox.ac.uk/downloads/files/mbrrace-uk/reports/Saving%20Lives%20Improving%20Mothers%20Care%20report%202014%20Full.pdf

Is epidural analgesia effective, and does it result in a higher number of instrumental deliveries?

A Cochrane systematic review of 38 studies in a total of 9658 women (Anim-Somuah, 2011) found that epidural analgesia offered better pain relief (mean difference (MD) -3.36, 95% CI -5.41 to -1.31, three trials, 1166 women); a reduction in the need for additional pain relief RR 0.05, 95% CI 0.02 to 0.17, 15 trials, 6019 women); a reduced risk of acidosis (RR 0.80, 95% CI 0.68 to 0.94, seven trials, 3643 women); and a reduced risk of naloxone administration (RR 0.15, 95% CI 0.10 to 0.23, 10 trials,| 2645 women). However, epidural analgesia was associated with an increased risk of assisted vaginal birth (RR 1.42, 95% CI 1.28 to 1.57, 23 trials, 7935 women), maternal hypotension (RR 18.23, 95% CI 5.09 to 65.35, eight trials, 2789 women), motor-blockade (RR 31.67, 95% CI 4.33 to 231.51, three trials, 322 women), maternal fever (RR 3.34, 95% CI 2.63 to 4.23, six trials, 2741 women), urinary retention (RR 17.05, 95% CI 4.82 to 60.39, three trials, 283 women), longer second stage of labour (MD 13.66 minutes, 95% CI 6.67 to 20.66, 13 trials, 4233 women), oxytocin administration (RR 1.19, 95% CI 1.03 to 1.39, 13 trials, 5815 women) and an increased risk of caesarean section for fetal distress (RR 1.43, 95% CI 1.03 to 1.97, 11 trials, 4816 women). There was no evidence of a significant difference in the risk of caesarean section overall (RR 1.10, 95% CI 0.97 to 1.25, 27 trials, 8417 women), long-term backache (RR 0.96, 95% CI 0.86 to 1.07, three trials, 1806 women), Apgar score less than seven at five minutes (RR 0.80, 95% CI 0.54 to 1.20, 18 trials, 6898 women), and maternal satisfaction with pain relief (RR 1.31, 95% CI 0.84 to 2.05, seven trials, 2929 women).
A meta-analysis of 11 studies (8 bupivicaine, 3 ropivicaine), (Sultan 2013) compared different concentrations of epidural analgesia in relation to obstetric outcomes. 1,145 patients were provided with low concentration and 852 patients with high concentration epidural analgesia. The researchers found that low concentrations were associated with a reduction in assisted vaginal deliveries. (OR = 0.70; 95% CI 0.56 to 0.86; P < 0.001) They suggest that this may be due a decrease in motor blockade as a consequence of reduction in amount of local anaesthetic used.

Anim-Somuah M, Smyth RMD, Jones L. Epidural versus non-epidural or no analgesia in labour. Cochrane Database of Systematic Reviews 2011, Issue 12. Art. No.: CD000331
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000331.pub3/full

Sultan P, Murphy C, Halpern S, Carvalho B. The effect of low concentrations versus high concentrations of local anesthetics for labour analgesia on obstetric and anesthetic outcomes: A meta-analysis. Can J Anaesth 2013, 60: 840-854.

Evidence Level: I

Patient information is available from:

BUPA. Epidural for Childbirth. 2014. London: BUPA.
http://www.bupa.co.uk/health-information/directory/e/epidural-for-childbirth

Last amended January 2016
Last reviewed March 2017

EXTREME PREMATURITY
Supporting information

This guideline has been prepared with reference to the following:

MBRRACE-UK. Perinatal Mortality Surveillance Report - UK Perinatal Deaths for births from January to December 2013. 2015. The Infant Mortality and Morbidity Studies, Department of Health Sciences, University of Leicester

https://www.npeu.ox.ac.uk/downloads/files/mbrrace-uk/reports/MBRRACE-UK%20Perinatal%20Surveillance%20Report%202013.pdf

Royal College of Obstetricians and Gynaecologists. Perinatal Management of pregnant women at the threshold of infant viability (The Obstetric Perspective): Scientific Impact Paper No.41. 2014. London. RCOG

https://www.rcog.org.uk/globalassets/documents/guidelines/scientific-impact-papers/sip_41.pdf

Australian Research Centre for Health of Women and Babies. Antenatal magnesium sulphate prior to pre-term birth for neuroprotection of the fetus, infant and child – national clinical practice guidelines. Adelaide: ARCH;2010

https://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/cp128_mag_sulphate_child.pdf

Costeloe K, Hennessy E, Haider S et al. Short term outcomes after extreme preterm birth in England: comparison of two birth cohorts in 1995 and 2006 (the EPICure studies) BMJ 2012;345:14

http://www.bmj.com/content/345/bmj.e7976

Moore T, Hennessy E, Myles J et al. Neurological and developmental outcome in extremely premature children born in England in 2006 and 1995; the EPICure studies. BMJ 2012;345:15

http://www.bmj.com/content/345/bmj.e7961

Royal College of Obstetricians and Gynaecologists. Magnesium Sulphate to Prevent Cerebral Palsy following Preterm Birth (Scientific Impact Paper No. 29). 2011

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/sip29/

Patient Information is available from:
Tommy's. Explaining Premature Birth. London: Tommy's. 2014
http://www.tommys.org/page.aspx?pid=961

Last amended January 2016
Last reviewed March 2017

FETAL ABNORMALITY – ANTENATAL DETECTION
Supporting information

This guideline has been prepared with reference to the following:

Public Health England. NHS Fetal Anomaly Screening Programme 18+0 to 20+6 Weeks Fetal Anomaly Scan National Standards and Guidance for England. 2015

http://fetalanomaly.screening.nhs.uk/getdata.php?id=11218

Last amended March 2017
Last reviewed March 2017

FETAL BLOOD SAMPLING
Supporting information

This guideline has been prepared with reference to the following:

de Ruiter A, Taylor GP, Clayden P et al. British HIV Association guidelines for the management of HIV infection in pregnant women 2012 (2014 interim review). HIV Med. 2014;15:1-77

http://www.bhiva.org/documents/Guidelines/Pregnancy/2012/BHIVA-Pregnancy-guidelines-update-2014.pdf

NICE. Intrapartum care: care of healthy women and their babies during childbirth. 2014. London. NICE

http://www.nice.org.uk/guidance/CG190

Royal College of Anaesthetists, Royal College of Midwives, Royal College of Obstetricians and Gynaecologists, Royal College of Paediatrics and Child Health. Safer Childbirth: Minimum Standards for the Organisation and Delivery of Care in Labour. 2007

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/safer-childbirth-minimum-standards-for-the-organisation-and-delivery-of-care-in-labour/

Winn S.H. Assessing and credentialing standards of care: the UK CNST. Best Practice & Research Clinical Obstetrics and Gynaecology. 2007. Vol 24, No 4 pp.537-555.

Once fetal blood sampling (FBS) has given a diagnosis of fetal hypoxia, delivery should occur within 30 minutes?

A prospective study looked at 107 consecutive attempts at FBS on 72 patients (Annappa, 2008). The median time from the decision to perform FBS to obtaining the result was 17min (interquartile range: 11-22min). The median time from result to delivery was 21min (interquartile range: 16-25min) in those fetuses that had abnormal results. The median time from decision to perform FBS to delivery was 37min in cases where acidaemia was present. The authors recommended that the time taken between the decision to test and the result being available should be taken into consideration when expediting delivery of babies that may be hypoxaemic.

A Cochrane systematic review of two trials in a total of 3348 mother-baby pairs allocated to either lactate or pH estimation of fetal blood samples in labour (East 2010) found no statistically significant differences for any fetal/neonatal/infant outcomes, including low Apgar score at five minutes, admission to neonatal intensive care units or neonatal encephalopathy, or for low umbilical arterial pH, base deficit or metabolic acidaemia. There was a statistically higher success rate for lactate compared with pH estimation (risk ratio 1.10, 95% CI, 1.08 to 1.12, n = 2992). There were no significant between-group differences in mode of birth or operative birth for non-reassuring fetal status. The authors concluded that fetal scalp blood lactate estimation was more likely to be successfully undertaken than pH estimation.

Annappa R, Campbell DJ, Simpson NA. Fetal blood sampling in labour and the decision to delivery interval. Eur J Obstet Gynecol Reprod Biol 2008;141:10-2

East CE, Leader LR, Sheehan P, et al. Intrapartum fetal scalp lactate sampling for fetal assessment in the presence of a non-reassuring fetal heart rate trace. Cochrane Database of Systematic Reviews 2010, Issue 3. Art. No.: CD006174
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD006174.pub2/full

Evidence Level: III

Last amended October 2016
Last reviewed March 2017

This guideline has been prepared with reference to the following:

NICE. Caesarean Section. 2011. London. NICE

http://www.nice.org.uk/guidance/cg132

Is general anaesthesia for caesarean section as safe as regional anaesthesia?
A revised Cochrane systematic review of 22 studies in 1793 women (Afolabi, 2012) found no significant differences for a range of maternal or neonatal outcomes between regional and general anaesthesia. Compared to women who had General Anaesthetic, women who had either epidural anaesthesia or spinal anaesthesia were found to have a significantly lower difference between pre and postoperative haematocrit. For epidural, the mean difference (MD) was 1.70% and 95% confidence interval (CI) 0.47 to 2.93 (one trial, 231 women) and for spinal anaesthesia, the MD was 3.10% and 95% CI 1.73 to 4.47 (one trial, 209 women). Compared with General Anaesthesia, women having either an epidural anaesthesia or spinal anaesthesia had a lower estimated maternal blood loss (epidural versus GA: standardised mean difference (SMD) -0.32 mL; 95% CI -0.56 to -0.07; two trials, 256 women; spinal versus GA anaesthesia: SMD -0.59 mL; 95% CI -0.83 to 0.35; two trials, 279 women). There was evidence of a significant difference in terms of satisfaction with anaesthetic technique - compared with the epidural or spinal group, more women in the GA group stated they would use the same technique again if they needed CS for a subsequent pregnancy (epidural versus GA: risk ratio (RR) 0.80; 95% CI 0.65 to 0.98; one trial, 223 women; spinal versus GA anaesthesia: RR 0.80; 95% CI 0.65 to 0.99; one trial, 221 women).No significant difference was seen in terms of neonatal Apgar scores of six or less and of four or less at five minutes and the need for neonatal resuscitation with oxygen.
A recent systematic review (Heesen 2013) found that although general anaesthesia is associated with a higher blood loss than neuraxial anaesthesia, the need for blood transfusion was not greater. The higher blood loss with general anaesthesia is therefore of uncertain clinical relevance.

Afolabi BB, Lesi FE. Regional versus general anaesthesia for caesarean section. Cochrane Database of Systematic Reviews 2012, Issue 10. Art. No.: CD004350
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004350.pub3/full

Heesen M, Hoffman T, Klohr S et al. Is general anaesthesia for caesarean section associated with postpartum haemorrhage? Sytematic review and meta-analysis. Acta Anaesthesiological Scandinavica 2013; 57: 1092-1102.

Evidence Level: I

The risk of failed intubation in the obstetric population is approximately 10 times greater than in the non-obstetric population?
A retrospective survey, carried out over a 6-year period (1993 -1998) in the South Thames (West) region (Barnardo, 2000), recorded 36 failed tracheal intubations occurring in 8970 obstetric general anaesthetics (incidence 1/249). There was no significant difference in the incidence of failed tracheal intubation in each of the six years. The results of this survey give an overall 6-year incidence of failed tracheal intubation in obstetrics of 1/249 (95% CI 1/370±1/187).
Another retrospective study compared 851 cases of general anaesthesia use during caesarean section, with an age-matched group of 814 female patients undergoing non-obstetric abdominal or gynecological surgery with rapid sequence induction. Failed intubation occurred in three patients undergoing cesarean delivery (0.4%) and in one non-obstetric patient (0.1%; P = 0.339). The authors of the study concluded that the rate of failed intubations in patients undergoing cesarean delivery may be equivalent to non-obstetric patient

Barnardo PD, Jenkins JG. Failed tracheal intubation in obstetrics: a 6-year review in a UK region. Anaesthesia 2000;55:690-4.
http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2044.2000.01536.x/full

Heinrich S, Irouschek A, Prottengeier J et al. Adverse airway events in parturient compared with non-parturient patients. Is there a difference? Results from a quality management project. J Obstet Gynaecol Res. 2015;41:1032-9

Evidence Level: IV

Antacids are indicated, to reduce the risk of gastric aspiration?
A Cochrane systematic review of 22 studies in 2658 women (Paranjothy, 2014) found that, compared to no treatment or placebo, there was a significant reduction in the risk of intragastric pH < 2.5 with antacids (RR 0.17, 95% CI 0.09 to 0.32, two studies, 108 women). The combined use of 'antacids plus H_2antagonists' was associated with a significant reduction in the risk of intragastric pH < 2.5 at intubation when compared with placebo (RR 0.02, 95% CI 0.00 to 0.15, one study, 89 women) or compared with antacids alone (RR 0.12, 95% CI 0.02 to 0.92, one study, 119 women).

Paranjothy S, Griffiths JD, Broughton HK, et al. Interventions at caesarean section for reducing the risk of aspiration pneumonitis. Cochrane Database of Systematic Reviews 2014, Issue 2. Art. No.: CD004943. http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004943.pub4/full

Evidence Level: I

Last amended March 2017
Last reviewed March 2017

GENITAL HERPES
Supporting information

This guideline has been prepared with reference to the following:

Royal College of Obstetricians and Gynaecologists. Management of genital herpes in pregnancy (Green Top Guideline No. 30). 2014. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/genital-herpes/

NICE. Caesarean Section. 2011. London. NICE

http://www.nice.org.uk/guidance/cg132

Baker D. Consequences of herpes simplex virus in pregnancy and their prevention. Curr Opin Infect Dis. 2007 Feb;20(1):73-6.

Sauerbrei A., Wutzler P. Herpes simplex and varicella-zoster virus infections during pregnancy: current concepts of prevention, diagnosis and therapy. Part 2: Varicella-voster virus infections. Med Microbiol Immunol. 2007 Jun; 196(2):95-102.

Cowan FM, Munday P, Herpes Simplex Virus Advisory Panel. Guidelines for the management of herpes simplex virus infection in pregnancy. Sexually Transmitted Infections 1998; 74: 93-4

Last amended March 2017
Last reviewed March 2017

Immunoglobulin (HBIG) treatment prevents vertical transmission of hepatitis B?
A meta-analysis of 37 RCTs involving a total of 5900 newborns (Shi, 2010) found that, compared with the control group, newborns in the HBIG group had a lower intrauterine infection rate (indicated by HBsAg as OR 0.22, 95% CI 0.17 to 0.29, from 32 RCTs; indicated by HBV DNA as OR 0.15, 95% CI 0.07 to 0.30, from 13 RCTs; p<0.01 for both) and a higher protection rate (indicated by hepatitis B surface antibody (HBsAb) as OR 11.79, 95% CI 4.69 to 29.61], from 15 RCTs; p<0.01).
A 2017 systematic review of 36 RCTs (all conducted in China) found that maternal HBIG did not decrease HBeAg in newborns compared with no intervention (184/889 (21%) with HBIG versus 232/875 (27%) with no intervention; RR 0.68, TSA-adjusted CI 0.04 to 6.37 (Eke, 2017). The review authors commented that "Due to very low to low quality evidence found in this review, we are uncertain of the effect of benefit of antenatal HBIG administration to the HBV-infected mothers on newborn outcomes, such as HBsAg, HBV-DNA, and HBeAg compared with no intervention."

Eke A, Eleje GU, Eke UA et al. Hepatitis B immunoglobulin during pregnancy for prevention of mother-to-child transmission of hepatitis B virus. Cochrane Database Syst Rev. 2017:CD008545
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD008545.pub2/full

Shi Z, Li X, Ma L, et al. Hepatitis B immunoglobulin injection in pregnancy to interrupt hepatitis B virus mother-to-child transmission-a meta-analysis. Int J Infect Dis 2010;14:e622-34
http://www.sciencedirect.com/science/article/pii/S1201971210000032
Evidence Level: I

Last amended March 2017
Last reviewed March 2017

HIGH DEPENDENCY CARE
Supporting information

This guideline has been prepared with reference to the following:

MCC/EMC Standards Development working group. Enhanced Care for the Sick Mother: Standards for Maternal Critical Care. 2016

http://www.noeccn.org.uk/resources/Documents/MCC%20NoE/MCCFinalDraft2016.pdf

Last amended August 2016
Last reviewed March 2017

This guideline has been prepared with reference to the following:

British HIV Association (BHIVA). British HIV Association guidelines for the management of HIV infection in pregnant women 2012 (2014 Interim Review).

http://www.bhiva.org/documents/Guidelines/Pregnancy/2012/BHIVA-Pregnancy-guidelines-update-2014.pdf

NICE. Caesarean Section. 2011. London. NICE

http://www.nice.org.uk/guidance/cg132

Elective caesarean section (ECS) is the preferred method of delivery for women with a viral load >50 copies/mL, or who have not received adequate antiviral treatment?
A Cochrane systematic review (Read, 2005) identified only one RCT of the efficacy of ECS for prevention of maternal transmission of HIV-1. Data regarding viral load according to mode of delivery were available from this clinical trial as well as from five observational studies. Among HIV-1-infected women not taking antiretrovirals during pregnancy or taking only zidovudine, ECS was found to be efficacious for the prevention of transmission (caesarean section 3.5% vs vaginal delivery: 10.2%).

Read JS, Newell ML. Efficacy and safety of cesarean delivery for prevention of mother-to-child transmission of HIV-1. Cochrane Database of Systematic Reviews 2005: CD005479
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD005479/full

Evidence Level: I

What is the most effective regimen for antiviral treatment?

