Royal College of Obstetricians & Gynaecologists

Birth After Previous Caesarean Birth

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Birth After Previous Caesarean Birth

This is the second edition of this guideline. The first edition was published in 2007 under the same title.[1]

Executive summary of recommendations

Antenatal care schedule

What is the recommended schedule of antenatal care for pregnant women with previous caesarean delivery?

Implementation of a vaginal birth after previous caesarean delivery (VBAC) versus elective repeat caesarean section (ERCS) checklist or clinical care pathway is recommended to facilitate best practice in antenatal counselling, shared decision making and documentation. [*New 2015*] ✓

Suitability for planned VBAC

Which women are best suited to have a planned VBAC?

Planned VBAC is appropriate for and may be offered to the majority of women with a singleton pregnancy of cephalic presentation at 37^{+0} weeks or beyond who have had a single previous lower segment caesarean delivery, with or without a history of previous vaginal birth. B

What are the contraindications to VBAC?

Planned VBAC is contraindicated in women with previous uterine rupture or classical caesarean scar and in women who have other absolute contraindications to vaginal birth that apply irrespective of the presence or absence of a scar (e.g. major placenta praevia). D

In women with complicated uterine scars, caution should be exercised and decisions should be made on a case-by-case basis by a senior obstetrician with access to the details of previous surgery. D

Can women with two or more prior caesareans be offered planned VBAC?

Women who have had two or more prior lower segment caesarean deliveries may be offered VBAC after counselling by a senior obstetrician. This should include the risk of uterine rupture and maternal morbidity, and the individual likelihood of successful VBAC (e.g. given a history of prior vaginal delivery). Labour should be conducted in a centre with suitable expertise and recourse to immediate surgical delivery. [*New 2015*] C

What factors are associated with an increased risk of uterine rupture in women undergoing VBAC?

An individualised assessment of the suitability for VBAC should be made in women with factors that increase the risk of uterine rupture. ✓

Antenatal counselling

What are the overall aims of antenatal counselling?

The antenatal counselling of women with a previous caesarean birth should be documented in the notes. ✓

A final decision for mode of birth should be agreed upon by the woman and member(s) of the maternity team before the expected/planned date of delivery. ✓

When a date for ERCS is being arranged, a plan for the event of labour starting before the scheduled date should be documented in the notes. ✓

The routine use of VBAC checklists during antenatal counselling should be considered, as they would ensure informed consent and shared decision making in women undergoing VBAC. [*New 2015*] B

A patient information leaflet should be provided with the consultation. ✓

What are the risks and benefits of planned VBAC versus ERCS from 39^{+0} weeks of gestation?

Women should be made aware that successful VBAC has the fewest complications and therefore the chance of VBAC success or failure is an important consideration when choosing the mode of delivery. B

Women should be made aware that the greatest risk of adverse outcome occurs in a trial of VBAC resulting in emergency caesarean delivery. B

Women should be informed that planned VBAC is associated with an approximately 1 in 200 (0.5%) risk of uterine rupture. B

Women should be informed that the absolute risk of birth-related perinatal death associated with VBAC is extremely low and comparable to the risk for nulliparous women in labour. C

Women should be informed that ERCS is associated with a small increased risk of placenta praevia and/or accreta in future pregnancies and of pelvic adhesions complicating any future abdominopelvic surgery. C

The risk of perinatal death with ERCS is extremely low, but there is a small increase in neonatal respiratory morbidity when ERCS is performed before 39^{+0} weeks of gestation. The risk of respiratory morbidity can be reduced with a preoperative course of antenatal corticosteroids. C

What is the likelihood of VBAC success?

Women should be informed that the success rate of planned VBAC is 72–75%. C

What factors determine the individualised likelihood of VBAC success?

Women with one or more previous vaginal births should be informed that previous vaginal delivery, particularly previous VBAC, is the single best predictor of successful VBAC and is associated with a planned VBAC success rate of 85–90%. Previous vaginal delivery is also independently associated with a reduced risk of uterine rupture. C

Intrapartum management of planned VBAC

What delivery setting is appropriate for conducting planned VBAC?