A Cochrane Review of 25 trials with a total of 18,901 participants (Siegfried, 2011) concluded that: “Short courses of antiretroviral drugs are…effective for reducing mother-to-child transmission of HIV and are not associated with any safety concerns in the short-term. ZDV given to mothers during the antenatal period, followed by ZDV+3TC intrapartum and postpartum for one week, and sd-NVP given to infants within 72 hours of delivery and ZDV for one week, may be most effective when considering short antiretroviral courses. Where HIV-infected women present late for delivery, post-exposure prophylaxis with a single dose of NVP immediately after birth plus ZDV for the first 6 weeks after birth is beneficial.”
A retrospective multicentre cohort study of women receiving Highly Active Anti-Retroviral Treatment (HAART) in London and Brighton (Read, 2012) found that under treatment, viral load was <50 copies/ml in 292 of 378 pregnancies (77.2%) by delivery. Pre-treatment viral load was associated with the time taken, and the proportion achieving a viral load <50 copies/ml at (P<=0.001). When baseline viral load was <10,000 copies/ml, gestational age at HAART initiation did not affect success up to 26.3 weeks gestation. When viral load was >10,000 copies/ml, deferring HAART past 20.4 weeks reduced the probability of reaching < 50 copies/ml by delivery (P=0.011). When baseline viral load was >100,000 copies/ml the likelihood of reaching a viral load of < 50 copies/ml was low (37%: hazard ratio 0.31), and dependent on the length of time on HAART.

Read PJ, Mandalia S, Khan P, et al. When should HAART be initiated in pregnancy to achieve an undetectable HIV viral load by delivery? AIDS 2012;26:1095-103

Siegfried N, van der Merwe L, Brocklehurst P, et al. Antiretrovirals for reducing the risk of mother-to-child transmission of HIV infection. Cochrane Database of Systematic Reviews 2011: CD00351
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD003510.pub3/full

Evidence Level: I

Patient information is available from:
Royal College of Obstetricians and Gynaecologists. HIV and pregnancy (Information for you). 2013.
https://www.rcog.org.uk/globalassets/documents/patients/patient-information-leaflets/pregnancy/hiv-and-pregnancy.pdf

Last amended February 2015
Last reviewed March 2017

HOME BIRTH
Supporting information

This guideline has been prepared with reference to the following:

NICE. Intrapartum care: care of healthy women and their babies during childbirth. 2017. London. NICE

http://www.nice.org.uk/guidance/CG190

NICE. Antenatal care for uncomplicated pregnancies. 2017. London. NICE

https://www.nice.org.uk/guidance/cg62

Hodnett ED. Alternative versus conventional institutional settings for birth. Cochrane Database Syst Rev 2012. CD000012

http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000012.pub4/full

Royal College of Obstetricians and Gynaecologists and Royal College of Midwives. Home Births: RCOG and Royal College of Midwives Joint Statement No. 2. 2007

https://www.rcm.org.uk/sites/default/files/home_births_rcog_rcm0607.pdf

Is there a higher likelihood of a normal birth with less intervention among women who plan for a home birth?
A Cochrane review (Olsen 2012) noted the lack of adequately powered randomised trials comparing home and hospital birth. A number of large observation studies have reported that planned home births are associated with considerably less interventions than planned hospital births.
A cohort study of births in North America (Johnson 2005) compared outcomes of planned home births (n=5148) with all births (n=336,086) and in the former found lower rates of caesarean section (3.7% compared with 19.0%), vacuum extraction (0.6% compared with 5.2%), episiotomy (2.1% compared with 33.0%), induction of labour (9.2% compared with 21.0%) and stimulation of labour (9.2% compared with 21.0%).
A cohort study of Swedish births (Lindgren 2008) compared 897 planned home births with 11,341 hospital births and found much lower levels of intervention in the former. The adjusted relative risk in planned home births for caesarean section was 0.4 (95% CI 0.3 to 0.5), vacuum extraction was 0.2 (95% CI 0.1 to 0.3) and for episiotomy was 01 (95% CI 0.0 to 0.2).
A cohort study of 64,538 births in NHS Trusts (Birthplace 2011) found that “Women with planned births at home … were significantly less likely that those with planned births in obstetric units to have an instrumental or operative delivery or to receive medical interventions”. The study found that the proportion of women with a normal birth was 88% for planned home births and 58% for planned obstetric unit births.
Another North American study of 2,081,753 births (Cheng 2013) found a reduced frequency of operative vaginal delivery in planned home births (0.1%) compared with hospital births (6.2%), induction of labour (1.4% compared with 25.7%) and augmentation of labour (2.1% compared with 22.2%).

Olsen O, Clausen JA: Planned hospital birth versus planned home birth. Cochrane Database Syst Rev 2012, 9:CD000352
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000352.pub2/full

Johnson KC, Daviss B. Outcomes of planned home births with certified professional midwives: large prospective study in North America. BMJ. 2005. 330(7505)
http://www.bmj.com/content/330/7505/1416

Lindgren HE, Radestad IJ, Christensson K. et al. Outcome of planned home births compared to hospital births in Sweden between 1992 and 2004. A population-based register study. Acta Obstetricia et Gynecologica Scandinavica 2008. 87;751-9

Birthplace. Perinatal and maternal outcomes by planned place of birth for healthy women with low risk pregnancies: the Birthplace in England national prospective cohort study. BMJ. 343. 2011 http://www.bmj.com/content/343/bmj.d7400

Cheng YW, Snowden JM, King TL et al. Selected perinatal outcomes associated with planned home births in the United States", American Journal of Obstetrics & Gynecology. 209(4) p325. 2013.

Evidence Level: III

Last amended March 2017
Last reviewed March 2017

This guideline has been prepared with reference to the following:

NICE. Hypertension in pregnancy: the management of hypertensive disorders during pregnancy. 2011. London. NICE

http://www.nice.org.uk/guidance/cg107

If taken in pregnancy, angiotensin-converting enzyme (ACE) inhibitors and/or angiotensin II receptor blockers (ARBs) carry an increased risk of congenital abnormalities?
A review paper on this topic (Al-Maawali, 2012) states that: "Most published studies have failed to show an effect of ACE inhibitors on congenital malformations. A recent systematic review and meta-analysis conducted by Motherisk does not suggest increased fetal risk of malformations. However, ACE inhibitors should be avoided in late pregnancy, as they might cause renal failure and acalvaria in the baby."

Al-Maawali A, Walfisch A, Koren G. Taking angiotensin-converting enzyme inhibitors during pregnancy: is it safe? Can Family Physician 2012;58:49-51

Evidence Level: I

Patient information is available from:
National Institute for health and care excellence. Hypertension in pregnancy: the management of hypertensive disorders during pregnancy. London: NICE. 2010
http://www.nice.org.uk/guidance/CG107/IFP/chapter/About-this-information

Last amended February 2015
Last reviewed March 2017

This guideline has been prepared with reference to the following:

NICE. Induction of labour. 2008. London: NICE

http://www.nice.org.uk/guidance/cg70

Induction is indicated if pregnancy is prolonged (term plus 10 -14 days)?
A Cochrane systematic review of 22 trials in 9383 women (Gulmezoglu, 2012) found that a policy of labour induction at 41 completed weeks or beyond was associated with fewer (all-cause) perinatal deaths (1/2986 versus 9/2953; RR 0.30; 95% CI 0.09 to 0.99). There was no evidence of a statistically significant difference in the risk of caesarean section (RR 0.92; 95% CI 0.76 to 1.12; RR 0.97; 95% CI 0.72 to 1.31) for women induced at 41 and 42 completed weeks respectively. Women induced at 37 to 40 completed weeks were more likely to have a caesarean section with expectant management than those in the labour induction group (RR 0.58; 95% CI 0.34 to 0.99). There were fewer babies with meconium aspiration syndrome (41+: RR 0.29; 95% CI 0.12 to 0.68, four trials, 1325 women; 42+: RR 0.66; 95% CI 0.24 to 1.81, two trials, 388 women).
Another systematic review and meta-analysis of 25 studies (Hussain, 2011) also found significantly fewer perinatal deaths (RR = 0.31; 95% CI: 0.11-0.88) compared to expectant management, but no significant difference in the incidence of stillbirth (RR = 0.29; 95% CI: 0.06-1.38).

Gülmezoglu AM, Crowther CA, Middleton P et al. Induction of labour for improving birth outcomes for women at or beyond term. Cochrane Database Syst Rev. 2012:CD004945
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004945.pub3/abstract

Hussain AA, Yakoob MY, Imdad A, et al. Elective induction for pregnancies at or beyond 41 weeks of gestation and its impact on stillbirths: a systematic review with meta-analysis. BMC Public Health 2011;11 Suppl 3/:S5
http://www.biomedcentral.com/1471-2458/11/S3/S5

Evidence Level: I

Membrane sweeping (if membranes remain unruptured) increases the chances of labour starting naturally within 48 hr?
A Cochrane systematic review of 22 trials in 2797 women (Boulvain, 2005) found that membrane sweeping, compared to no sweeping, was associated with reduced duration of pregnancy and reduced frequency of pregnancy continuing beyond 41 weeks (RR 0.59, 95% CI 0.46 to 0.74) and 42 weeks (RR 0.28, 95% CI 0.15 to 0.50; NNT = 8 to avoid one formal induction of labour).
A randomised controlled trial of 140 women (Parlakgumus, 2014) found that sweeping of the membranes does not reduce the time to onset of labour (6 days in the sweeping group vs. 4 days in the control group) neither does it reduce the need for induction of labour (20.3% of the sweeping groups vs. 12.7% of controls, p=0.22).

Boulvain M, Stan CM, Irion O. Membrane sweeping for induction of labour. Cochrane Database Syst Rev. 2005: CD000451
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000451.pub2/full

Parlakgumus HA, Yalcinkaya C, Haydardedeoglu B et al. The impact of sweeping the membranes on cervical length and labor: a randomized clinical trial. Ginekologia polska, 2014;85:682-7

Evidence Level: I

In nulliparous or multiparous women with intact membranes with unfavourable cervix, prostaglandin is to be preferred to oxytocin?
A Cochrane systematic review of 61 trials in 12,819 women (Alfirevic, 2009) concluded that "Comparison of oxytocin with either intravaginal or intracervical PGE2 reveals that the prostaglandin agents probably increase the chances of achieving vaginal birth within 24 hours." Oxytocin, in the two

trials reporting this outcome, resulted in an increase in unsuccessful vaginal delivery (70% versus 21%, RR 3.33, 95% CI 1.61 to 6.89).

Alfirevic Z, Kelly AJ, Dowswell T. Intravenous oxytocin alone for cervical ripening and induction of labour. Cochrane Database Syst Rev. 2009, Issue 4. Art. No.: CD003246
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD003246.pub2/full

Evidence Level: I

What evidence is there for contraindications for induction of labour with prostaglandin for mothers with history of inflammatory disease?
BNF (2014) reports that caution be taken administering dinoprostone to mothers with cervicitis or acute vaginitis.

British National Formulary. Dinoprostone. London: BNF. 2014
http://www.evidence.nhs.uk/formulary/bnf/current/7-obstetrics-gynaecology-and-urinary-tract-disorders/71-drugs-used-in-obstetrics/711-prostaglandins-and-oxytocics/dinoprostone

Is there an association between prostaglandins and hyperstimulation?
NICE states: "When offering PGE2 (prostaglandin E2) for induction of labour, healthcare professionals should inform women about the associated risks of uterine hyperstimulation" (2008).
The association between prostaglandins and hyperstimulation is described in a systematic review (Mozurkewich, 2011) of clinical trials which found that when compared with placebo, use of vaginal and cervical prostaglandin E2 was consistently associated with increased risk of hyperstimulation. 14 trials compared intravaginal prostaglandins with placebo and found that the relative risk (RR) of hyperstimulation was 4.14 (95% CI 1.93 to 8.90; number needed to harm [NNH] = 65). The same systematic review also found that IV prostaglandin E2 was associated with a higher rate of hyperstimulation that IV oxytocin (with FHR changes: RR 6.76, 95% CI 1.23 to 37.11, NNH = not estimable; without FHR changes: RR 4.25, 95% CI 1.48 to 12.24, NNH = 13).

NICE. Induction of labour. 2008. London. NICE
http://www.nice.org.uk/guidance/cg70

Mozurkewich EL, Chilimigras JL, Berman DR. Methods of induction of labour: A systematic review: BMC Pregnancy and Childbirth, 2011:11
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3224350/

Evidence: I

In women with a previous caesarean section, the risk of scar rupture is increased if both oxytocin and prostaglandin are used. How great is the increased risk?
A retrospective cohort study of 29,008 pregnant mothers who had their first births by caesarean found that the risk of scar rupture was 1.77% (95% CI 0.48% to 4.47%) when labour was induced with both oxytocin and prostaglandin, compared with a risk of 0.19% (95% CI 0.11% to 0.32%) when labour was spontaneous (Dekker, 2010). Therefore this study describes a nine-fold increase of risk when oxytocin and prostaglandin are used together.
A case-control study of 41 cases and 157 controls found that the incidence odds of uterine rupture in those who have taken both oxytocin and prostaglandin was 2.50 compared with only 0.17 in those who had a spontaneous birth. Therefore this study describes a fifteen-fold increase of the odds of rupture incidence when oxytocin and prostaglandin are used together.

Dekker, G A, Chan, A, Luke, C G, et al. Risk of uterine rupture in Australian women attempting vaginal birth after one prior caesarean section: a retrospective population-based cohort study. BJOG 2010,117,1358-65

Weimar CHE, Lim AC, Bots ML et al. Eur J Obstet Gynecol Reprod Biol. European journal of obstetrics, gynecology, and reproductive biology, 2010, 151, 41-5

Evidence III

Patient information is available from:
NICE. Induction of labour. 2008. London. NICE
http://www.nice.org.uk/Guidance/CG70/InformationForPublic

Last amended December 2015
Last reviewed March 2017

INTERMITTENT AUSCULTATION
Supporting information

This guideline has been prepared with reference to the following:

NICE. Intrapartum care: care of healthy women and their babies during childbirth. 2017. London. NICE

http://www.nice.org.uk/guidance/CG190

Royal College of Midwives. Evidence Based Guidelines for Midwifery-Led Care in Labour: Intermittent Auscultation. 2012

https://www.rcm.org.uk/sites/default/files/Intermittent%20Auscultation%20(IA)_0.pdf

NICE. Caesarean Section. 2011. London. NICE

http://www.nice.org.uk/guidance/cg132

Last amended March 2017
Last reviewed March 2017

LATENT PHASE OF LABOUR
Supporting information

What maternal and/or fetal risks are associated with a prolonged period of latency?
A cohort study (Maghoma, 2002) compared 150 women with prolonged latent phase of labour (>8 hrs) with 100 controls (latent phase <8 hrs). Cases required oxytocin augmentation (62% vs. 17%; P<0.0001) and caesarean section (29% vs. 6%; P<0.0001) more frequently than controls. Thick meconium staining of the liquor was more frequent in cases (15% vs. 5%; P<0.05), as were 5-minute Apgar scores less than 7 (17% vs. 3%; P<0.001) and admission to the neonatal unit (22% vs. 1%; P<0.0001).

Maghoma J, Buchmann EJ. Maternal and fetal risks associated with prolonged latent phase of labour. J Obstet Gynaecol 2002;22:16-9

Evidence Level: III

Last amended November 2010
Last reviewed March 2017

MATERNAL TRANSFER (including in-utero transfer)
Supporting information

What are the risk factors for maternal transfer?

A prospective cohort study in 29,248 women with a singleton, term and "booked" pregnancy (Rowe, 2012) found that over 1 in 4 women were transferred from "alongside maternity units" (AMU) and over 1 in 5 from "freestanding maternity units (FMU). In both types, compared with multiparous women aged 25-29 years, nulliparous women aged <20 years had higher odds of transfer (FMU-adjusted OR, 4.5; 95% CI, 3.10-6.57; AMU-adjusted OR, 2.6; 95% CI, 2.18-2.06), and the odds of transfer increased with increasing age. Nulliparous women aged >= 35 years in FMUs had 7.4 times the odds of transfer (95% CI, 5.43-10.10) and, in AMUs, 6.0 times the odds of transfer (95% CI, 4.81-7.41). Starting labour care after 40 weeks of gestation and the presence of complicating conditions at the start of labour care were also independently associated with a higher risk of transfer.

Rowe RE, Fitzpatrick R, Hollowell J, et al. Transfers of women planning birth in midwifery units: data from the birthplace prospective cohort study. BJOG 2012;119:1081-90
http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2012.03414.x/full

Evidence Level: I

Last amended October 2012
Last reviewed March 2017

This guideline has been prepared with reference to the following:

NICE. Intrapartum care: care of healthy women and their babies during childbirth. 2017. London. NICE

http://www.nice.org.uk/guidance/CG190

ACOG. Committee Opinion No.689 Summary: Delivery of a Newborn With Meconium-Stained Amniotic Fluid. Obstet Gynecol. 2017;129:593-4

http://www.acog.org/Resources-And-Publications/Committee-Opinions/Committee-on-Obstetric-Practice/Delivery-of-a-Newborn-With-Meconium-Stained-Amniotic-Fluid

Nursing and Midwifery Council. The Code: Professional standards of practice and behaviour for nurses and midwives. N.M.C. 2015. London

https://www.nmc.org.uk/code

Resuscitation Council UK. Resuscitation and support of transition of babies at birth, 2015

https://www.resus.org.uk/resuscitation-guidelines/resuscitation-and-support-of-transition-of-babies-at-birth/

Society of Obstetricians and Gynaecologists of Canada. Maternal Fetal Medicine Committee. Management of meconium at birth. (SOGC Clinical Practice Guideline No. 224) Int J Gynaecol Obstet 2009;107:80-1

Unnecessary intubation and lower airway suction does more harm than good?
A review paper on this topic (Vain, 2009) states that: “Universal intrapartum suction of infants with meconium stained amniotic fluid and postnatal suction of vigorous infants have been used in an attempt to decrease the incidence and severity of the disease by clearing the airway. Both procedures have been proven fruitless when challenged through randomised control trials. Endotracheal intubation and suctioning are currently recommended only for non-vigorous infants.” This statement was echoed in the latest committee opinion of the American College of Obstetrics and Gyneclogy (2017).