Women should be advised that planned VBAC should be conducted in a suitably staffed and equipped delivery suite with continuous intrapartum care and monitoring with resources available for immediate caesarean delivery and advanced neonatal resuscitation. ✓

Women with an unplanned labour and a history of previous caesarean delivery should have a discussion with an experienced obstetrician to determine feasibility of VBAC. [*New 2015*] ✓

Epidural analgesia is not contraindicated in a planned VBAC, although an increasing requirement for pain relief in labour should raise awareness of the possibility of an impending uterine rupture. D

Women should be advised to have continuous electronic fetal monitoring for the duration of planned VBAC, commencing at the onset of regular uterine contractions. D

How should women with a previous caesarean birth be advised in relation to induction or augmentation of labour?

Women should be informed of the two- to three-fold increased risk of uterine rupture and around 1.5-fold increased risk of caesarean delivery in induced and/or augmented labour compared with spontaneous VBAC labour. D

A senior obstetrician should discuss the following with the woman: the decision to induce labour, the proposed method of induction, the decision to augment labour with oxytocin, the time intervals for serial vaginal examination and the selected parameters of progress that would necessitate discontinuing VBAC. ✓

Clinicians should be aware that induction of labour using mechanical methods (amniotomy or Foley catheter) is associated with a lower risk of scar rupture compared with induction using prostaglandins. D

Planning and conducting ERCS

What elements are involved in the perioperative, intraoperative and postoperative care for ERCS?

ERCS delivery should be conducted after 39^{+0} weeks of gestation. A

Antibiotics should be administered before making the skin incision in women undergoing ERCS. [*New 2015*] B

All women undergoing ERCS should receive thromboprophylaxis according to existing RCOG guidelines. [*New 2015*] ✓

Early recognition of placenta praevia, adopting a multidisciplinary approach and informed consent are important considerations in the management of women with placenta praevia and previous caesarean delivery. [*New 2015*] ✓

How should women in special circumstances be cared for?

Clinicians should be aware that there is uncertainty about the safety and efficacy of planned VBAC in pregnancies complicated by post-dates, twin gestation, fetal macrosomia, antepartum stillbirth or maternal age of 40 years or more. Hence, a cautious approach is advised if VBAC is being considered in such circumstances. ✓

Women who are preterm and considering the options for birth after a previous caesarean delivery should be informed that planned preterm VBAC has similar success rates to planned term VBAC but with a lower risk of uterine rupture. B

1. Purpose and scope

The purpose of this guideline is to provide evidence-based information to inform the antenatal and intrapartum care of pregnant women who have had previous caesarean delivery, with the options for delivery being either planned vaginal birth after previous caesarean delivery (VBAC) or elective repeat caesarean section (ERCS).

2. Introduction and background epidemiology

There has been continued debate about defining an acceptable caesarean delivery rate and what rate achieves optimal maternal and infant outcomes. The overall caesarean delivery rate in England for 2012–2013 was 25.5%[2]; the majority were emergency (14.8%) rather than elective (10.7%) caesarean births. The caesarean delivery rates for Wales,[3] Northern Ireland[4] and Scotland[5] in 2012–2013 were 27.5%, 29.8% and 27.3% respectively. Hence, counselling women for and managing birth after caesarean delivery are important issues.

There is a consensus (National Institute for Health and Care Excellence [NICE],[6] Royal College of Obstetricians and Gynaecologists [RCOG],[1] American College of Obstetricians and Gynecologists [ACOG]/ National Institutes of Health [NIH][7–9]) that planned VBAC is a clinically safe choice for the majority of women with a single previous lower segment caesarean delivery. Such a strategy is also supported by health economic modelling[6,10] and would also at least limit any escalation of the caesarean delivery rate and maternal morbidity associated with multiple caesarean deliveries.[11–15] This guideline provides evidence-based recommendations on best practice for the antenatal and intrapartum management of women undergoing planned VBAC and ERCS. The terms used in this guideline are defined in Appendix I.