Vain NE, Szyld EG, Prudent LM, et al. What (not) to do at and after delivery? Prevention and management of meconium aspiration syndrome. Early Hum Dev 2009;85:621-6

ACOG. Committee Opinion No.689 Summary: Delivery of a Newborn With Meconium-Stained Amniotic Fluid. Obstet Gynecol. 2017;129:593-4
http://www.acog.org/Resources-And-Publications/Committee-Opinions/Committee-on-Obstetric-Practice/Delivery-of-a-Newborn-With-Meconium-Stained-Amniotic-Fluid

Evidence Level: I

Is therapeutic use of surfactant indicated if the baby has aspirated meconium?
A Cochrane review of 4 trials in 326 infants (El Shahed, 2014) found the risk of requiring extracorporeal membrane oxygenation was significantly reduced in a meta-analysis of two trials (n = 208); (typical RR 0.64, 95% CI 0.46 - 0.91; typical risk difference -0.17, 95% CI - 0.30 to -0.04); NNT 6 (95% CI 3 - 25). One trial (n = 40) reported a statistically significant reduction in the length of hospital stay [mean difference - 8 days (95% CI -14 to -3 days)]. There were no statistically significant reductions in any other outcomes studied (duration of assisted ventilation, duration of supplemental oxygen, pneumothorax, pulmonary interstitial emphysema, air leaks, chronic lung disease, need for oxygen at discharge or intraventricular haemorrhage).

El Shahed AI, Dargaville PA, Ohlsson A et al. Surfactant for meconium aspiration syndrome in term and late preterm infants. Cochrane Database Syst Rev. 2014:CD002054
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD002054.pub3/full

Evidence Level: I

Patient information is available from:
Patient.co.uk. Meconium-stained liquor. 2015
http://www.patient.co.uk/doctor/Meconium-Stained-Liquor.htm

Last amended March 2017
Last reviewed March 2017

MEDICAL TERMINATION
Supporting information

This guideline has been prepared with reference to the following:

Royal College of Obstetricians and Gynaecologists 2010 Late intrauterine death and stillbirth (Green–top Guideline No. 55). RCOG

https://www.rcog.org.uk/globalassets/documents/guidelines/gtg_55.pdf

Last amended March 2011
Last reviewed March 2017

This guideline has been prepared with reference to the following:

MBRRACE-UK. Saving Lives, Improving Mothers' Care - Surveillance of maternal deaths in the UK 2011-13 and lessons learned to inform maternity care in the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009-13. Oxford. University of Oxford. 2015

https://www.npeu.ox.ac.uk/downloads/files/mbrrace-uk/reports/MBRRACE-UK%20Maternal%20Report%202015.pdf

NICE. Antenatal and postnatal mental health: clinical management and service guidance. 2014. London. NICE

http://www.nice.org.uk/guidance/cg192

MBRRACE-UK. Saving Lives, Improving Mothers' Care - Lessons learned to inform future maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009–12. Oxford. University of Oxford. 2014

https://www.npeu.ox.ac.uk/downloads/files/mbrrace-uk/reports/Saving%20Lives%20Improving%20Mothers%20Care%20report%202014%20Full.pdf

NICE. Postnatal care. 2013. London

https://www.nice.org.uk/guidance/qs37

Scottish Intercollegiate Guidelines Network. Management of perinatal mood disorders. 2012. Edinburgh

http://www.sign.ac.uk/pdf/sign127.pdf

Royal College of Obstetricians and Gynaecologists. Management of Women with Mental Health Issues during Pregnancy and the Postnatal Period (Good Practice No. 14). 2011. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/good-practice-14/

Saving Mothers' Lives: Reviewing maternal deaths to make motherhood safer: 2006-2008. The Eighth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom. 2011

http://dx.doi.org/10.1111/j.1471-0528.2010.02847.x

Chambers C. Selective serotonin reuptake inhibitors and congenital malformations. 2009. BMJ; 339:703-4

http://www.bmj.com/content/339/bmj.b3525

Levi N, Bastiji-Garin S, Mockenhaupt M et al. Medications as risk factors of Stevens-Johnson syndrome and toxic epidermal necrolysis in children: a pooled analysis. Pediatrics 2009;123:297-304

Academy of Medical Royal Colleges. Managing urgent mental health needs in the acute trust. 2008. Academy of Medical Royal Colleges. London

http://www.rcpsych.ac.uk/pdf/ManagingurgentMHneed.pdf

Department of Health. Modernising Maternity Care: a commissioning toolkit for England. 2006

Department of Health. Mental Capacity Act. 2005. HMSO. London

http://www.legislation.gov.uk/ukpga/2005/9/contents

Boath E, Bradley E & Henshaw C The prevention of postnatal depression: A narrative systematic review. Psychosomatic Obstetrics and Gynaecology 26; 2005: 185-92

Department of Health. Mental Health Act. 1983. HMSO. London

http://www.legislation.gov.uk/ukpga/1983/20/contents

Last amended August 2016
Last reviewed March 2017

This guideline has been prepared with reference to the following:

Royal College of Obstetricians and Gynaecologists. Placenta Praevia Accreta and Vasa Praevia: Diagnosis and management. 2011. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg27/

Where there is a high probability of a morbidly adherent placenta is it appropriate to liaise with an interventional radiologist, if available locally?

A 2016 retrospective study of 12 patients with abnormal placental implantation and intractable intraoperative post-partum haemorrhage who underwent pelvic artery embolization (PAE) after caesarean delivery to control a haemorrhage (Rebonato, 2016). Arterial access was obtained prior to the delivery; PAE was performed in the obstetrics operating room by an interventional radiologist that was present with an interventional radiology (IR) team during the delivery. The authors concluded that PAE is a minimal invasive technique that may help to prevent hysterectomy and control PPH in API pregnancies without complications. Embolisation should be performed on an emergency basis. For such cases, an IR team on standby in the obstetrics theatre may be useful to prevent hysterectomy, blood loss and limit morbidity.

RCOG guidelines (2011) state that: interventional radiology can be life saving for the treatment of massive postpartum haemorrhage and therefore having this facility available locally is desirable. If a woman is suspected of having placenta accreta and she refuses donor blood, it is also recommended. (Hayes 2011) The place of prophylactic catheter placement for balloon occlusion or in readiness for embolization if bleeding ensues requires further evaluation however.

The treatment of severe postpartum haemorrhage using interventional radiology techniques and selective embolisation has been well documented in case series (e.g. Mok, 2008) but higher level evidence is lacking (Doumouchtsis, 2010). Uterine artery embolisation in cases of uncontrolled haemorrhage can be lifesaving and uterus sparing and should be considered. Less clear is the value of prophylactic placement of arterial catheters in cases where placenta accreta is suspected antenatally.

The report ‘Why Mothers Die 2000-2002’ (CEMACH, 2004) states that if the mother “decides against accepting blood transfusion in any circumstances, she should be booked for delivery in a unit with facilities for prompt management of haemorrhage, such as interventional radiology, cell salvage and surgical expertise” (p. 94). They also report having an interventional radiologist present at high risk elective operations as good practice.

CEMACH (2004) record that no deaths were reported in women who had had interventional radiology or B-Lynch suture. However, they explain that “interventional radiology for embolisation of the uterine or other vessels may be difficult to deliver where haemorrhage has occurred without warning, where the woman’s condition is unstable and she cannot be moved and especially where the delivery hospital is not on a general hospital site. But consideration could be given to arranging for the woman to deliver where there are appropriate facilities and it may sometimes be possible to stabilise the situation using angioplasty balloons prior to embolization” (CEMACH, 2004, p. 91).

Confidential Enquiry into Maternal and Child Health: Why Mothers Die: 2000-2002. 2004. London. RCOG

Doumouchtsis SK and S. Arulkumaran. The morbidly adherent placenta: an overview of management options. Acta Obstet Gynecol Scand 2010; 89(9):1126–33

Hayes E et al. The morbidly adherent placenta: diagnosis and management options. Cur Opin Obstet Gynecol 2011; 23:448–53

Mok, et al. Interventional radiology in women with suspected placenta accreta undergoing caesarean section. Int J Obstet Anesth; 2008;17(3):255–61

Rebonato A, Mosca S, Fischer M et al. Endovascular management of massive post-partum haemorrhage in abnormal placental implantation deliveries. Eur Radiol. 2016;26:1620-30

Royal College of Obstetricians and Gynaecologists. Placenta Praevia Accreta and Vasa Praevia: Diagnosis and management. 2011. London. RCOG
https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg27/

Evidence Level: II

Is it appropriate to insert balloons in the femoral arteries as a prophylactic measure before procedure for inflation in the event of postpartum haemorrhage?
An Israeli retrospective study by Sivan et al. (2010) evaluated prophylactic pelvic artery catheterisation, balloon occlusion and embolisation before Caesarean Section in women with ultrasound findings consistent with, or significant clinical risk factors for, placenta accreta (n=30). The results of this study provide limited evidence for the safe and effective use of prophylactic pelvic artery catheterisation in women with placenta accreta, but the sample size was small. Further research is needed on the effectiveness of treatments for reducing morbidity associated with maternal blood loss during surgery for morbidly adherent placenta. A retrospective case-control study of 117 patients with placenta accreta also concluded that preoperative placement of Uterine Artery Balloons (UABs) is relatively safe and is associated with a reduced estimated blood loss and fewer massive transfusions compared to a group without UABs.

Ballas J, et al. Preoperative intravascular balloon catheters and surgical outcomes in pregnancies complicated by placenta accreta: a management paradox. Am J Obstet Gynecol. 2012 Sep;207(3):216.e1-5.

Sivan E, et al. (2010) Prophylactic pelvic artery catheterization and embolization in women with placenta accreta: can it prevent cesarean hysterectomy?.Am J Perinatol; 2010; 27(6):455-61.

Evidence Level: III

Patient information is available from:
Patient.co.uk. Placenta and Placental Problems. 2011.
http://www.patient.co.uk/doctor/placenta-and-placental-problems

Last amended March 2017
Last reviewed March 2017

This guideline has been prepared with reference to the following:

NICE. Multiple pregnancy: antenatal care for twin and triplet pregnancies. 2011. London. NICE

http://www.nice.org.uk/guidance/cg129

The perinatal mortality rate is 6 times higher in multiple (as compared to singleton) pregnancies?

A study of 30,181 births in Vejle County, Denmark, between 1995-2000 (Garne, 2004) found that the perinatal mortality rate was 8.9 per 1000 births with no significant change over time. The rate of multiple pregnancies was 1.94%. Fetuses and infants from multiple pregnancies contributed 18% of all deaths. Perinatal mortality for single births was 7.6 per 1000 births and for multiple births 42.2/1000 (P<0.0001).
Some studies have estimated the risk of mortality as 10 times higher than for singleton pregnancies (Dodd, 2005).

Dodd JM, Crowther CA. Evidence-based care of women with a multiple pregnancy. Best Pract Res Clin Obstet Gynaecol 2005;19:131-53

Garne E, Andersen HJ. The impact of multiple pregnancies and malformations on perinatal mortality. J Perinatal Med 2004;32:215-9

Evidence Level: IV

Patient information is available from:
NHS Choices. Your healthy twin pregnancy. 2016. London. NHS
http://www.nhs.uk/conditions/pregnancy-and-baby/pages/twins-healthy-multiple-pregnancy.aspx

Last amended March 2015
Last reviewed March 2017

This guideline has been prepared with reference to the following:

Aldrete JA, Reza-Medina M, Daud O, et al. Exacerbation of preexisting neurological deficits by neuroaxial anesthesia: report of 7 cases. Journal of clinical anesthesia. 2005:17:304–313

Daley MD, Roibin SH, Hew EM, et al. Epidural anesthesia for obstetrics after spinal surgery. Reg Anesth. 1990;15:280–284.

Crosby ET, Halpern SH. Obstetric epidural anaesthesia in patients with Harrington instrumentation. Can J Anaesth. 1989;36:693–696

Hubbert CH. Epidural anesthesia in patients with spinal fusion. Anesth Analg. 1985;64:843

Last amended February 2016
Last reviewed March 2017

This guideline has been prepared with reference to the following:

Royal College of Obstetricians and Gynaecologists. Thrombosis and Embolism during Pregnancy and the Puerperium, Reducing the Risk (Green-top Guideline No. 37a). 2015. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg37a/

Poston L, Harthoorn LF, Van Der Beek EM, et al. Obesity in pregnancy: implications for the mother and lifelong health of the child. A consensus statement. Pediatr Res 2011;69:175-80

Massiah N, Kumar G. Obesity and pregnancy: A care plan for management. The Internet Journal of Gynecology and Obstetrics. 2008. 9

https://ispub.com/IJGO/9/2/3093

Ramachenderan J, Braford J, McLean M. Maternal obesity and pregnancy complications: a review. Aust N Z J Obstet Gynaecol. 2008. 48:228-35

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 Enquires into Maternal deaths in the United Kingdom. 2007. London. RCOG

Bhattacharya S, Campbell DM, Liston WA, Bhattacharya S Effect of Body Mass Index on pregnancy outcomes in nulliparous women delivering singleton babies. BMC Public Health, BMC Public Health. 2007 Jul 24;7:168

http://europepmc.org/articles/PMC1940246;jsessionid=WfAkNsT1skrom66Lnsel.1

Yu C, Teoh T, Robinson S. Obesity in pregnancy. BJOG 2006; 113:1117–25

http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2006.00991.x/full

Krishnamoorthy U, Schram C, Hill S. Maternal obesity in pregnancy: is it time for meaningful research to inform preventive and management strategies? BJOG 2006; 113:1134–40

http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2006.01045.x/full

Alexander C, Liston W. Operating on the obese woman—a review. BJOG 2006; 113:1167–72

http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2006.01073.x/full

Confidential Enquiry into Maternal and Child Health. Pregnancy in Women With Type 1 and Type. 2 Diabetes 2002-2003. England, Wales and Northern Ireland. CEMACH, London National Audit Office, 2006

Cedergren M. Effects of gestational weight gain and body mass index on obstetric outcome in Sweden. Int J Cynaecol Obstet 2006,93:269-74

Confidential Enquiry into Maternal and Child Health: Why Mothers Die: 2000-2002. 2004. London. RCOG

Chelmow D, Rodriguez EJ, Sabatini MM. Suture closure of subcutaneous fat and wound disruption after cesarean section: Obstet Gynaecol 2004, 103:974-80

Artal R, O'Toole M. Guidelines of the American College of Obstetricians and Gynecologists for exercise during pregnancy and the postpartum period. Br J Sports Med. 2003. 37:6-12

http://europepmc.org/articles/PMC1724598

Perloff D, Grim C, Flack J, Frohlich ED, Hill M, McDonald M, Morgenstern BZ. Human blood pressure determination by sphygmomanometer. Circulation. 1993. 88:2460-70

http://circ.ahajournals.org/content/88/5/2460.long

Do women with a BMI >35 experience an increase in anaesthesia-related complications?
A 2009 review (Roofthooft) found this to be the case and recommended that general anaesthesia be avoided wherever possible in favour of regional anaesthesia.
The 2009 Institute of Medicine (IOM) Committee to Reevaluate Gestational Weight Gain Guidelines concluded that there were too few data to inform weight-gain guidelines by obesity severity. Therefore, the committee recommended a single range, 5-9 kg at term, for all obese women (Bodnar, 2010).

Bodnar LM, Siega-Riz AM, Simhan HN, et al. Severe obesity, gestational weight gain, and adverse birth outcomes. Am J Clin Nutr 2010; 91:1642-8
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2869513/

Roofthooft E. Anesthesia for the morbidly obese parturient. Curr Opin Anaesthesiol 2009;22:341-6

Evidence Level: V

Is there an increased risk of fetal anomalies?
A systematic review of 39 studies, with a meta-analysis of 18 of them (Stothard, 2009) found that, compared with mothers with normal BMI, obese mothers were at increased odds of pregnancies affected by neural tube defects (OR, 1.87; 95% CI 1.62-2.15), spina bifida (OR, 2.24; 95% CI, 1.86-2.69), cardiovascular anomalies (OR, 1.30; 95% CI, 1.12-1.51), septal anomalies (OR, 1.20; 95% CI, 1.09-1.31), cleft palate (OR, 1.23; 95% CI, 1.03-1.47), cleft lip and palate (OR, 1.20; 95% CI, 1.03-1.40), anorectal atresia (OR, 1.48; 95% CI, 1.12-1.97), hydrocephaly (OR, 1.68; 95% CI, 1.19-2.36), and limb reduction anomalies (OR, 1.34; 95% CI, 1.03-1.73). The risk of gastroschisis among obese mothers was significantly reduced (OR, 0.17; 95% CI, 0.10-0.30).

Stothard KJ, Tennant PW, Bell R, et al. Maternal overweight and obesity and the risk of congenital anomalies: a systematic review and meta-analysis. JAMA, 2009;301:636-50
http://jama.jamanetwork.com/article.aspx?articleid=183375

Evidence Level: I

Is there an increased risk of Caesarean section having to be performed?
A systematic review and meta-analysis of 11 cohort studies (Poobalan, 2009) found that, compared with women with normal BMI, the crude pooled odds ratios (95% CI) for caesarean section in overweight (BMI 25-30 kg m(-2)), obese (BMI 30-35 kg m(-2)) and morbidly obese (BMI > 35 kg m(-2)) women were 1.53 (1.48, 1.58), 2.26 (2.04, 2.51) and 3.38 (2.49, 4.57) respectively. The pooled odds of having an emergency caesarean section were 1.64 (95% CI 1.55, 1.73) in overweight and 2.23 (2.07, 2.42) in obese women. Caesarean delivery risk was increased by 50% in overweight women and was more than double for obese women compared with women with normal BMI.
A 2015 systematic review of reviews found that the odds of caesarean section increased by 2 to 2.36 times (Marchi, 2015).