3. Identification and assessment of evidence

This guideline was developed in accordance with standard methodology for producing RCOG Green-top Guidelines. MEDLINE, PubMed, all Evidence-Based Medicine (EBM) Reviews (Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, Methodology Register, ACP Journal Club, Database of Abstracts of Reviews of Effects [DARE], Health Technology Assessment database [HTA], Maternity and Infant Care), EMBASE and Trip were searched for relevant randomised controlled trials, systematic reviews, meta-analyses and cohort studies. The search was restricted to articles published between 2003 and February 2015. Search words included 'VBAC', 'TOLAC', 'vaginal birth after caesarean', 'previous caesarean', 'prior caesarean' and all relevant Medical Subject Headings (MeSH) terms. This guideline assesses the quality of evidence and determines the strength of recommendations in accordance with Scottish Intercollegiate Guidelines Network criteria.

4. Identified studies and limitations of data

Notable publications within the last 10 years have included evidence-based systematic reviews,[9,16,17] clinical guidelines from the UK (RCOG 2007[1] and NICE 2011[6]) and the USA (ACOG 2010[7]; NIH 2010 Consensus report[8]) and a study by the US National Institute of Child Health and Human Development (NICHD, 2004; 17 898 planned VBACs, 15 801 planned ERCSs at 37^{+0}–41^{+0} weeks of gestation[18]). Important attributes of the NICHD study[18] include its large sample size, prospective strict case ascertainment and reporting outcomes according to planned VBAC and planned ERCS antenatal decisions rather than observed modes of delivery. Many of the recent studies vary in their case ascertainment and outcome criteria. These include an Australian multicentre patient preference cohort trial (2012; 1237 planned VBACs, 1108 planned ERCSs at 38^{+0}–39^{+0} weeks of gestation),[19] a UK national case–control study (2012–2013; UK Obstetric Surveillance System)[12,13,20] and Scottish (2013),[21] Australian (2010)[22] and Dutch (2009)[23] population-based studies. Importantly, although planned ERCS is recommended to be conducted from 39^{+0} weeks of gestation,[6] most studies have reported ERCS outcomes for deliveries that have occurred between 37^{+0} and 40^{+0} weeks of gestation.

5. Antenatal care schedule

5.1 What is the recommended schedule of antenatal care for pregnant women with previous caesarean delivery?

Implementation of a VBAC versus ERCS checklist or clinical care pathway is recommended to facilitate best practice in antenatal counselling, shared decision making and documentation. ✓

The antenatal care schedule should comply with that recommended by the NICE antenatal care guideline,[24] with specific reviews as shown in Appendices II and III. NICE[25] pathways may also be used as guides when devising appropriate local clinical care pathways.

Evidence level 4

In the majority of cases, counselling for mode of delivery could be conducted by a member of the maternity team soon after the woman's midtrimester ultrasound, assuming that there

were no contraindications to planned VBAC. An obstetrician should be involved in any of the following situations: the woman had contraindications that precluded VBAC, she was uncertain of mode of delivery, she specifically requested ERCS, she required induction of labour (e.g. more than 41^{+0} weeks of gestation) or she developed specific pregnancy complications (e.g. pre-eclampsia, breech presentation, fetal growth restriction, macrosomia). After initial counselling, some more complex cases may need senior support. In most cases, the decision regarding mode of delivery should be finalised by 36^{+0} weeks of gestation. Having well-structured evidence-based patient information leaflets that list key points, including the probability of the woman having successful VBAC, is likely to improve the informed decision-making process on mode of birth after caesarean delivery[26] (see Appendix IV).

Evidence level 4

Use of specialist antenatal clinics designed to guide and support women through the informed decision-making process on mode of birth after a primary caesarean delivery has been found to improve VBAC attempt rates in Australia.[27]

6. Suitability for planned VBAC

6.1 Which women are best suited to have a planned VBAC?

Planned VBAC is appropriate for and may be offered to the majority of women with a singleton pregnancy of cephalic presentation at 37^{+0} weeks or beyond who have had a single previous lower segment caesarean delivery, with or without a history of previous vaginal birth.