Poobalan AS, Aucott LS, Gurung T, et al. Obesity as an independent risk factor for elective and emergency caesarean delivery in nulliparous women: systematic review and meta-analysis of cohort studies. Obesity Reviews 2009;10:28-35

Marchi J, Berg M, Dencker A et al. Risks associated with obesity in pregnancy, for the mother and baby: a systematic review of reviews. Obes Rev. 2015;16:621-38

Evidence Level: III

Is there an increased risk of pre-term birth and low-birthweight infants?

A systematic review and meta-analysis of 84 studies (64 cohort and 20 case-control) in a total of 1 095 834 women (McDonald, 2010) found that although the overall risk of preterm birth was similar in overweight and obese women and women of normal weight, the risk of induced preterm birth was increased in overweight and obese women (RR 1.30, 95% CI 1.23 to 1.37). Although overall the risk of having an infant of low birth weight was decreased in overweight and obese women (0.84, 0.75 to 0.95), the decrease was greater in developing countries than in developed countries (0.58, 0.47 to 0.71 v 0.90, 0.79 to 1.01). After accounting for publication bias, the apparent protective effect of overweight and obesity on low birth weight disappeared with the addition of imputed "missing" studies (0.95, 0.85 to 1.07), whereas the risk of preterm birth appeared significantly higher in overweight and obese women (1.24, 1.13 to 1.37).

McDonald SD, Han Z, Mulla S, et al. Overweight and obesity in mothers and risk of preterm birth and low birth weight infants: systematic review and meta-analyses. BMJ, 2010; 341: c3428
http://www.bmj.com/content/341/bmj.c3428

Evidence Level: I

Do antenatal dietary interventions have a positive effect on maternal and infant health outcomes?

A systematic review of 9 RCTs in a total of 743 women (Dodd, 2010) found no statistically significant differences between women who received an antenatal intervention and those who did not for the large-for-gestational-age infant outcome (three studies; 366 women; RR 2.02; 95% CI 0.84,4.86) or mean gestational weight gain [four studies; 416 women; weighted mean difference (3.10 kg; 95% CI) 8.32, 2.13 (random effects model)]. There were no statistically significant differences identified for other reported outcomes.

A meta-analysis of 44 RCTs in a total of 7278 women (Thangaratinam, 2012) evaluated three categories of interventions: diet, physical activity, and a mixed approach. Overall, there was 1.42 kg reduction (95% CI 0.95 to 1.89 kg) in gestational weight gain with any intervention compared with control. With all interventions combined, there were no significant differences in birth weight (mean difference -50 g, -100 to 0 g) and the incidence of large for gestational age (RR 0.85, 0.66 to 1.09) or small for gestational age (1.00, 0.78 to 1.28) babies between the groups, though by itself physical activity was associated with reduced birth weight (mean difference -60 g, -120 to -10 g). Interventions were associated with a reduced the risk of pre-eclampsia (0.74, 0.60 to 0.92) and shoulder dystocia (0.39, 0.22 to 0.70), with no significant effect on other critically important outcomes. Dietary intervention resulted in the largest reduction in maternal gestational weight gain (3.84 kg, 2.45 to 5.22 kg), with improved pregnancy outcomes compared with other interventions. The overall evidence rating was low to very low for important outcomes such as pre-eclampsia, gestational diabetes, gestational hypertension, and preterm delivery.

The same team (Thangaratinam, 2012) produced a systematic review of 88 studies (40 randomised and 48 non-randomised and observational studies) in a total of 182,139 women, which reached the following conclusions: Meta-analysis of 30 RCTs (4503 women) showed a reduction in weight gain in the intervention group of 0.97 kg compared with the control group (95% CI -1.60 kg to -0.34 kg; p = 0.003). Weight management interventions overall in pregnancy resulted in a significant reduction in the incidence of pre-eclampsia (RR 0.74, 95% CI 0.59 to 0.92; p = 0.008) and shoulder dystocia (RR 0.39, 95% CI 0.22 to 0.70; p = 0.02). Dietary interventions in pregnancy resulted in a significant decrease in the risk of pre-eclampsia (RR 0.67, 95% CI 0.53 to 0.85; p = 0.0009), gestational hypertension (RR 0.30, 95% CI 0.10 to 0.88; p = 0.03) and preterm birth (RR 0.68, 95% CI 0.48 to 0.96; p = 0.03) and showed a trend in reducing the incidence of gestational diabetes (RR 0.52, 95% CI 0.27 to 1.03). There were no differences in the incidence of small-for-gestational-age infants between the groups (RR 0.99, 95% CI 0.76 to 1.29). There were no significant maternal or fetal adverse effects observed for the interventions in the included trials. The overall strength of evidence for weight gain in pregnancy and birthweight was moderate for all interventions considered together. There was high-quality evidence for small-for-gestational-age infants as an outcome. The quality of evidence for all interventions on pregnancy outcomes was very low to moderate. The quality of evidence for all adverse outcomes was very low.

Dodd JM, Grivell RM, Crowther CA, et al. Antenatal interventions for overweight or obese pregnant women: a systematic review of randomised trials. BJOG 2010;117:1316-26
http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2010.02540.x/full

Thangaratinam S, Rogozinska E, Jolly K, et al. Effects of interventions in pregnancy on maternal weight and obstetric outcomes: meta-analysis of randomised evidence. BMJ 2012;344:e2088
http://www.bmj.com/content/344/bmj.e2088

Thangaratinam S, Rogozinska E, Jolly K, et al. Interventions to reduce or prevent obesity in pregnant women: a systematic review. Health Technology Assessment 2012;16(31):1-191
http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0047725/

Evidence Level: I

Patient information is available from:
NHS Choices. Overweight and Pregnant. London: NHS. 2017
http://www.nhs.uk/Conditions/pregnancy-and-baby/pages/overweight-pregnant.aspx#close

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OPERATIVE VAGINAL DELIVERY
Supporting information

This guideline has been prepared with reference to the following:

Royal College of Obstetricians and Gynaecologists. Operative vaginal delivery (Green-top 26). 2011. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg26/

Metal vacuum extractor cups should be avoided in infants <36 gestation (i.e. premature)?
This advice appears to date back to concerns first voiced in the 1950s. A review of the literature (Chalmers, 1960) says that: "With regard to the use of the instrument for premature births, we have delivered nine babies weighing less than 5 lb. 8 oz. (2,485 g.) and in eight of these have been satisfied that the ventouse did not cause injury. All these babies made good progress after delivery, with the exception of Case 30, in which the child, weighing 4 lb. 8 oz. (2,040 g.), died from tentorial tears. This damage may have been caused by the instrument, but a similar risk of intracranial haemorrhage is, of course, present in forceps delivery or even in spontaneous delivery in children of this size. Both deWatteville and Voegeli have reservations regarding the use of the ventouse for delivery of premature babies. The latter refers to the ability of the forceps blades to protect the premature head from soft tissue damage, though Rosa (1955) regards this as completely illusory. We cannot, therefore, at this stage say for certain whether ventouse extraction of the smallest premature babies is to be recommended."
RCOG guidelines (see above) advise against the use of any vacuum extraction below 34 weeks.

Chalmers JA, Fothergill RJ. Use of a vacuum extractor (Ventouse) in obstetrics. Br Med J 1960;i:1684-9
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1967726/pdf/brmedj02922-0028.pdf

Evidence Level: V

What are the pros and cons of vacuum extractor vs forceps?
A Cochrane systematic review of 32 studies in a total of 6597 women (O'Mahoney, 2010) found that forceps were less likely than the ventouse to fail to achieve a vaginal birth with the allocated instrument (RR 0.65, 95% CI 0.45 to 0.94). However, with forceps there was a trend to more caesarean sections, and significantly more third- or fourth-degree tears (with or without episiotomy), vaginal trauma, use of general anaesthesia, and flatus incontinence or altered continence. Facial injury was more likely with forceps (RR 5.10, 95% CI 1.12 to 23.25). Using a random-effects model because of heterogeneity between studies, there was a trend towards fewer cases of cephalhaematoma with forceps (average RR 0.64, 95% CI 0.37 to 1.11).Among different types of ventouse, the metal cup was more likely to result in a successful vaginal birth than the soft cup, with more cases of scalp injury and cephalhaematoma. The hand-held ventouse was associated with more failures than the metal ventouse, and a trend to fewer than the soft ventouse. Overall forceps or the metal cup appeared to be most effective at achieving a vaginal birth, but with increased risk of maternal trauma with forceps and neonatal trauma with the metal cup.

O'Mahony F, Hofmeyr GJ, Menon V. Choice of instruments for assisted vaginal delivery. Cochrane Database of Systematic Reviews 2010: CD005455
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD005455.pub2/full

Evidence Level: I

Patient information is available from:
Royal College of Obstetricians and Gynaecologists. Information for you – An assisted vaginal birth (ventouse or forceps). London: RCOG. 2012
https://www.rcog.org.uk/globalassets/documents/patients/patient-information-leaflets/pregnancy/pi-an-assisted-vaginal-birth-ventouse-or-forceps.pdf

Last amended March 2015
Last reviewed March 2017

OXYTOCIN
Supporting information

This guideline has been prepared with reference to the following:

NICE. Intrapartum care: care of healthy women and their babies during childbirth. 2017

http://www.nice.org.uk/guidance/CG190

Is a high dose regimen preferable to a low dose regimen?
A systematic review of 10 RCTs in 5423 women (Wei, 2010) found that high-dose oxytocin was associated with a moderate decrease in the risk of caesarean section (RR 0.85; 95% CI 0.75-0.97), a small increase in spontaneous vaginal delivery (RR, 1.07; 95% CI, 1.02-1.12), and a decrease in labour duration (mean difference: -1.54 hours, 95% CI, -2.44 to -0.64). While hyperstimulation was increased with high-dose oxytocin (RR, 1.91; 95% CI, 1.49-2.45), there was no evidence of an increase in maternal or neonatal morbidity.
A 2014 systematic review of 9 RCTs did not find evidence that high-dose oxytocin increases either vaginal delivery within 24 hours (RR 0.94, 95% CI 0.78 to 1.14) or the caesarean section rate (RR 0.96, 95% CI 0.81 to 1.14) (Budden, 2014). Nor did this review find a significant decrease in induction to delivery time (mean difference -0.90 hours, 95% CI -2.28 to +0.49 hours). High-dose oxytocin was shown to increase the rate of uterine hyperstimulation (RR 1.86, 95% CI 1.55 to 2.25).

Budden A, Chen LJ, Henry A. High-dose versus low-dose oxytocin infusion regimens for induction of labour at term. Cochrane Database Syst Rev. 2014:CD009701
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD009701.pub2/full

Wei SQ, Luo ZC, Qi HP, et al. High-dose vs low-dose oxytocin for labor augmentation: a systematic review. Am J Obstet Gynecol 2010;203:296-304

Evidence Level: I

Should oxytocin be administered as soon as dystocia is recognised?
A meta-analysis of 9 trials in 1,983 women (Wei, 2009) found that early oxytocin was associated with an increase in the probability of spontaneous vaginal delivery (RR 1.09, 95% CI 1.03-1.17). For every 20 patients treated with early oxytocin augmentation, one additional spontaneous vaginal delivery is expected. A decrease in antibiotic use (RR 0.45, 95% CI 0.21-0.99) was observed with early intervention. Early oxytocin was associated with an increased risk of hyperstimulation (RR 2.90, 95% CI 1.21-6.94) without evidence of adverse neonatal effects.

Wei SQ, Luo ZC, Xu H, et al. The effect of early oxytocin augmentation in labor: a meta-analysis. Obstet Gynecol 2009;114:641-9

Evidence Level: I

Is oxytocin used alone superior to combination use with vaginal prostaglandins?
A Cochrane systematic review of 61 trials in 12, 819 women (Alfirevic, 2009) found that, when oxytocin inductions were compared with expectant management, fewer women failed to deliver vaginally within 24hours (8.4% versus 53.8%, risk ratio (RR) 0.16, 95% confidence interval (CI) 0.10 to 0.25). There was a significant increase in the number of women requiring epidural analgesia (RR 1.10, 95% CI 1.04 to 1.17). Compared with vaginal prostaglandins, oxytocin increased unsuccessful vaginal delivery within 24 hours in the two trials reporting this outcome (70% versus 21%, RR 3.33, 95% CI 1.61 to 6.89). There was a small increase in epidurals when oxytocin alone was used (RR 1.09, 95% CI 1.01 to 1.17).Most of the studies included women with ruptured membranes, and there was some evidence that vaginal prostaglandin increased infection in mothers (chorioamnionitis RR 0.66, 95% CI 0.47 to 0.92) and babies (use of antibiotics RR 0.68, 95% CI 0.53 to 0.87). When oxytocin was compared with intracervical prostaglandins, there was an increase in unsuccessful vaginal delivery within 24 hours (50.4% versus 34.6%, RR 1.47, 95% CI 1.10 to 1.96) and an increase in caesarean sections (19.1% versus 13.7%, RR 1.37, 95% CI 1.08 to 1.74) in the oxytocin group.

Alfirevic Z, Kelly AJ, Dowswell T. Intravenous oxytocin alone for cervical ripening and induction of labour. Cochrane Database of Systematic Reviews 2009, CD003246
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD003246.pub2/full

Evidence Level: I

Once contractions are established, especially in a parous woman, it may be possible and desirable to stop the infusion?

A randomised study in 104 women (Daniel-Spiegel, 2004) found no advantage to continuing oxytocin after cervical dilatation had reached 5 cm.

Another randomised study of 127 women (Diven, 2012) found that discontinuation of oxytocin in active labour after labour induction does not lead to a statistically significant change in the number of caesarean deliveries. The caesarean rate was similar for the discontinuation group (19.2%) and the routine care group (25.2%).

Daniel-Spiegel E, Weiner Z, Ben-Shlomo I, et al. For how long should oxytocin be continued during induction of labour? BJOG 2004;111:331-4
http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2004.00096.x/full

Diven LC, Rochon ML, Gogle J et al. Oxytocin discontinuation during active labor in women who undergo labor induction. American Journal of Obstetrics & Gynecology. 2012;207:471

Evidence Level: II

Last amended March 2017
Last reviewed March 2017

This guideline has been prepared with reference to the following:

MBRRACE-UK collaboration. Perinatal Mortality Surveillance Report: UK Perinatal Deaths for births from January to December 2013. 2015

https://www.npeu.ox.ac.uk/downloads/files/mbrrace-uk/reports/MBRRACE-UK%20Perinatal%20Surveillance%20Report%202013.pdf

Royal College of Obstetricians and Gynaecologists. The care of women requesting induced abortion (Evidenced-based clinical guideline 7). 2011. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/the-care-of-women-requesting-induced-abortion/

Royal College of Obstetricians and Gynaecologists. Termination of pregnancy for fetal abnormality in England, Scotland and Wales. 2010. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/termination-of-pregnancy-for-fetal-abnormality-in-england-scotland-and-wales/

Royal College of Obstetricians and Gynaecologists. Late intrauterine fetal death and stillbirth (Green-top 55). 2010. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg55/

Schott J, Henley A, Kohner N. Pregnancy loss and the death of a baby: Sands guideline for professionals. 2007. Sands UK / Bosun-Publications

Royal College of Obstetricians and Gynaecologists. Registration of stillbirths and certification of pregnancy loss before 24 weeks of gestation (Good practice 4). 2005. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/good-practice-4/

Hughes P, Turton P, Hopper E et al. Assessment of guidelines for good practice in psychosocial care of mothers after stillbirth: a cohort study. Lancet. 2002;360:114-8

Mifepristone and misoprostol are useful alternatives to prostaglandins in fetal loss >36 weeks gestation?
A double-blind controlled multicentre study in 94 women (Cabrol, 1990) found mifepristone (600 mg/d for 2 d) effective in achieving fetal expulsion within 72 hours in 29 of 46 patients (63%). In the placebo group (n = 48) there were only 8 successes (17.4%).
A systematic review of 14 trials (Gomez Ponce de Leon, 2009) found 100% success rate for both oral and vaginal misoprostol and no statistically significant difference (RR=1.00, 95% CI=0.89 to 1.12) in uterine evacuation at 48 h for vaginal misoprostol either with or without oxytocin administration.

Cabrol D, Dubois C, Cronje H, et al. Induction of labor with mifepristone (RU 486) in intrauterine fetal death. Am J Obstet Gynecol 1990;163:540-2

Gómez Ponce de León R, Wing DA**.** Misoprostol for termination of pregnancy with intrauterine fetal demise in the second and third trimester of pregnancy: a systematic review. Contraception 2009;79:259-71

Evidence Level: I

Last amended December 2015
Last reviewed March 2017

This guideline has been prepared with reference to the following:

NICE. Intrapartum care: care of healthy women and their babies during childbirth. 2017. London. NICE

http://www.nice.org.uk/guidance/CG190

Royal College of Obstetricians and Gynaecologists. Third- and Fourth-degree Perineal Tears, Management (Green-top Guideline No. 29). 2015. London. RCOG

https://www.rcog.org.uk/globalassets/documents/guidelines/gtg-29.pdf

NHS England patient Safety Domain. National Safety Standards for Invasive Procedures (NatSSIPs). 2015. NHS England

https://www.england.nhs.uk/wp-content/uploads/2015/09/natssips-safety-standards.pdf

HSE. Control of substances hazardous to health: the control of substances hazardous to health regulations 2002 (as amended). Approved code of practice and guidance. 2013

http://www.hse.gov.uk/pubns/priced/l5.pdf

Kettle C, Johanson R. Continuous and interrupted suturing techniques for repair of episiotomy or second-degree tears. Cochrane database systematic review. 2012

http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000947.pub3/full

National Patient Safety Agency. Reducing the risk or retained swabs after vaginal birth and perineal suturing. 2010

http://www.nrls.npsa.nhs.uk/alerts/?entryid45=74113

Last amended March 2017
Last reviewed March 2017

This guideline has been prepared with reference to the following:

Royal College of Obstetricians and Gynaecologists. Postpartum haemorrhage, prevention and management (Green-top Guideline no.52). 2016. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg52/

Bohlmann MK & Rath W. Medical prevention and treatment of postpartum hemorrhage: a comparison of different guidelines. Archives of Gynecology & Obstetrics. 2014;289:555-67

North West Regional Transfusion Committee. Toolkit for the management of massive Haemorrhage. 2013

http://www.transfusionguidelines.org.uk/uk-transfusion-committees/regional-transfusion-committees/north-west/policies/massive-haemorrhage-toolkit

Saving Mothers' Lives: Reviewing maternal deaths to make motherhood safer: 2006-2008. The Eighth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom. 2011. BJOG.

http://dx.doi.org/10.1111/j.1471-0528.2010.02847.x

Royal College of Obstetricians and Gynaecologists. Placenta Praevia Accreta and Vasa Praevia: Diagnosis and management. 2011. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg27/

National Patient Safety Agency Rapid response report NPSA/2010/017. The transfusion of blood and blood components in an emergency. 2010

http://www.nrls.npsa.nhs.uk/EasySiteWeb/getresource.axd?AssetID=83689&type=full&servicetype=Attachment

The risk of PPH is greater with increasing placental weight?
A study of 308,717 singleton deliveries in Norway from 1999-2004 (Eskild, 2011) found a gradual increase in the prevalence of excess postpartum haemorrhage with increasing placental weight (test for trend, $P < 0.05$). Having a placenta of 1100 g or more was associated with 2.5 times (odds ratio 2.54, 95% CI 2.31-2.79) higher prevalence than having a placenta of 300-499 g, after adjustment for offspring birthweight, parity, caesarean section and placenta-related and delivery-related complications.