B

There is a consensus, endorsed by evidence-based systematic reviews[9,16,17] and clinical guidelines,[1,6–8] that planned VBAC is a safe and appropriate mode of delivery for the majority of pregnant women with a single previous lower segment caesarean delivery.

Evidence level 2++

However, a review of the previous caesarean delivery records and current pregnancy is recommended to identify contraindications to VBAC.

6.2 What are the contraindications to VBAC?

Planned VBAC is contraindicated in women with previous uterine rupture or classical caesarean scar and in women who have other absolute contraindications to vaginal birth that apply irrespective of the presence or absence of a scar (e.g. major placenta praevia).

D

In women with complicated uterine scars, caution should be exercised and decisions should be made on a case-by-case basis by a senior obstetrician with access to the details of previous surgery.

D

Women with the following risk factors are considered to be at increased risk of adverse maternal and/or perinatal outcome as a consequence of VBAC.

Previous uterine rupture

Based on limited observational data,[28–30] women who have experienced a previous uterine rupture are reported to have a higher risk (5% or higher) of recurrent uterine rupture with labour. Hence previous uterine rupture is considered a contraindication to VBAC.

Evidence level 3

Type of previous uterine incision

Based on limited observational data,[31,32] there is insufficient evidence to support the safety of VBAC in women with previous inverted T or J incisions, low vertical uterine incisions or significant inadvertent uterine extension at the time of primary caesarean; hence caution should be exercised in these women and decisions should be made by a senior obstetrician on a case-by-case basis. VBAC is contraindicated in women with previous classical caesarean delivery due to the high risk of uterine rupture.[33]

Evidence level 3

Previous uterine surgery

Although previous uterine surgery is not within the scope of this guideline, there is uncertainty whether women who have undergone laparoscopic or abdominal myomectomy, particularly where the uterine cavity has been breached, are at increased risk of uterine rupture.[34–41] Uterine rupture after hysteroscopic resection of uterine septum is considered a rare complication.[42,43] Given this uncertainty, women who have had such uterine surgery should be considered to have delivery risks at least equivalent to those of VBAC and managed similarly in labour.

Evidence level 3

Placenta praevia

A major degree of placenta praevia (and some cases of minor or partial placenta praevia) is a contraindication to vaginal delivery, including VBAC (see RCOG Green-top Guideline No. 27).[44] A systematic review reported that women with one, two, or three or more previous caesarean deliveries experience a 1%, 1.7% or 2.8% risk respectively of placenta praevia in subsequent pregnancies,[9] concurring with the findings of a recent UK population study and meta-analysis.[45] Placenta accreta occurs in 11–14% of women with placenta praevia and one prior caesarean delivery and in 23–40% of women with placenta praevia and two prior caesarean deliveries. In women with placenta praevia and five or more prior caesarean deliveries, the incidence of placenta accreta is up to 67%.[9] In view of these associations, the RCOG and NICE have produced recommendations for women with a previous caesarean delivery which can be found in RCOG Green-top Guideline No. 27[44] and the NICE guideline.[6]

Evidence level 2++

6.3 Can women with two or more prior caesareans be offered planned VBAC?

Women who have had two or more prior lower segment caesarean deliveries may be offered VBAC after counselling by a senior obstetrician. This should include the risk of uterine rupture and maternal morbidity, and the individual likelihood of successful VBAC (e.g. given a history of prior vaginal delivery). Labour should be conducted in a centre with suitable expertise and recourse to immediate surgical delivery.

C

A multivariate analysis of the NICHD study showed that there was no significant difference in the rates of uterine rupture in VBAC with two or more previous caesarean births (9/975, 92/10 000) compared with a single previous caesarean birth (115/16 915, 68/10 000).[46] These findings concur with other observational studies, which, overall, have shown similar rates of VBAC success with two previous caesarean births (VBAC success rates of 62–75%) and single prior caesarean birth.[47–50] It is notable that more than half of the women with two previous caesarean deliveries had also had a previous vaginal birth and 40% had a previous VBAC. Hence, caution should be applied when extrapolating these data to women with no previous vaginal delivery.

Evidence level 2+

A systematic review[51] has suggested that women with two previous caesarean deliveries who are considering VBAC should be counselled about the success rate (71.1%), the uterine rupture rate (1.36%) and the comparable maternal morbidity to the repeat caesarean delivery option. The rates of hysterectomy (56/10 000 compared with 19/10 000) and transfusion (1.99% compared with 1.21%) were increased in women undergoing VBAC after two previous caesarean births compared with one previous caesarean birth. Therefore, provided that the woman has been fully informed by a senior obstetrician of the increased risks and a comprehensive individualised risk analysis has been undertaken of the indication for and the nature of the previous caesarean deliveries, then planned VBAC may be supported in women with two or more previous lower segment caesarean deliveries.

Evidence level 2++

Women seeking multiple (e.g. three or more) future pregnancies should be counselled that opting for ERCS may expose themselves to greater surgical risks for future pregnancies

Evidence level 3

(particularly placenta praevia, placenta accreta and hysterectomy) associated with repeated ERCS delivery[11–13,44,52,53] and therefore greater consideration ought to be given to attempting VBAC. Evidence level 3

6.4 What factors are associated with an increased risk of uterine rupture in women undergoing VBAC?

An individualised assessment of the suitability for VBAC should be made in women with factors that increase the risk of uterine rupture. ✓

Factors that potentially increase the risk of uterine rupture include short inter-delivery interval (less than 12 months since last delivery), post-date pregnancy, maternal age of 40 years or more, obesity, lower prelabour Bishop score, macrosomia and decreased ultrasonographic lower segment myometrial thickness.[20,22,23,54–57] A recent retrospective study[58] involving 3176 patients evaluated the safety of women undergoing VBAC with a short inter-delivery interval. The study concluded that a short inter-delivery interval (less than 12 months) is not a risk factor for major complications such as uterine rupture and maternal death, but that it is for preterm delivery. Further data are needed before the safety of such an approach can be confirmed. Evidence level 3

There is uncertainty in how to incorporate this knowledge in antenatal counselling and therefore the presence of these risk factors does not contraindicate VBAC. However, such factors may be considered during the decision-making process, particularly if considering induction or augmentation of VBAC labour (see section 8.2). Evidence level 2–

A recent meta-analysis[59] has suggested that measurement of lower uterine segment (LUS) thickness antenatally in women with a previous caesarean delivery could be used to predict the occurrence of a uterine defect (scar dehiscence or scar rupture) in women undergoing VBAC. According to the study, a myometrial thickness (the minimum thickness overlying the amniotic cavity at the level of the uterine scar) cut-off of 2.1–4.0 mm provided a strong negative predictive value for the occurrence of a uterine defect during VBAC, whereas a myometrial thickness cut-off between 0.6 and 2.0 mm provided a strong positive predictive value for the occurrence of a uterine defect. However, the study could not define an ideal LUS thickness cut-off value usable in clinical practice. This meta-analysis provides support for the use of antenatal LUS measurements in the prediction of a uterine defect in women undergoing VBAC; however, clinical applicability needs be assessed in prospective observational studies using a standardised method of measurement. Evidence level 1+

7. Antenatal counselling

7.1 What are the overall aims of antenatal counselling?

The antenatal counselling of women with a previous caesarean birth should be documented in the notes. ✓

A final decision for mode of birth should be agreed upon by the woman and member(s) of the maternity team before the expected/planned date of delivery. ✓

When a date for ERCS is being arranged, a plan for the event of labour starting before the scheduled date should be documented in the notes. ✓

The routine use of VBAC checklists during antenatal counselling should be considered, as they would ensure informed consent and shared decision making in women undergoing VBAC. B

A patient information leaflet should be provided with the consultation. ✓

Ideally, discussion should be individualised to the woman's medical circumstances and consider her individual chance of VBAC success and future reproductive preferences. The antenatal counselling process should be documented in the medical records. Where possible, outcomes from women who give birth at term (37^{+0}–42^{+0} weeks of gestation) should be used for the purposes of antenatal counselling and are used throughout this guideline. As up to 10% of women scheduled for ERCS go into labour before 39^{+0} weeks, it is good practice to discuss and document a plan for delivery if labour starts prior to the scheduled date.