Eskild A, Vatten LJ. Placental weight and excess postpartum haemorrhage: a population study of 308,717 pregnancies. BJOG 2011;118:1120-5
http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2011.02954.x/full

Evidence Level: IV

Oxytocin is the treatment of choice in the immediate management of PPH?
A Cochrane Systematic Review examined a range of treatment choices for the management of PPH (Mousa, 2014). Overall, the review found that misoprostol does not work as well as oxytocin infusion, and it has more side effects". This review identified 2 RCTs (1787 participants) that compared oxytocin with misoprostol and found that primary outcomes (maternal mortality, serious maternal morbidity, admission to intensive care and hysterectomy) did not differ between the groups, although women given misoprostol were more likely to have additional blood loss of at least 1000 mL (RR 2.65, 95% CI 1.04 to 6.75). Misoprostol was associated with a significant increase in vomiting and shivering.

A placebo-controlled RCT in 2069 women (Sheehan, 2011) examined the effects of adding an oxytocin infusion to bolus oxytocin in the event of blood loss at elective caesarean section. No difference was found in the occurrence of major obstetric haemorrhage between the groups (bolus and infusion 15.7% (158/1007) v bolus only 16.0% (159/994), adjusted odds ratio 0.98, 95% CI 0.77 to 1.25, P=0.86). The need for an additional uterotonic agent in the bolus and infusion group was lower than that in the bolus only group (12.2% (126/1033) v 18.4% (189/1025), 0.61, 0.48 to 0.78, P<0.001). Women were less likely to have a major obstetric haemorrhage in the bolus and infusion group than in the bolus only group if the obstetrician was junior rather than senior (0.57, 0.35 to 0.92, P=0.02). The addition of an oxytocin infusion after caesarean delivery reduced the need for additional uterotonic agents but did not affect the overall occurrence of major obstetric haemorrhage.
An evidence-based review (Rajan, 2010) states that "it appears at this time that oxytocin is the preferable uterotonic to use. Misoprostol may be a reasonable option where parenteral administration of an uterotonic is not feasible. There is little evidence to guide treatment decisions should PPH occur."

Mousa, H.A., Blum, J., Abou, G.,Senoun, Shakur, H. & Alfirevic, Z. 2014, "Treatment for primary postpartum haemorrhage", *Cochrane Database of Systematic Reviews,* vol. 2.
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD003249.pub3/full

Sheehan SR, Montgomery AA, Carey M, et al. Oxytocin bolus versus oxytocin bolus and infusion for control of blood loss at elective caesarean section: double blind, placebo controlled, randomised trial. BMJ 2011;343:d4661.
http://www.bmj.com/content/343/bmj.d4661

Rajan PV, Wing DA. Postpartum hemorrhage: evidence-based medical interventions for prevention and treatment**.** Clin Obstet Gynecol 2010;53:165-81.

Evidence Level: I

A repeat dose of oxytocin may be indicated if bleeding is not controlled?
A randomised controlled trial in 720 women (Gungorduk, 2010) compared one group (Group A, n=360) receiving a 5-IU oxytocin bolus plus placebo infusion with another (Group B, n=360) who received a 5-IU oxytocin bolus plus 30 IU infusion, to control blood loss in elective caesarean section. Mean estimated blood loss (P < 0.001) and the proportion of women with blood loss estimated to be greater than 1000 mL were significantly less for group B than for group A (RR 0.35, 95% CI 0.20-0.63). In addition, more women in the group A required additional uterotonic agents (RR 0.35, 95% CI 0.22-0.56) and blood transfusion (RR 0.12, 95% CI 0.01-0.98).

Güngördük K, Asicioglu O, Celikkol O, et al. Use of additional oxytocin to reduce blood loss at elective caesarean section: A randomised control trial. Aus NZ J Obstet Gynaecol 2010;50:36-9

Evidence Level: II

Tranexamic acid (TA) may be used as a blood product replacement, if recommended by consultant haematologist?
A 2015 systematic review of RCTs concluded that "TA decreased blood loss greater than 400 mL or greater than 500 mL and this effect was more apparent with vaginal births (Novikova, 2015). The studies had methodological shortcomings. Blood loss greater than 1000 mL decreased with the use of TA in six trials (2093 women), however, the difference was most obvious in caesarean section (two trials, 1400 women) and not in vaginal birth in which there were few such outcomes (one trial, 439 women). Mean blood loss decreased with the use of TA by 77 mL, overall (five studies, 1186 women) and with both vaginal and caesarean section births."
A 2016 systematic review of RCTs concluded that "There is no reliable evidence that TXA prevents postpartum haemorrhage during childbirth. Many of the trials conducted to date are small, low quality and contain serious flaws" (Ker, 2016).

Ker K, Shakur H, Roberts I. Does tranexamic acid prevent postpartum haemorrhage? A systematic review of randomised controlled trials. BJOG. 2016 Oct;123(11):1745-52

Novikova N, Hofmeyr GJ, Cluver C. Tranexamic acid for preventing postpartum haemorrhage. Cochrane Database Syst Rev. 2015:CD007872
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007872.pub3/full

Evidence Level: I

Misoprostol is an acceptable alternative/additional treatment?
A review of 51 RCTs (Sheldon, 2012) concluded that "There is now a solid body of evidence to justify the use of misoprostol for postpartum haemorrhage indications in many settings. The evidence supports use of 600 mug orally for the prevention of PPH and 800 mug sublingually for the treatment of PPH. There is no evidence to support the adjunct use of misoprostol following administration of conventional uterotonics for prevention or treatment purposes."
A 2014 systematic review of RCTs concluded that "When used after prophylactic uterotonics, misoprostol and oxytocin infusion worked similarly. The review suggests that among women who received oxytocin for the treatment of primary PPH, adjunctive use of misoprostol confers no added benefit" (Mousa, 2014).

Mousa HA, Blum J, Abou El Senoun G et al. Treatment for primary postpartum haemorrhage. Cochrane Database Syst Rev. 2014:CD003249
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD003249.pub3/full

Sheldon WR, Blum J, Durocher J, et al. Misoprostol for the prevention and treatment of postpartum hemorrhage. Exp Opin Invest Drugs 2012;21:235-50.

Evidence Level: I

Uterine massage is effective in preventing PPH?
A revised Cochrane systematic review of two trials in 2164 women (Hofmeyr, 2013) in which women were randomly assigned to received uterine massage or no massage with active management of the 3rd stage of labour was inconclusive. It did report however, that in one trial of 200 women uterine massage given every 10 minutes for 60 minutes after birth effectively reduced blood loss, and the need for additional uterotonics, by some 80%. The number of women losing more than 500 ml of blood also appeared to be halved. The mean blood loss was less in the uterine massage group at 30 minutes (mean difference (MD) -41.60, 95% CI -75.16 to -8.04) and 60 minutes after enrolment (MD -77.40, 95% CI -118.71 to -36.09 ml). The need for additional uterotonics was reduced in the uterine massage group (RR 0.20, 95% CI 0.08 to 0.50). The second trial involved 1964 women who were assigned to receive oxytocin, uterine massage or both after delivery of the baby and before delivery of the placenta. There was no added benefit for uterine massage when oxytocin was used.

Hofmeyr GJ, Abdel-Aleem H, Abdel-Aleem MA. Uterine massage for preventing postpartum haemorrhage. Cochrane Database of Systematic Reviews 2013: CD006431
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD006431.pub3/full

Evidence Level: I

Patient information is available from:
Royal College of Obstetrics and gynaecology. Heavy bleeding after birth (Postpartum haemorrhage). 2016. London: RCOG
https://www.rcog.org.uk/en/patients/patient-leaflets/heavy-bleeding-after-birth-postpartum-haemorrhage/

Last amended March 2017
Last reviewed March 2017

This guideline has been prepared with reference to the following:

Bates SM, Greer IA, Middeldorp S, et al. VTE, thrombophilia, antithrombotic therapy, and pregnancy: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest 2012;141:e691S-736S

http://journal.publications.chestnet.org/article.aspx?articleid=1159497

Leung AN, Bull TM, Jaeschke R, et al. An official American Thoracic Society/Society of Thoracic Radiology clinical practice guideline: evaluation of suspected pulmonary embolism in pregnancy. Am J Resp Crit Care Med 2011;184:1200-8

http://www.atsjournals.org/doi/full/10.1164/rccm.201108-1575ST#.VS5cpfnF98E

Patients in the second and third trimester must be nursed on a left lateral tilt (never supine) to prevent aortocaval compression?
A study (Kuo, 1997) of three different recumbent positions on autonomic nervous activity in late pregnancy was carried out in 30 pregnant and 24 non-pregnant aged-matched women. The authors found that: “In the non-pregnant women, the normalised high-frequency power was greatest in the right lateral decubitus position. In the pregnant women, the normalised high-frequency power was lowest and the low/high-frequency power ratio was greatest in the supine position. Both the percentage decrease of normalised high-frequency power and the percentage increase of low/high-frequency power ratio in the supine and right lateral positions were greater than those in the left lateral position. For women in late pregnancy, the left lateral decubitus position may be beneficial because cardiac vagal activity is least suppressed and cardiac sympathetic activity is least enhanced. Aortocaval compression might be the mechanism underlying the change in cardiac autonomic nervous activity when supine and right lateral decubitus positions are assumed in late pregnancy.” A prospective observational study of 26 patients (Fields et al, 2013) compared the left lateral and supine position and did not find any clear evidence to suggest that the former was superior. The authors reflected that inferior vena cava compression could be assessed via ultrasound at the bedside to determine optimal patient position.

Kuo CD, Chen GY, Yang MJ, et al. The effect of position on autonomic nervous activity in late pregnancy. Anaesthesia 1997;52:1161-5

Fields JM, Catallo K, Au AK et al. Resuscitation of the pregnant patient: What is the effect of patient positioning on inferior vena cava diameter? Resuscitation. 2013;84:304-8

Evidence Level: IV

Radiological investigations are not contraindicated during pregnancy where there is a significant clinical indication?
A review of the subject (Fenig, 2001) states: “It seems that, due to the low level of X-ray exposure to the foetus, neither diagnostic radiography nor nuclear diagnostic examination justifies termination of pregnancy.”

Fenig E, Mishaeli M, Kalish Y, et al. Pregnancy and radiation. Cancer Treat Rev 2001;27:1-7

Evidence Level: V

Last amended August 2016
Last reviewed March 2017

This guideline has been prepared with reference to the following:

NICE. Intrapartum care: care of healthy women and their babies during childbirth. 2017. London. NICE

http://www.nice.org.uk/guidance/CG190

Royal College of Anaesthetists, Royal College of Midwives, Royal College of Obstetricians and Gynaecologists, Royal College of Paediatrics and Child Health. Safer Childbirth: Minimum Standards for the Organisation and Delivery of Care in Labour. 2007

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/safer-childbirth-minimum-standards-for-the-organisation-and-delivery-of-care-in-labour/

Gibb D, Arulkumaran S. Fetal Monitoring in Practice (3rd ed.). 2007. Churchill Livingstone. Edinburgh

Tuffnell D, Haw WL, Wilkinson K. How long does a fetal scalp blood sample take? BJOG 2006:113: 332-4

http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2006.00859.x/full

Is planned early management preferable to expectant management?
A 2017 systematic review of RCTs found that women who had planned early birth were at a reduced risk of maternal infectious morbidity (chorioamnionitis and/or endometritis) than women who had expectant management following term prelabour rupture of membranes (average risk ratio (RR) 0.49; 95% confidence interval (CI) 0.33 to 0.72; eight trials, 6864 women), and their neonates were less likely to have definite or probable early-onset neonatal sepsis (RR 0.73; 95% CI 0.58 to 0.92; 16 trials, 7314 infants) (Middleton, 2017). No clear differences between the planned early birth and expectant management groups were seen for the risk of caesarean section (average RR 0.84; 95% CI 0.69 to 1.04; 23 trials, 8576 women); serious maternal morbidity or mortality (no events; three trials; 425 women); definite early-onset neonatal sepsis (RR 0.57; 95% CI 0.24 to 1.33; six trials, 1303 infants); or perinatal mortality (RR 0.47; 95% CI 0.13 to 1.66; eight trials, 6392 infants).

Middleton P, Shepherd E, Flenady V et al. Planned early birth versus expectant management (waiting) for prelabour rupture of membranes at term (37 weeks or more). Cochrane Database Syst Rev. 2017:CD005302 http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD005302.pub3/full

Evidence Level: I

Does antibiotic prophylaxis help prevent infection?
A Cochrane systematic review of 4 trials in 2639 women (Wojcieszek, 2014) found no convincing evidence of benefit for mothers or neonates from the routine use of antibiotics for PROM at or near term. The use of antibiotics did not result in a statistically significant reduction in any of the following outcomes:

- endometritis (average RR 0.34 95% CI 0.05 to 2.31)
- probable early-onset neonatal sepsis (average RR 0.69, 95%; CI 0.21 to 2.33)
- definite early-onset neonatal sepsis (average RR 0.57, 95% CI 0.08 to 4.26)
- maternal infectious morbidity (chorioamnionitis and/or endometritis) (average RR 0.48, 95% CI 0.20 to 1.15)
- stillbirth (RR 3.00, 95% CI 0.61 to 14.82)
- perinatal mortality (RR 1.98, 95% CI 0.60 to 6.55)

Another revised Cochrane review, of 22 trials, involving 6872 women and babies (Kenyon, 2013), concluded that: “routine prescription of antibiotics for women with preterm rupture of the membranes is associated with prolongation of pregnancy and improvements in a number of short-term neonatal morbidities, but no significant reduction in perinatal mortality. Despite lack of evidence of longer-term benefit in childhood, the advantages on short-term morbidities are such that we would recommend

antibiotics are routinely prescribed. The antibiotic of choice is not clear but co-amoxiclav should be avoided in women due to increased risk of neonatal necrotising enterocolitis."

Wojcieszek A, Stock O, Flenady V. Antibiotics for prelabour rupture of membranes at or near term. Cochrane Database Syst Rev. 2014. CD001807
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD001807.pub2/full

Kenyon S, Boulvain M, Neilson JP. Antibiotics for preterm rupture of membranes. Cochrane Database Syst Rev. 2013: CD001058
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD001058.pub3/full

Evidence Level: I

Speculum examination or pad test is only required if there is doubt about whether membranes have ruptured?
NICE guidance (2017) states: "Do not carry out a speculum examination if it is certain that the membranes have ruptured."
An earlier NICE guideline (2013) recommends that that the "Vision Amniotic Leak Detector Pad be considered for use in pregnant women with unexplained vaginal wetness". This still applies to patients where there is some doubt as to whether the wetness is due to their membranes rupturing and appears to be recommending this is checked out via pad in the primary setting rather than checked via speculum exam.

NICE. Intrapartum care: care of healthy women and their babies during childbirth. 2017. London. NICE
http://www.nice.org.uk/guidance/CG190

NICE. Vision Amniotic Leak Detector to assess unexplained vaginal wetness in pregnancy. 2012. London. NICE
https://www.nice.org.uk/guidance/mtg15

Evidence Level: IV

Patient information is available from:
Royal College of Obstetricians and Gynaecologists. Information for you: when your waters break early. 2012. London. RCOG
https://www.rcog.org.uk/globalassets/documents/patients/patient-information-leaflets/pregnancy/when-your-waters-break-early.pdf

Last amended March 2017
Last reviewed March 2017

This guideline has been prepared with reference to the following:

NICE. Preterm labour and birth. 2015. London. NICE

https://www.nice.org.uk/guidance/ng25

Knight M, Kenyon S, Brocklehurst P et al. on behalf of MBRRACEUK. Saving Lives, Improving Mothers' Care - Lessons learned to inform future maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009–12. Oxford. University of Oxford. 2014

https://www.npeu.ox.ac.uk/downloads/files/mbrrace-uk/reports/Saving%20Lives%20Improving%20Mothers%20Care%20report%202014%20Full.pdf

Sweet G, Carnielli V, Greisen G et al. European Consensus Guidelines on the Management of Neonatal Respiratory Distress Syndrome in Preterm Infants – 2013 Update. 2013

http://www.curoservice.com/health_professionals/management_nRDS/RDS_EU_guidelines_Neonat2013.pdf

Royal College of Obstetricians and Gynaecologists. Pre-term labour, antibiotics and cerebral palsy. Scientific Impact Paper. 2013. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/sip33/

Royal College of Obstetricians and Gynaecologists. Prevention of early onset neonatal group B streptococcal disease. Green top guideline. 2012. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg36/

Royal College of Obstetricians and Gynaecologists. Tocolysis for Women in Preterm Labour. Green-top guideline. 2011. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg1b/

Royal College of Obstetricians and Gynaecologists. Magnesium Sulphate to Prevent Cerebral Palsy following Preterm Birth (Scientific Impact Paper No. 29). 2011

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/sip29/

De Heus R, Mulder E & Visser G. Management of preterm labour: atosiban or nifedipine? Int J Women's Health. 2. 137-42. 2010

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2971730/

Royal College of Obstetricians and Gynaecologists. Antenatal Corticosteroids to Reduce Neonatal Morbidity (Green-top Guideline No. 7). 2010

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg7/

Royal College of Obstetricians and Gynaecologists. Preterm Prelabour Rupture of Membranes (Green-top Guideline No. 44). 2010

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg44/

Australian Research Centre for Health of Women and Babies. Clinical Practice Guidelines on Antenatal Magnesium Sulphate Prior to Preterm Birth for Neuroprotection of the Fetus, Infant and Child. 2010

https://www.nhmrc.gov.au/guidelines-publications/cp128

Department of Health. Oracle Children's Study: From the Chief Medical Officer, the Chief Nursing Officer and the Chief Pharmaceutical Officer. 2008. Department of Health

http://webarchive.nationalarchives.gov.uk/20130107105354/http://www.dh.gov.uk/en/Publicationsandstatistics/Lettersandcirculars/Professionalletters/Chiefmedicalofficerletters/DH_088217

Crowley P. Prophylactic corticosteroids for preterm birth. Cochrane Database Syst Rev. 2007: CD000065

http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000065.pub2/full

Mast Diagnostics Ltd. QuikCheck fetal fibronectin test summary. 2006

The Worldwide Atosiban versus Beta-agonists Study Group. Effectiveness and safety of the oxytocin antagonist Atosiban versus beta-adrenergic agonists in the treatment of preterm labour. B J Obstet Gynaecol. 2001. 108; 133-42

http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2001.00043.x/full

Kenyon SL, Taylor DJ, Tarnow-Mordi W et al. Broad-spectrum antibiotics for preterm, prelabour rupture of fetal membranes: the ORACLE I randomised trial. ORACLE Collaborative Group. Lancet. 2001;357:979-88

Woolley R. Benefits and risks of episiotomy: a review of the English language literature since 1980. Obstetrics and Gynaecology Survey 1995 50; 821-35

http://www.gentlebirth.org/format/woolley.html

Antenatal steroid treatment helps prevent neonatal deaths?
A systematic review of 44 studies (Mwansa-Kambafwile, 2010) found that antenatal steroids decreased neonatal mortality among preterm infants (<36 weeks gestation) by 31% (RR 0.69; 95% CI 0.58-0.81). The authors' meta-analysis of four RCTs from middle-income countries suggested 53% mortality reduction (RR 0.47; 95% CI 0.35-0.64) and 37% morbidity reduction (RR 0.63; 95% CI 0.49-0.81).

Mwansa-Kambafwile J, Cousens S, Hansen T, et al. Antenatal steroids in preterm labour for the prevention of neonatal deaths due to complications of preterm birth. Int J Epidemiol 2010;39[Suppl 1]:i122-33 http://www.ncbi.nlm.nih.gov/pmc/articles/pmid/20348115/

Evidence Level: I

What is the optimal dosing regimen for nifedipine?
A comparative study of two dose regimens of tocolytic oral nifedipine (Nassar, 2009) randomised one group to high-dose (HD) nifedipine (N = 49; 20 mg loading dose, repeated in 30 minutes, daily 120 to 160 mg slow-release nifedipine for 48 hours followed by 80 to 120 mg daily until 36 weeks) and the other to low-dose (LD) nifedipine (N = 53; 10 mg, up to four doses every 15 minutes, daily 60 to 80 mg slow-release nifedipine for 48 hours followed by 60 mg daily until 36 weeks). Uterine quiescence at 48 hours (primary outcome); delivery at 48 hours, 34 and 37 weeks; and recurrent preterm labour were similar. Gestational age at delivery was higher in HD (36.0 +/- 2.8 versus 34.7 +/- 3.7 weeks, P = 0.049). Rescue treatment was needed more in LD (24.5 versus 50.9%, odds ratio = 0.3; 95% confidence interval 0.1 to 0.7). Maternal adverse effects, birth weight, intensive care nursery admission, and composite neonatal morbidity were similar. However, neonatal mechanical ventilation was needed less and nursery stay was shorter in HD. HD nifedipine does not seem to have an

advantage over LD in achieving uterine quiescence at 48 hours. The authors advised that further studies were needed.
A systematic review of 269 studies in a total of 5607 women (Khan, 2010) found that adverse feto-maternal events were highest amongst women given more than 60 mg total dose of nifedipine [OR 3.78, 95% CI 1.27-11.2, p = 0.017] and in reports from case series compared to controlled studies (OR 2.45, 95% CI 1.17-5.15, p = 0.018).
A RCT comparing Nifedipine and Ritodrine found that Nifedipine (Papatsonis et al. 1997) was associated with a longer postponement of delivery, fewer maternal side effects, and fewer admissions to the NICU. In the study the dosing regimen was as follows:

> "Tocolysis with nifedipine was initiated with a 10-mg capsule … If uterine contractions persisted after 15 minutes, a second dose of 10mg was given. If contractions still persisted after the second dose of 10mg, two additional capsules could be given again in intervals of 15 minutes. Thus the maximum dose of nifedipine in the 1st hour was 40mg. Depending on the tocolytic effect of the nifedipine capsules administered in the 1st hour, a maintenance does of 60-160mg of slow-release nifedipine was used per day. Depending on the clinical condition, nifedipine was decreased progressively after 3 days. The patients were kept on a minimum dose of 20mg of slow-release nifedipine three times daily until a gestational age of 34 weeks, at which time the medication was stopped".

A systematic review of RCTs comparing nifedipine and beta-adrenergic agonists (Tsatsaris, 2001) performed a sensitivity analysis to compare nifedipine trials using less than 100mg per day with those trials using more than 100mg per day and found than outcomes did not appear to be effected.

Khan K, Zamora J, Lamont RF, et al. Safety concerns for the use of calcium channel blockers in pregnancy for the treatment of spontaneous preterm labour and hypertension: a systematic review and meta-regression analysis. J Maternal-Fetal Neonat Med 2010;23:1030-8

Nassar AH, Abu-Musa AA, Awwad J, et al. Two dose regimens of nifedipine for management of preterm labor: a randomized controlled trial. Am J Perinatol 2009;26:575-81

Papatsonis DN, Van Geijn HP, Adèr HJ et al. Nifedipine and ritodrine in the management of preterm labor: a randomized multicenter trial. Obstet Gynecol. 1997;90:230-4

Tsatsaris V, Papatsonis D, Goffinet F et al. Tocolysis with nifedipine or beta-adrenergic agonists: a meta-analysis. Obstet Gynecol. 2001;97:840-7

Evidence Level: I

Antibiotics are indicated if membranes have ruptured?
A meta-analysis of RCTs (Hutzal, 2008) found that administration of antibiotics was associated with prolongation of pregnancy in preterm premature rupture of membranes (P < .01).
The ORACLE study (Kenyon et al. 2008) compared the use of erythromycin and/or amoxicillin–clavulanate (co-amoxiclav) with that of placebo for women with preterm rupture of the membranes and assessed any functional impairment of the child at age 7 years (n=4148). The authors found that the prescription of antibiotics for women seemed to have little effect.

Hutzal CE, Boyle EM, Kenyon SL, et al. Use of antibiotics for the treatment of preterm parturition and prevention of neonatal morbidity: a metaanalysis. Am J Obstet Gynecol 2008;199:e1-8

Kenyon S, Pike K, Jones D et al. Childhood outcomes following prescription of antibiotics to pregnant women with preterm ruptured membranes: 7 year follow up of the Oracle I trial Lancet 2008 372:1276-8
http://www.sciencedirect.com/science/article/pii/S0140673608612027

Evidence Level: I

Patient information is available from:
Tommy's Giving birth to your premature baby. Tommy's: London. 2014
http://www.tommys.org/page.aspx?pid=963

Last amended March 2017
Last reviewed March 2017

REMIFENTANIL PATIENT CONTROLLED ANALGESIA (PCA) USE IN LABOUR SUITE
Supporting information

This guideline has been prepared with reference to the following:

Lim LFM, Leo S. Role of Remifentanil in labour analgesia. Trends in Anaesthesia and Critical Care 2013;3: 152-6

Volmanen P, Alahuhta S. Will remifentanil be a labour analgesic? IJOA 2004; 13: 1-4

Volmanen P, Akural EI, Raudaskoski T, et al. Remifentanil in obstetrics; a dose-finding study. Anaes Analg 2002;94;913-7

Roelants F, De Franceschi E, Veyckemans F et al. Patient controlled intravenous analgesia using Remifentanil in the parturient. Can J Anaes 2001;48;2: 175-8.

Thurlow JA, Waterhouse P. PCA in labour using Remifentanil in two parturient with platelet abnormalities.BJA 2000;84: 411-3

Babenco HD, Conard PF, Gross JB. The pharmacodynamic effects of Remifentanil bolus on ventilator control. Anesthesiology 2000;92:393-8

http://anesthesiology.pubs.asahq.org/article.aspx?articleid=1945986

Jones R, Pegrum A, Stacey RGW. Patient-controlled analgesia using remifentanil in the parturient with thrombocytopaenia. Anaesthesia. 1999;54:461

http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2044.1999.00857.x/full

Kan RE, Hughes SC, Rosen MA, et al. Intravenous Remifentanil: placental transfer, maternal and neonatal effects. Anesthesiology 1998; 88: 146-71

http://anesthesiology.pubs.asahq.org/article.aspx?articleid=1947636

Last amended February 2016
Last reviewed March 2017

Broad spectrum antibiotics should be administered for 5 days?
A Cochrane systematic review (Chongsomchai, 2014) found no trial evidence with which to address this question.
A systematic review of observational studies found no significant reduction in the incidence of endometritis (odds ratio [OR] 0.84, 95% confidence interval [CI] 0.38 to 1.85, three studies, 567 women) and puerperal fever (OR 0.99, 95% CI 0.38 to 2.27, one study, 302 women) (Chibueze, 2015).

Chibueze EC, Parsons AJ, Ota E et al. Prophylactic antibiotics for manual removal of retained placenta during vaginal birth: a systematic review of observational studies and meta-analysis. BMC Pregnancy Childbirth. 2015 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4661978/

Chongsomchai C, Lumbiganon P, Laopaiboon M. Prophylactic antibiotics for manual removal of retained placenta in vaginal birth. Cochrane Database Syst Rev. 2014: CD004904 http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004904.pub3/full

Evidence Level: III

Oxytocin infusion is of value in reducing the need for manual removal of retained placenta?
A systematic review (Duffy, 2014) of 10 RCTs found that oxytocin did not result in statistically significant reduction in the need for the manual removal of the placenta compared with placebo (RR 0.86, 95% CI 0.73 to 1.02).
A randomised controlled trial in 61 women (Lim, 2011) compared intra-umbilical oxytocin 100 IU diluted in 30 ml of saline to controlled cord traction. There was a significant reduction in the rate of subsequent manual removal of placenta (30 vs. 67.7%, $p < 0.05$), incidence of uterine atony (3.3 vs. 25.8%, $p < 0.05$) and the need for uterotonic agents (33.3 vs. 64.5%, $p < 0.05$) in the oxytocin group when compared with the control group.

Duffy J, Mylan S, Showell M et al. Pharmacologic Intervention for Retained Placenta: A Systematic Review and Meta-analysis. Obstetrics & Gynecology 2014. 125(3) 711-8.

Lim PS, Singh S, Lee A, et al. Umbilical vein oxytocin in the management of retained placenta: an alternative to manual removal of placenta? Arch Gynecol Obstet 2011;284:1073-9

Evidence Level: I

Patient information is available from:
Patient.co.uk Retained Placenta. 2011.
http://www.patient.co.uk/doctor/retained-placenta

Last amended March 2017
Last reviewed March 2017

This guideline has been produced with reference to the following:

NICE. Hypertension in pregnancy: the Management of hypertensive disorders during pregnancy. 2011. London. NICE

http://www.nice.org.uk/guidance/cg107

Magnesium sulphate is the treatment of choice for controlling seizures?
A Cochrane systematic review of 7 trials in a total of 1396 women (Duley, 2010a) compared magnesium sulphate with placebo or no anticonvulsant. Magnesium sulphate was associated with a reduction in maternal death (seven trials;1396 women; RR 0.59, 95% CI 0.38 to 0.92) and recurrence of seizures (seven trials;1390 women; RR 0.43, 95% CI 0.33 to 0.55) compared to diazepam. There were no clear differences in other measures of maternal morbidity. There was no clear difference in perinatal mortality (four trials; 788 infants; RR 1.04, 95% CI 0.81 to 1.34) or neonatal mortality (four trials; 759 infants; RR 1.18, 95% CI 0.75 to 1.84). In the magnesium sulphate group, fewer liveborn babies had an Apgar score less than seven at one minute (two trials; 597 babies; RR 0.75, 95% CI 0.65 to 0.87) or at five minutes (RR 0.70, 95% CI 0.54 to 0.90), and fewer appeared to need intubation at the place of birth (two trials; 591 infants; RR 0.67, 95% CI 0.45 to 1.00). There was no difference in admission to a special care nursery (four trials; 834 infants; RR 0.91, 95% CI 0.79 to 1.05), but fewer babies in the magnesium sulphate group had a length of stay more than seven days (three trials 631 babies; RR 0.66, 95% CI 0.46 to 0.96).
Previous systematic reviews by the same team established that magnesium was considerably more effective in reducing seizures than either diazepam or phenytoin (Duley, 2003).
A Cochrane systematic review (Duley, 2010b) of 17 studies found insufficient evidence with which to compare alternative regimens for magnesium sulphate, due to the small size of the studies identified.
An updated Cochrane review (Doyle 2009) revised its conclusion from its previous incarnation, now confirming the neuroprotective role of magnesium sulphate given to women at risk of pre-term birth for the pre-term fetus.

Doyle LW, Crowther CA, Middleton P, Marret S, Rouse D. Magnesium sulphate for women at risk of preterm birth for neuroprotection of the fetus. Cochrane Database of Systematic Reviews. 2009: CD004661
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004661.pub3/full

Duley L, Henderson-Smart DJ, Walker GJ, et al. Magnesium sulphate versus diazepam for eclampsia. Cochrane Database of Systematic Reviews. 2010: CD000127
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000127.pub2/full

Duley L, Matar HE, Almerie MQ, et al. Alternative magnesium sulphate regimens for women with pre-eclampsia and eclampsia. Cochrane Database of Systematic Reviews. 2010: CD007388
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007388.pub2/full

Duley L, Gülmezoglu AM, Henderson-Smart DJ. Magnesium sulphate and other anticonvulsants for women with pre-eclampsia. Cochrane Database of Systematic Reviews. 2010: CD000025
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000025.pub2/full

Duley L, Henderson-Smart DJ. Magnesium sulphate versus phenytoin for eclampsia. Cochrane Database of Systematic Reviews. 2010: CD000128
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000128.pub2/full

Evidence Level: I

Is early delivery preferable to expectant management in severe pre-eclampsia?
A revised Cochrane systematic review of four trials in a total of 425 women (Churchill, 2013) found that although expectant approach may be associated with decreased morbidity to the baby, differences between the two outcomes were still not statistically significant. There was still insufficient evidence that the risk of stillbirth or death after delivery was affected (risk ratio (RR) 1.08, 95% confidence interval (CI) 0.69 to 1.71) Babies in the “early delivery” group had a greater incidence of hyaline membrane disease (RR 2.30, 95% CI 1.39 - 3.81 – 2 studies, 133 women), and were more

likely to be admitted to neonatal intensive care ((RR 1.35, 95% CI 1.16 to 1.58)), but were less likely to be small-for-gestational age (RR 0.30, 95% CI 0.14 to 0.65; two studies; 125 women). Women who had been allocated to the interventionist group were more likely to have a caesarean section (RR 1.09, 95% CI 1.01 to 1.18; four studies; 425 women) than those allocated an expectant policy. There were no statistically significant differences between the two strategies for any other outcomes.
A randomised trial in 200 women with eclampsia (Seal, 2012) found no benefit for early caesarean delivery (at >/= 34 weeks) compared to similarly-timed vaginal delivery.
Maternal event rate was similar: 10.89% in the caesarean arm vs 7.07% for vaginal delivery (RR 1.54; 95% CI 0.62-3.81). Although the neonatal event rate was less in caesarean delivery-9.90% vs 19.19% (RR 0.52; 95% CI 0.25-1.05)-the difference was not significant
statistically.

Churchill D, Duley L, Thornton JG, Jones L. Interventionist versus expectant care for severe pre-eclampsia between 24 and 34 weeks' gestation. Cochrane Database of Systematic Reviews. 2013: CD003106. http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD003106.pub2/full

Seal SL, Ghosh D, Kamilya G, et al. Does route of delivery affect maternal and perinatal outcome in women with eclampsia? A randomized controlled pilot study. Am J Obstet Gynecol 2012;206:.e1-7

Evidence Level: I

Are corticosteroids of benefit in HELLP syndrome?
A Cochrane systematic review of 5 trials in a total of 170 patients (Matchaba, 2004) found no significant differences in the primary outcomes of maternal mortality and morbidity due to placental abruption, pulmonary oedema and liver haematoma or rupture. Women randomised to dexamethasone rather than standard treatment did, however, have a shorter hospital stay (weighted mean difference (WMD) -4.50; 95% CI -7.13 to -1.87), and a shorter time to delivery (41 ± 15 hrs) versus (15 ± 4.5 hrs) (p = 0.0068).
There were no significant differences in perinatal mortality or morbidity due to respiratory distress syndrome, need for ventilatory support, intracerebral haemorrhage, necrotizing enterocolitis and a five minute Apgar less than seven. The mean birthweight was significantly greater in the group allocated to dexamethasone (WMD 247.00, 95% CI 65.41 - 428.59).