Clinical trials have shown decision aids, specific patient information literature and 'VBAC checklists', which encompass such information, may facilitate the decision-making process by lowering decisional conflict, improving level of knowledge, improving satisfaction and increasing the perception of having made an informed choice.[60–66]

Evidence level 1–

Documentation of the counselling process (for example, using a standardised VBAC checklist or clinical care pathway) and provision of a patient information leaflet[67] are recommended.[60–62,68] An example checklist is provided in Appendix IV.

Evidence level 1+

7.2 What are the risks and benefits of planned VBAC versus ERCS from 39^{+0} weeks of gestation?

Women should be made aware that successful VBAC has the fewest complications and therefore the chance of VBAC success or failure is an important consideration when choosing the mode of delivery.

B

Women should be made aware that the greatest risk of adverse outcome occurs in a trial of VBAC resulting in emergency caesarean delivery.

B

Women should be informed that planned VBAC is associated with an approximately 1 in 200 (0.5%) risk of uterine rupture.

B

Women should be informed that the absolute risk of birth-related perinatal death associated with VBAC is extremely low and comparable to the risk for nulliparous women in labour.

C

Women should be informed that ERCS is associated with a small increased risk of placenta praevia and/or accreta in future pregnancies and of pelvic adhesions complicating any future abdominopelvic surgery.

C

The risk of perinatal death with ERCS is extremely low, but there is a small increase in neonatal respiratory morbidity when ERCS is performed before 39^{+0} weeks of gestation. The risk of respiratory morbidity can be reduced with a preoperative course of antenatal corticosteroids.

C

The maternal and fetal risks of planned VBAC and ERCS from 39^{+0} weeks of gestation are summarised in Table 1.

Planned VBAC adverse maternal outcomes

Uterine rupture

The NICHD study[18] showed that planned VBAC, compared with ERCS, had a higher risk of uterine rupture (0.7% versus 0%). The US Agency for Healthcare Research and Quality (AHRQ) meta-analysis and studies from the UK, Australia and Ireland reported a VBAC uterine rupture risk of 0.5%,[9] 0.2%,[20] 0.33%[22] and 0.2%[73] respectively. Rates of uterine rupture differ according to whether VBAC labour is spontaneous (0.15–0.4%), induced (0.54–1.4%) or augmented (0.9–1.91%)[18,20,22] (Appendix V). In the UK cohort study, two women with uterine rupture died (uterine rupture case fatality 1.3%, 95% CI 0.2–4.5%).[20]

Evidence level 2–

Table 1. Risks and benefits of opting for VBAC versus ERCS from 39^{+0} weeks of gestation

	Planned VBAC	ERCS from 39^{+0} weeks
Maternal outcomes	• 72–75% chance of successful VBAC. If successful, shorter hospital stay and recovery.	• Able to plan a known delivery date in select patients. This may however change based on circumstances surrounding maternal and fetal wellbeing in the antenatal period.
	• Approximately 0.5% risk of uterine scar rupture. If occurs, associated with maternal morbidity and fetal morbidity/mortality.	• Virtually avoids the risk of uterine rupture (actual risk is extremely low: less than 0.02%).
		• Longer recovery.
		• Reduces the risk of pelvic organ prolapse and urinary incontinence in comparison with number of vaginal births (dose–response effect) at least in the short term.[69]
		• Option for sterilisation if fertility is no longer desired. Evidence suggests that the regret rate is higher and that the failure rate from sterilisation associated with pregnancy may be higher than that from an interval procedure. If sterilisation is to be performed at the same time as a caesarean delivery, counselling and agreement should have been given at least 2 weeks prior to the procedure.[70]
	• Increases likelihood of future vaginal birth.	• Future pregnancies – likely to require caesarean delivery, increased risk of placenta praevia/accreta and adhesions with successive caesarean deliveries/ abdominal surgery.
	• Risk of anal sphincter injury in women undergoing VBAC is 5% and birthweight is the strongest predictor of this. The rate of instrumental delivery is also increased up to 39%.[71]	
	• Risk of maternal death with planned VBAC of 4/100 000 (95% CI 1/100 000 to 16/100 000).[9]	• Risk of maternal death with ERCS of 13/100 000 (95% CI 4/100 000 to 42/100 000).[9]
Infant outcomes	• Risk of transient respiratory morbidity of 2–3%.	• Risk of transient respiratory morbidity of 4–5% (6% risk if delivery performed at 38 instead of 39 weeks). The risk is reduced with antenatal corticosteroids, but there are concerns about potential long-term adverse effects.[72]
	• 10 per 10 000 (0.1%) prospective risk of antepartum stillbirth beyond 39^{+0} weeks while awaiting spontaneous labour (similar to nulliparous women).	
	• 8 per 10 000 (0.08%) risk of hypoxic ischaemic encephalopathy (HIE).	• < 1 per 10 000 (< 0.01%) risk of delivery-related perinatal death or HIE.
	• 4 per 10 000 (0.04%) risk of delivery-related perinatal death. This is comparable to the risk for nulliparous women in labour.	