Matchaba PT, Moodley J. Corticosteroids for HELLP syndrome in pregnancy. Cochrane Database of Systematic Reviews 2004: CD002076
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD002076.pub2/full

Evidence Level: I

Patient information is available from:
Royal College of Obstetricians and Gynaecologists. Information for you – Pre-eclampsia. 2012. London: RCOG
https://www.rcog.org.uk/globalassets/documents/patients/patient-information-leaflets/pregnancy/pre-eclampsia.pdf

Last amended March 2015
Last reviewed March 2017

This guideline has been prepared with reference to the following:

Howell C, Grady K, Cox C. 2014, "Chapter 31 Shoulder dystocia " in Managing Obstetric Emergencies and Trauma: The MOET Course Manual , 3rd ed. Edn. 2014. Royal College of Obstetricians and Gynaecologists, London, 369-82

Royal College of Obstetricians and Gynaecologists. Shoulder dystocia. Guideline No. 42. 2nd ed. 2012. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg42/

Royal College of Anaesthetists, Royal College of Midwives, Royal College of Obstetricians and Gynaecologists, Royal College of Paediatrics and Child Health. Safer Childbirth: Minimum Standards for the Organisation and Delivery of Care in Labour. 2007

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/safer-childbirth-minimum-standards-for-the-organisation-and-delivery-of-care-in-labour/

Stoner R. Obstetric Brachial Plexus Injury: a change in direction. NHS Litigation Authority Review. 2006. 34

Are intrapartum interventions for preventing shoulder dystocia effective?
A Cochrane systematic review (Athukorala, 2006) found insufficient evidence to reach a firm conclusion on this question. Two trials were included; one compared McRobert's manoeuvre and suprapubic pressure with no prophylactic manoeuvres in 185 women and the other compared McRobert's manoeuvre with lithotomy positioning in 40 women. The first study found 15 cases of shoulder dystocia in the therapeutic group vs 5 in the "no manoeuvres" group. There were significantly more caesarean sections in the prophylactic group; when these were included in the results, significantly fewer instances of shoulder dystocia were seen in the prophylactic group (RR 0.33, 95% CI 0.12 to 0.86). The second study found one case of shoulder dystocia in both the prophylactic and lithotomy groups.
A retrospective review of 205 cases (Leung, 2011) found that, following the failure of McRobert's' manoeuvre, subsequent application of rotational methods and posterior arm delivery had similarly high success rates but the former was possibly associated with less fetal injury.

Athukorala C, Middleton P, Crowther CA. Intrapartum interventions for preventing shoulder dystocia. Cochrane Database of Systematic Reviews 2006: CD005543
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD005543.pub2/full

Leung TY, Stuart O, Suen SS, et al. Comparison of perinatal outcomes of shoulder dystocia alleviated by different type and sequence of manoeuvres: a retrospective review. BJOG 2011;118:985-90
http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2011.02968.x/full

Evidence Level: I

Fundal pressure should not be used during the management of shoulder dystocia?
Fundal pressure (pushing down on the top of the mother's uterus to try to hurry up labour or force a baby out) is not recommended by RCOG guidance, which states that it "should not be used during the management of shoulder dystocia. It is associated with a high neonatal complication rate and may result in uterine rupture" (RCOG, 2012). This guidance was based on the findings from a cohort study (Gross et al, 1987), a focus group study (Focus Group Shoulder Dystocia, 1998).

Focus Group Shoulder Dystocia. In: Confidential Enquiries into Stillbirths and Deaths in Infancy. Fifth Annual Report. London: Maternal and Child Health Research Consortium;1998;73–9

Gross TL, Sokol RJ, Williams T et al. Shoulder dystocia: a fetal-physician risk. Am J Obstet Gynecol 1987;156: 1408–18

Royal College of Obstetricians and Gynaecologists. Shoulder dystocia. Guideline No. 42. 2nd ed. 2012. London: RCOG
https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg42/

Evidence Level: V

Mothers should be instructed not to push?

RCOG guidelines state that “Maternal pushing should be discouraged, as this may exacerbate impaction of the shoulders” (RCOG, 2014). This recommendation was based on a computer simulation study (Gonik et al, 2003).

Royal College of Obstetricians and Gynaecologists. Shoulder dystocia. Guideline No. 42. 2nd ed. 2012. London: RCOG
https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg42/

Gonik B, Zhang N, Grimm MJ. Defining forces that are associated with shoulder dystocia: the use of a mathematic dynamic computer model. Am J Obstet Gynecol. 2003;188:1068-72

Evidence Level: V

Patient information is available from:

Patient.co.uk. Birth injuries to the baby. 2015
http://www.patient.co.uk/doctor/birth-injuries-to-the-baby

Last amended March 2017
Last reviewed March 2017

This guideline has been prepared with reference to the following:

The Highland Council. Women, Pregnancy and Substance Misuse: Good Practice Guidelines. 2013

http://www.forhighlandschildren.org/4-icspublication/index_76_2618347006.pdf

Dryden C, Young D, Hepburn M et al. Maternal methadone use in pregnancy: factors associated with the development of neonatal abstinence syndrome and implications for healthcare resources. BJOG. 116. 665-71. 2009

http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2008.02073.x/pdf

Board of Science of the British Medical Association. Fetal alcohol spectrum disorders - a guide for healthcare professionals. London: British Medical Association. 2007

http://bmaopac.hosted.exlibrisgroup.com/exlibris/aleph/a21_1/apache_media/3UQ4QIHNR25DH7623BMFDY45UIK7LH.pdf

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 Enquires into Maternal deaths in the United Kingdom. 2007

http://www.hqip.org.uk/assets/NCAPOP-Library/CMACE-Reports/21.-December-2007-Saving-Mothers-Lives-reviewing-maternal-deaths-to-make-motherhood-safer-2003-2005.pdf

Advisory Council on the Misuse of Drugs. Hidden Harm. 2003

https://www.gov.uk/government/publications/amcd-inquiry-hidden-harm-report-on-children-of-drug-users

Last amended February 2015
Last reviewed March 2017

This guideline has been prepared with reference to the following:

Royal College of Obstetricians and Gynaecologists. The management of third- and fourth-degree perineal tears, 3rd ed. 2015. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg29/

Does midline episiotomy constitute a risk factor for third degree tears?
A retrospective cohort study of 41,347 women found that episiotomy was associated with 3rd degree perineal tear (aOR 2.26, 95% CI 1.03-4.97) (Shmueli, 2017).

Shmueli A, Gabbay Benziv R, Hiersch L et al. Episiotomy - risk factors and outcomes. J Matern Fetal Neonatal Med. 2017;30:251-256

Evidence Level: III

Do anal sphincter tears need to be repaired immediately?
A randomised controlled trial in 165 women (Nordenstam, 2008) allocated 78 to immediate operation and 87 to delayed (8-12 hours) repair. Functional outcome was the same at 1-year follow-up. Delayed repair was not recommended routinely, but, if unavoidable, did not appear to prejudice outcome.

Nordenstam J, Mellgren A, Altman D, et al. Immediate or delayed repair of obstetric anal sphincter tears: a randomised controlled trial. BJOG 2008;115:857-65
http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2008.01726.x/full

Evidence Level: II

Does antibiotic prophylaxis at the time of repair help to prevent infection?
A randomised, placebo-controlled trial in 147 patients (Duggal, 2008) allocated 83 to placebo and 64 to antibiotics. There were 40 drop-outs (27.2%). At 2 weeks postpartum, 4 of 49 (8.2%) patients who received antibiotics and 14 of 58 (24.1%) patients who received placebo developed a perineal wound infection (P=.037). Antibiotic prophylaxis is recommended in RCOG guidelines (see above).
A Cochrane review (Buppasiri, 2014) which included just the Duggal (2008) trial was cautiously supportive of the data but recommended further larger trials were carried out.

Buppasiri P, Lumbiganon P, Thinkhamrop J et al. Antibiotic prophylaxis for third- and fourth-degree perineal tear during vaginal birth. Cochrane Database Syst Rev. 2014: CD005125
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD005125.pub4/full

Duggal N, Mercado C, Daniels K, et al. Antibiotic prophylaxis for prevention of postpartum perineal wound complications: a randomized controlled trial. Obstet Gynecol 2008;111:1268-73

Evidence Level: II

Are continuous or interrupted suturing techniques indicated for perineal repair?
A revised Cochrane review of 16 studies in 8184 women (Kettle, 2012) found that continuous sutures compared with interrupted sutures (all layers or perineal skin only) were associated with less pain for up to 10 days postpartum (RR 0.76, 95% CI 0.66 -0.88, 9 trials).

Kettle C, Hills RK, Ismail KM. Continuous versus interrupted sutures for repair of episiotomy or second degree tears. Cochrane Database Syst Rev. 2012: CD000947
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000947.pub3/full

Evidence Level: I

After a water birth, suture of perineal tears should take place after an hour?

The source of this timing appears to be a NHS Quality Improvement Scotland (2008) document. However no accompanying evidence for this is provided so one must assume this advice is supported by anecdotal evidence only.

NHQ Quality Improvement Scotland. Perineal repair after childbirth: A Procedure and Standards tool to support Practice Development. Edinburgh: NHS Scotland. 2008
http://www.healthcareimprovementscotland.org/previous_resources/implementation_support/perineal_repair_after_childbir.aspx

Should a stool softener be used in combination with a bulking agent after repair of obstetric anal sphincter injury?

A RCT from 2007 (Eogan M et al) compared the stool softener lactulose and lactulose combined with the bulking agent ispaghula husk and found that pain scores were similar in both groups but incontinence in the immediate postnatal period was more frequent with the two preparations compared with lactulose alone (32.86% versus 18.18%, P= 0.03). The authors therefore concluded that the routine prescription of bulking agents and lactulose together is not recommended.

Eogan M, Daly L, Behan M et al. Randomised clinical trial of a laxative alone versus a laxative and a bulking agent after primary repair of obstetric anal sphincter injury. BJOG. 2007;114:736-40
http://onlinelibrary.wiley.com/wol1/doi/10.1111/j.1471-0528.2007.01331.x/full

Evidence Level: II

Patient information is available from:
NHS Choices. Epistiomy. 2016. London. NHS
http://www.nhs.uk/Conditions/pregnancy-and-baby/Pages/episiotomy.aspx

Last amended March 2017
Last reviewed March 2017

THIRD STAGE OF LABOUR
Supporting information

Does active management of the third stage of labour confer any benefits over expectant management?

A Cochrane review of 7 studies in 8247 women (Begley, 2015) found "The evidence suggested that for women at mixed levels of risk of bleeding, active management showed a reduction in the average risk of maternal primary haemorrhage at time of birth (more than 1000 mL) (average risk ratio (RR) 0.34, 95% CI 0.14 to 0.87, three studies, 4636 women) and of maternal haemoglobin (Hb) less than 9 g/dL following birth (average RR 0.50, 95% CI 0.30 to 0.83, two studies, 1572 women). We also found no difference in the incidence in admission of infants to neonatal units (average RR 0.81, 95% CI 0.60 to 1.11, two studies, 3207 women) nor in the incidence of infant jaundice requiring treatment (0.96, 95% CI 0.55 to 1.68, two studies, 3142 women)."

A systematic review of five randomized controlled trials in 30,532 subjects (Du, 2014) found that controlled cord traction conferred the following benefits over expectant management: reduced postpartum haemorrhage (relative risk 0.93, 95% confidence interval 0.87 to 0.99), reduced need for manual removal of placenta (RR 0.70, 95% CI 0.58 to 0.84) and reduced duration of third stage of labour (mean difference -3.20 minutes, 95% CI -3.21 to -3.19). However, no statistically significant benefit was found for severe postpartum haemorrhage, need for blood transfusion or need for therapeutic uterotonics.

Begley CM, Gyte GM, Devane D et al. Active versus expectant management for women in the third stage of labour. Cochrane Database Syst Rev. 2015:CD007412
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007412.pub4/full

Du Y, Ye M & Zheng F. Active management of the third stage of labor with and without controlled cord traction: a systematic review and meta-analysis of randomized controlled trials. Acta Obstet Gynecol Scand. 2014;93:626-33
http://onlinelibrary.wiley.com/doi/10.1111/aogs.12424/full

Evidence Level: I

Patient information is available from:

NHS Choices. What happens during labour and birth. 2016. London: NHS
http://www.nhs.uk/Conditions/pregnancy-and-baby/Pages/what-happens-during-labour-and-birth.aspx

Last amended March 2017
Last reviewed March 2017

TRANSCERVICAL CATHETER INDUCTION OF LABOUR
Supporting information

This guideline has been prepared with reference to the following:

NICE. Insertion of a double balloon catheter for induction of labour in pregnant women without previous caesarean section. 2015. London. NICE

http://www.nice.org.uk/guidance/ipg528

NICE. Induction of labour. 2008. London. NICE

http://www.nice.org.uk/guidance/cg70

What are the differences in placement/insertion to delivery interval between Foley catheter and Cook's Catheters when used for transcervical catheter induction of labour?

There is limited evidence of direct comparisons between types of catheter used for induction of labour with the majority of studies comparing mechanical with pharmacological cervical ripening or placebo (Jozwiak 2012)
However, several trials report shorter insertion to delivery time for the Foley catheter. A randomised trial of 330 nulliparous women with unfavourable cervices at term (Pennell 2009) compared single transcervical Foley balloon catheters without extra-amniotic saline infusion to double balloon catheters. The single balloon catheter resulted in a significantly shorter induction-to-delivery interval (median time 23.2 hrs [95% CI, 20.8–25.8 hrs] vs 24.5 hrs [95% CI, 23.7–30.6 hrs] A prospective quazi-randomised trial (Mei-Dan 2012) assigned the standard Foley balloon catheter with extra-amniotic infusion or Cook balloon to 188 women. Time from insertion to delivery was shorter in the Foley catheter group. (19.6 ± 11.4 compared to 23.4 ± 15.5 hrs, p = .03)
In contrast, a controlled blind study (Solt 2009) of nulliparous and multiparous women which randomised participants to labour induction by Foley or double balloon catheter, found that for the multiparous women the mean interval from catheter withdrawal to delivery time was shorter for the non-Foley group. (14.6 ± 12.3 and 22.6 ± 27.2 hrs). For nulliparous women, no statistically significant differences between the two catheters were identified.

Jozwiak M, Bloemenkamp KWM, Kelly AJ et al. Mechanical methods for induction of labour. Cochrane Database of Systematic Reviews 2012: CD001233
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD001233.pub2/full

Mei-Dan E. Walfisch A. Suarez-Easton S et al. Comparison of two mechanical devices for cervical ripening: a prospective quasi-randomized trial. J Matern Fetal Neonatal Med. 2012;25:723–7

Pennell CE, Henderson JJ, O'Neill MJ et al. Induction of labour in nulliparous women with an unfavourable cervix: a randomized controlled trial comparing double and single balloon catheters and PGE2 gel. BJOG. 2009;116: 1443–52
http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2009.02279.x/full

Solt, I., Ben Harush S, Kaminsky S, Sosnorvsky V, Ophir E and Bornstein J. A prospective randomized study comparing induction of labor with the foley catheter and the cervical ripening double balloon catheter in nuliparous and multiparous women. Obstet Gynecol, 2009; 201:S124

Evidence Level: II

Patient information is available from:

NICE. Induction of labour: Information for the Public. London: NICE. 2008
http://www.nice.org.uk/Guidance/CG70/InformationForPublic

Last amended December 2015
Last reviewed March 2017

UMBILICAL CORD PROLAPSE
Supporting information

This guideline has been prepared with reference to the following:

Royal College of Obstetricians and Gynaecologists. Umbilical cord prolapse (Green-top 50). 2014 London. RCOG

https://www.rcog.org.uk/globalassets/documents/guidelines/gtg-50-umbilicalcordprolapse-2014.pdf

All staff involved in the management of obstetric emergencies (including cord prolapse) should receive at least annual training?
A retrospective cohort study (Siassakos, 2009) examined the case records of all 62 cases of cord prolapse occurring in a large tertiary maternity unit within a UK university hospital between 1993 and 2007. Thirty four cases occurred before the introduction of multidisciplinary simulation training and 28 after. After training, there was a statistically significant reduction in median diagnosis-delivery interval from 25 to 14.5 minutes ($P < 0.001$). There was also a statistically significant increase in the proportion of caesarean sections where recommended actions had been performed (from 34.78 to 82.35%, $P = 0.003$). The authors concluded that "…introduction of annual training, in accordance with national recommendations, was associated with improved management of cord prolapse".

Siassakos D, Hasafa Z, Sibanda T, et al. Retrospective cohort study of diagnosis-delivery interval with umbilical cord prolapse: the effect of team training. BJOG 2009;116:1089-96
http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2009.02179.x/full

Evidence Level: IV

Prolapse of the umbilical cord is an independent risk factor for perinatal mortality?
A large population-based study (Kahanna, 2004) comparing all deliveries complicated by cord prolapse (n=456; 0.4%) to deliveries without this complication (n=120,771) noted higher rates of perinatal mortality in the cord prolapse group vs. the control group (OR=6.4, 95% CI 4.5-9.0).
A retrospective study of 132 babies born after the identification of cord prolapse at the John Radcliffe Hospital, Oxford, between 1984 and 1992 (Murphy, 1995), found that 12 babies died. There were 6 stillbirths and 6 neonatal deaths. Only 1 of the neonatal deaths was due to birth asphyxia. The authors commented that mortality in this group of babies was predominantly attributable to congenital anomalies and prematurity rather than birth asphyxia.
A population-based case-control study in 709 cases of cord prolapse and 2407 randomly selected controls (Critchlow, 1994) found an increased risk of mortality (RR 2.7, 95% CI 1.9 to 4.0), with mortality being less likely to occur among cases delivered by cesarean section (RR 0.4, 95% CI 0.2 to 0.6).