The estimates of risk for adverse maternal or fetal events in VBAC are based on women receiving continuous electronic monitoring during their labour.

Hysterectomy and other morbidities

The rates of hysterectomy, thromboembolic disease, transfusion and endometritis did not differ significantly between planned VBAC and ERCS according to the AHRQ meta-analysis[9] and another meta-analysis.[74] However, the NICHD study showed unsuccessful compared with

Evidence level 2+

successful VBAC increased the risk of uterine rupture (2.3% versus 0.1%), hysterectomy (0.5% versus 0.1%), transfusion (3.2% versus 1.2%) and endometritis (7.7% versus 1.2%).[18] Meta-analysis has shown that hysterectomy was required in 14–33% of uterine rupture cases.[9]

Evidence level 2+

A review of Maternal-Fetal Medicine Units Network publications[75] suggests that, at term, women undergoing VBAC as compared with ERCS have a significantly greater incidence of blood transfusion (2% versus 1%), but the likelihood of hysterectomy is not increased.

Evidence level 3

Planned VBAC adverse perinatal outcomes

Antepartum stillbirth

Planned VBAC is associated with an additional 10 per 10 000 prospective risk of antepartum stillbirth beyond 39^{+0} weeks of gestation (recommended timing for ERCS delivery) while awaiting spontaneous labour.[76] The pathophysiology of the increased risk of stillbirth associated with VBAC is unexplained, but this increased risk is evident in women with previous caesarean delivery compared with no prior caesarean delivery despite correcting for gestation and other factors.[76,77]

Evidence level 2–

Delivery-related perinatal death

In the NICHD study, planned VBAC is associated with a 4 per 10 000 risk of term perinatal death (i.e. intrapartum stillbirth or neonatal death), with around one-third (1.4 per 10 000 overall) of deaths due to uterine rupture.[18] In contrast, ERCS is associated with a risk of delivery-related perinatal death of 1 per 10 000 or less. The risk of perinatal death arising from uterine rupture during VBAC was reported as 4.5% in a Dutch population study[23] and 2–16% in the AHRQ meta-analysis.[9]

Evidence level 2–

Neonatal hypoxic ischaemic encephalopathy (HIE)

In the NICHD study, HIE affected 8 per 10 000 planned VBACs and, of these, 60% of cases (7/12) were due to uterine rupture.[18]

Evidence level 2+

ERCS and adverse maternal and perinatal outcomes

Maternal mortality

Both the NICHD[18] study and AHRQ[9] meta-analysis showed an increased risk of maternal mortality with ERCS compared with planned VBAC (13/100 000 versus 4/100 000),[9] although data were conflicting on whether the differences were statistically significant. Absolute risks are extremely low for either mode of delivery.

Evidence level 1–

Neonatal respiratory morbidity

ERCS compared with planned VBAC increased the risks of transient tachypnoea of the newborn (4–5% versus 2–3%) and respiratory distress syndrome (0.5% versus less than 0.05%).[9,18,78–81] The Antenatal Steroids for Term Elective Caesarean Section (ASTECS) trial[82] reported that respiratory morbidity was 11.4%, 6.2% and 1.5% at 37, 38 and 39 weeks of gestation respectively.