Critchlow CW, Leet TL, Benedetti TJ, et al. Risk factors and infant outcomes associated with umbilical cord prolapse: a population-based case-control study among births in Washington State. Am J Obstet Gynecol 1994;170:613-8

Kahana B, Sheiner E, Levy A, et al. Umbilical cord prolapse and perinatal outcomes. Int J Gynaecol Obstet 2004;84:127-32

Murphy DJ, MacKenzie IZ. The mortality and morbidity associated with umbilical cord prolapse. Br J Obstet Gynaecol 1995;102:826-30

Evidence Level: IV

Patient information is available from:
Royal College of Obstetricians and Gynaecologists. Umbilical Cord prolapse in late pregnancy – information for you. 2009. London. RCOG
https://www.rcog.org.uk/globalassets/documents/patients/patient-information-leaflets/pregnancy/umbilical-cord-prolapse-in-late-pregnancy.pdf

Last amended March 2017
Last reviewed March 2017

UMBILICAL CORD SAMPLING
Supporting information

Samples should, ideally, be collected within 30 min following placental delivery?
A prospective observational study of 38 placentas of infants delivered by elective caesarean section (Armstrong, 2006) took arterial samples from 20 placentas and venous samples from 18 placentas. Arterial and venous lactate was significantly higher after 20 minutes in both clamped and unclamped vessels. Changes in unclamped vessels were greater than in clamped vessels. The pH remained unchanged over 60 minutes in clamped vessels, but changed significantly in unclamped vessels. Base excess changed significantly in both clamped and unclamped vessels. The authors concluded that delayed sampling from unclamped cords was very unreliable.

Armstrong L, Stenson B. Effect of delayed sampling on umbilical cord arterial and venous lactate and blood gases in clamped and unclamped vessels. Arch Dis Child Fetal Neonatal Ed 2006;91:F342–F345
http://europepmc.org/articles/PMC2672835;jsessionid=mSpBQiOpwQOR2VTd78bp.5

Evidence Level: IV

Last amended June 2010
Last reviewed March 2017

UTERINE RUPTURE
Supporting information

If scar rupture suspected, oxytocin treatment should be stopped, if already in progress?
A retrospective, multicentre cohort study in 13,523 patients (Cahill, 2007) noted that, in a total of 128 women who experienced a uterine rupture, 80 occurred in those who had received oxytocin (62.5%). There was evidence of "dose response" for maximum oxytocin amount and uterine rupture, with a uterine rupture rate of 2.07% (AOR 2.98; 95% CI 1.51-5.90) at the highest dosages.

Cahill AG, Stamilio DM, Odibo AO, et al. Does a maximum dose of oxytocin affect risk for uterine rupture in candidates for vaginal birth after cesarean delivery? Am J Obstet Gynecol 2007;197:495.e1-5

Evidence Level: IV

Patient information is available from:
Patient.co.uk Uterine rupture. 2015
http://www.patient.co.uk/doctor/Uterine-Rupture.htm

Last amended March 2017
Last reviewed March 2017

This guideline has been prepared with reference to the following:

Royal College of Obstetricians and Gynaecologists. Birth after previous caesarean birth (Green-top Guideline No. 45). 2015. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg45/

Anon. Vaginal birth after previous cesarean delivery: ACOG Practice bulletin no. 115. Obstet Gynecol 2010;116:450-63

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 Enquires into Maternal deaths in the United Kingdom. 2007

http://www.publichealth.hscni.net/sites/default/files/Saving%20Mothers'%20Lives%202003-05%20.pdf

What, according to the latest guidance are the specific risks and benefits of VBAC?

- Planned VBAC carries a risk of uterine rupture of 1 in 200 (0.5%).
- There is virtually no risk of rupture in women undergoing Elective repeat Caesarean section (ERCS) (0.02%).
- Risk of maternal death from uterine rupture is <1 per 100,000 cases in the developed world.
- Planned VBAC carries an 8/10,000 (0.08%) risk of the infant developing hypoxic ischaemic encephalopathy (HIE).
- VBAC reduces the risk of transient respiratory morbidity of the baby to 2-3% compared to ERCS (4 - 5%, or 6% if performed at 38 weeks instead of 39 weeks).
- ERCS may increase the risk of serious complications in future pregnancies.
- Preterm VBAC has similar success rates to planned term VBAC, but with lower risk of uterine rupture.
- If successful, VBAC offers a shorter hospital stay and recovery compared to ERCS.

Royal College of Obstetricians and Gynaecologists. Birth after previous caesarean birth (Green-top Guideline No. 45). 2015. London. RCOG
https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg45/

What evidence is available to support the decision whether or not to attempt VBAC?
A Cochrane systematic review (Dodd, 2013) found no randomised controlled trials and concluded that "Planned elective repeat caesarean section and planned induction of labour for women with a prior caesarean birth are both associated with benefits and harms. Evidence for these care practices is largely drawn from non-randomised studies, associated with potential bias. Any results and conclusions must therefore be interpreted with caution. Randomised controlled trials are required to provide the most reliable evidence regarding the benefits and harms of both planned elective repeat caesarean section and planned induction of labour for women with a previous caesarean birth."

Dodd JM, Crowther CA, Huertas E et al. Planned elective repeat caesarean section versus planned vaginal birth for women with a previous caesarean birth. Cochrane Database Syst Rev. 2013: CD004224
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004224.pub3/full

Evidence Level: V

VBAC should be approached with caution in women with a twin gestation?
A retrospective study of VBAC in 134 patients with twin gestation (Aaronson, 2010) recorded that 25 underwent a trial of labour and the remaining 109 underwent a repeat caesarean delivery. Although there were no cases of uterine rupture, maternal mortality, or peripartum fever, higher rates of perinatal mortality were noted in patients undergoing trial of labour (8% vs. 1.8%, p = 0.042, OR = 4.652, 95% CI = 1.122-19.286). However, trial of labour was not found to be an independent risk factor for perinatal mortality after controlling for confounders such as gestational age, ethnicity, and

fetal malformations (adjusted OR = 1.07, 95% CI = 0.07-15.95, p = 0.95). More research was called for.

Aaronson D, Harlev A, Sheiner E, et al. Trial of labor after cesarean section in twin pregnancies: maternal and neonatal safety. J Matern Fetal Neonat Med 2010;23:550-4

Evidence Level: IV

VBAC should be approached with caution in women who have had two previous caesareans?
A systematic review and meta-analysis of 20 case series and 23 cohort studies (Tahseen, 2010) concluded that "Women requesting for a trial of vaginal delivery after two caesarean sections should be counselled appropriately considering available data of success rate 71.1%, uterine rupture rate 1.36% and of a comparative maternal morbidity with repeat CS option."

Tahseen S, Griffiths M. Vaginal birth after two caesarean sections (VBAC-2): a systematic review with meta-analysis of success rate and adverse outcomes of VBAC-2 versus VBAC-1 and repeat (third) caesarean sections. BJOG 2010;117:5-19
http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2009.02351.x/full

Evidence Level: I

What is the risk of uterine rupture following previous caesarean section?
A population-based registry study in 18,794 women (Al-Zirqi, 2010) identified 94 cases of uterine rupture. Compared with elective prelabour caesarean section, odds of rupture increased for emergency prelabour caesarean section (OR: 8.63; 95% CI: 2.6-28.0), spontaneous labour (OR: 6.65; 95% CI: 2.4-18.6) and induced labour (OR: 12.60; 95% CI: 4.4-36.4). The odds were increased for maternal age > or =40 years versus <30 years (OR: 2.48; 95% CI: 1.1-5.5), non-Western (mothers born outside Europe, North America or Australia) origin (OR: 2.87; 95% CI: 1.8-4.7) and gestational age > or =41 weeks versus 37-40 weeks (OR: 1.73; 95% CI: 1.1-2.7). Uterine rupture after trial of labour significantly increased severe postpartum haemorrhage (OR: 8.51; 95% CI: 4.6-15.1), general anaesthesia exposure (OR: 14.20; 95% CI: 9.1-22.2), hysterectomy (OR: 51.36; 95% CI: 13.6-193.4) and serious perinatal outcome (OR: 24.51 (95% CI: 11.9-51.9).

Al-Zirqi I, Stray-Pedersen B, Forsén L, et al. Uterine rupture after previous caesarean section. BJOG 2010;117: 809-20
http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2010.02533.x/full

Evidence Level: IV

Patient information is available from:
Health talk online. Making decisions about your birth after caesarean. 2015. Oxford. University of Oxford
http://healthtalkonline.org/peoples-experiences/pregnancy-children/making-decisions-about-birth-after-caesarean/topics

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This guideline has been prepared with reference to the following:
Royal College of Obstetricians and Gynaecologists. The management of breech presentation, 3rd ed. London, RCOG, 2006. Guideline No. 20b

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg20b/

Vaginal breech delivery, in carefully selected cases, is as safe as delivery by caesarean section?
Although vaginal breech birth can be associated with a higher risk of perinatal mortality and short-term neonatal morbidity than elective Caesarean section, careful case selection and labour management in a modern obstetrical setting "may achieve a level of safety similar to elective Caesarean section" (Kotaska, 2009).
A systematic review of observational studies found that the relative risk of perinatal mortality and morbidity was about two- to five-fold higher in the planned vaginal than in the planned caesarean delivery group (Berhan, 2016). The absolute risks of perinatal mortality, fetal neurologic morbidity, birth trauma, 5-minute Apgar score <7 and neonatal asphyxia in the planned vaginal delivery group were 0.3, 0.7, 0.7, 2.4 and 3.3%, respectively. The review concluded that perinatal mortality and morbidity in the planned vaginal breech delivery were significantly higher than with planned caesarean delivery. Even taking into account the relatively low absolute risks of vaginal breech delivery, the current study substantiates the practice of individualised decision-making on the route of delivery in a term breech presentation.

Berhan Y, Haileamlak A. The risks of planned vaginal breech delivery versus planned caesarean section for term breech birth: a meta-analysis including observational studies. BJOG. 2016;123:49-57

Kotaska A, Menticoglou S, Gagnon R, et al. Vaginal delivery of breech presentation. J Obstet Gynaecol Canada: JOGC 2009;31:557-66, 567-78

Evidence Level: III

Is there any evidence to support hastening (expediting) vaginal breech delivery in order to lessen the risk of anoxia in the infant?
An updated Cochrane systematic review (Hofmeyr, 2012) found insufficient evidence with which to address this question.

Hofmeyr GJ, Kulier R. Expedited versus conservative approaches for vaginal delivery in breech presentation. Cochrane Database of Systematic Reviews 2012, Issue 6. Art. No.: CD000082.
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000082.pub2/full

Evidence Level: I (For "no evidence")

All women with an uncomplicated breech pregnancy at term (37-42 weeks) should be offered External Cephalic Version (ECV)?
A revised Cochrane systematic review of 7 studies in a total of 1245 women (Hofmeyr 2012) shows a statistically significant and clinically meaningful reduction in non-cephalic birth (risk ratio (RR) 0.46, 95% confidence interval (CI) 0.31 to 0.66; and caesarean section (RR 0.63, 95% CI 0.44 to 0.90) when ECV was attempted. No significant complications were observed in any of the infants.
An unblinded multicentred randomised controlled trial in a total of 1543 women from 68 centres in 21 countries (Hutton, 2011) compared early ECV (34-35 weeks) with delayed ECV (37-42 weeks). Fewer fetuses were in a non-cephalic presentation at birth in the early ECV group (314/765 [41.1%] versus 377/768 [49.1%] in the delayed ECV group; relative risk [RR] 0.84, 95% CI 0.75, 0.94, P=0.002). There were no differences in rates of caesarean section (398/765 [52.0%] versus 430/768 [56.0%]; RR 0.93, 95% CI 0.85, 1.02, P=0.12) or in risk of preterm birth (50/765 [6.5%] versus 34/768 [4.4%]; RR 1.48, 95% CI 0.97, 2.26, P=0.07) between groups. The authors concluded that external cephalic

version at 34-35 weeks versus 37 or more weeks of gestation increased the likelihood of cephalic presentation at birth but did not reduce the rate of caesarean section and may increase the rate of preterm birth.

Hofmeyr GJ, Kulier R. External cephalic version for breech presentation at term. Cochrane Database of Systematic Reviews 2012.: CD000083
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000083.pub2/full

Hutton EK, Hannah ME, Ross SJ, et al. The Early External Cephalic Version (ECV) 2 Trial: an international multicentre randomised controlled trial of timing of ECV for breech pregnancies. BJOG 2011;118:564-77
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3085121/

Evidence Level: I

Planned caesarean section is the best method of delivering a term frank or complete breech singleton?

A Cochrane systematic review of three trials in a total of 2396 women (Hofmeyr, 2003) found that 550/1227 (45%) of those women allocated to vaginal delivery actually had caesareans. Planned caesarean was safer (RR 0.33; 95% CI 0.19 - 0.56), with a reduction in perinatal or neonatal death (other than those associated with foetal abnormalities).

Hofmeyr GJ, Hannah M. Planned caesarean section for term breech delivery. Cochrane Database of Systematic Reviews 2003: CD000166
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000166/full

Evidence Level: I

Does spinal analgesia increase the success rate of ECV?

A RCT in 70 nulliparous women (Weiniger, 2007) randomised 36 to receive spinal analgesia (7.5 mg bupivacaine) and 34 to receive no analgesia before ECV. ECV was successful in 24 of 36 (66.7%) of the spinal analgesia group, compared with 11 of 34 (32.4%) without, P=.004 (95% CI of the difference: 0.0954-0.5513). ECV with spinal analgesia resulted in a lower visual analogue pain score, 1.76+/-2.74 compared with 6.84+/-3.08 without, P<.001. A secondary analysis logistic regression model demonstrated that the odds of successful ECV were 4.0-fold higher when performed with spinal analgesia P=.02 (95% CI, odds ratio [OR] 1.2-12.9). Complete breech presentation before attempting external cephalic version increased the odds of success 8.2-fold, P=.001 (95% CI, OR 2.2-30.3). Similar results were achieved in a later study by the same team involving 64 multiparous women (Weiniger, 2010). These results differ from an earlier RCT in 102 women (Dugoff, 1999). This randomised 50 (43%) to spinal analgesia and 52 (51%) to no analgesia. Successful ECV occurred in 44% vs 42% respectively, which was not statistically significant.

Dugoff L, Stamm CA, Jones OW, et al. The effect of spinal anesthesia on the success rate of external cephalic version: a randomized trial. Obstet Gynecol 1999;93:345-9

Weiniger CF, Ginosar Y, Elchalal U, et al. External cephalic version for breech presentation with or without spinal analgesia in nulliparous women at term: a randomized controlled trial. Obstet Gynecol 2007;110:1343-50

Weiniger CF, Ginosar Y, Elchalal U. Randomized controlled trial of external cephalic version in term multiparae with or without spinal analgesia. Br J Anaesth 2010;104:613-8
http://bja.oxfordjournals.org/cgi/pmidlookup?view=long&pmid=20338954

Evidence Level: II

Patient information is available from:

Royal College of Obstetricians and Gynaecologists. A breech baby at the end of pregnancy: information for you. 2008. London. RCOG
https://www.rcog.org.uk/globalassets/documents/patients/patient-information-leaflets/pregnancy/a-breech-baby-at-the-end-of-pregnancy.pdf

NHS Choices. Baby positions in the womb. London: NHS. 2013. http://www.nhs.uk/conditions/pregnancy-and-baby/pages/breech-birth.aspx#close

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VTE – PULMONARY EMBOLISM
Supporting information

This guideline has been prepared with reference to the following:

Royal College of Obstetricians and Gynaecologists**.** Thrombosis and Embolism during Pregnancy and the Puerperium, the Acute Management of (Green-top Guideline No. 37b). 2015. London. RCOG

https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg37b/

What evidence supports anticoagulant therapy for VTE in pregnancy?
A 2013 systematic review of eighteen observational studies (981 patients) found that anticoagulant therapy was associated with weight mean incidence (WMI) of major bleeding of 1.41% (95% CI 0.60–2.41%; I) antenatally and 1.90% (95% CI 0.80–3.60%) during the first 24 h after delivery (Romualdi, 2013). The estimated WMI of recurrent VTE during pregnancy was 1.97% (95% CI 0.88–3.49%; I2 39.5%). The authors of tis review concluded that anticoagulant therapy appears to be safe and effective for the treatment of pregnancy-related VTE, but the optimal dosing regimens remain uncertain.
A Cochrane systematic review OF RCTs (Che Yaakob, 2010) identified only three studies that might potentially help to answer this question. All three failed to meet the Cochrane inclusion criteria. The first study compared LMWH and UFH in pregnant women with previous thromboembolic events and, for most of these women, anticoagulants were used as thromboprophylaxis. There were only three women who had a thromboembolic event during the current pregnancy and it was unclear whether the anticoagulant was used as therapy or prophylaxis. The second study was excluded because it included only women undergoing caesarean birth. The third study was not a randomised trial. Further studies were called for.

Che Yaakob CA, Dzarr AA, Ismail AA, et al. Anticoagulant therapy for deep vein thrombosis (DVT) in pregnancy. Cochrane Database of Systematic Reviews 2010: CD007801
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007801.pub2/full

Romualdi E, Dentali F, Rancan E et al. Anticoagulant therapy for venous thromboembolism during pregnancy: a systematic review and a meta-analysis of the literature. J Thromb Haemost. 2013;11:270-81
http://onlinelibrary.wiley.com/doi/10.1111/jth.12085/full

Evidence Level: III

Patient information is available from:
Health Talk Online. Pulmonary Embolism/blood clots. Oxford: Oxford University. 2014.
http://www.healthtalk.org/peoples-experiences/pregnancy-children/conditions-threaten-womens-lives-childbirth-pregnancy/pulmonary-embolismblood-clots

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