Evidence level 2+

Long-term outcomes of planned VBAC versus ERCS

There are no data reporting on long-term maternal or infant outcomes of planned VBAC versus ERCS cohort groups.[9] There are considerable data to show that repeated ERCS is associated with an increased risk of placenta praevia, placenta accreta and surgical complications at the time of subsequent pregnancy and delivery, such as hysterectomy.[11–13,44,45,52,53]

Evidence level 2–

Perinatal outcomes of planned VBAC versus ERCS

The NICHD observational study showed that there was around a three-fold increase (0.38% versus 0.13%, OR 2.90, 95% CI 1.74–4.81) for one or more serious composite adverse perinatal outcomes (which include perinatal mortality and HIE) for planned VBAC at term compared with ERCS. Another prospective cohort study in Australia used a broader composite of adverse

Evidence level 2–

perinatal outcomes (perinatal mortality, HIE, neonatal intensive care unit admission, neonatal acidosis, birth trauma, neonatal sepsis) and also found an approximately three-fold risk for women attempting VBAC.[19]

Evidence level 2–

A review of Maternal-Fetal Medicine Units Network publications[75] suggests that, at term, in women undergoing VBAC as compared with ERCS, there were similar rates of neonatal seizures and perinatal mortality.

Evidence level 3

Summary of outcomes of planned VBAC versus ERCS

A reasonable summary of the evidence is that planned VBAC exposes the woman to a very low (0.25%) additional risk for experiencing perinatal mortality or serious neonatal morbidity and an additional 1.5% risk of any significant morbidity compared with opting for ERCS from 39^{+0} weeks of gestation. Nevertheless, it may be helpful to emphasise to women that the absolute risk of delivery-related perinatal death associated with VBAC is extremely low (4 per 10 000 [0.04%]) and comparable to the risk for nulliparous women in labour.[83,84]

Evidence level 2+

Cochrane reviews[85–87] suggest that there are benefits and risks associated with planned ERCS and planned induction of labour in women with a prior caesarean delivery. There is a paucity of randomised controlled trials that would provide the most reliable evidence and help women to make an informed choice. The related evidence for the established care pathways is potentially biased, as it is drawn from nonrandomised studies. Hence, the results and conclusions should be interpreted with caution and the uncertainties should be discussed with women.

Evidence level 1++

7.3 What is the likelihood of VBAC success?

Women should be informed that the success rate of planned VBAC is 72–75%.

C

Meta-analysis[88,89] (n = 103 188 VBAC labours) reported a pooled VBAC labour success rate of 74% (95% CI 72–75%), while the NICHD study reported a 73% VBAC labour success rate (n = 17 898 VBAC labours). A recent Australian cohort trial reported a VBAC success rate of 43% (535/1237 planned VBAC at 37 weeks), although excluding those women who required elective caesarean after opting for VBAC, the study showed a VBAC success rate of 59% (535/903 VBAC labours).[19] There are often differences in VBAC success rates between centres and published studies, so consideration should be given to counselling women using locally derived VBAC success rates given the pragmatic differences in population, induction/non-induction VBAC policies and healthcare provision.

Evidence level 2+

7.4 What factors determine the individualised likelihood of VBAC success?

Women with one or more previous vaginal births should be informed that previous vaginal delivery, particularly previous VBAC, is the single best predictor of successful VBAC and is associated with a planned VBAC success rate of 85–90%. Previous vaginal delivery is also independently associated with a reduced risk of uterine rupture.

C

Several pre-admission- and admission-based multivariate models have been published to predict the individualised likelihood of VBAC success.[90–93] Importantly, women at increased risk of unsuccessful VBAC are also at increased risk of uterine rupture, including catastrophic rupture leading to perinatal death.[92,94–96] Research is exploring the value of transvaginal/transabdominal ultrasonographic assessment of myometrial scar thickness to predict VBAC success and uterine scar rupture (see section 6.4).[57,59,97–99] Although prediction models ought to be intuitively beneficial, such models have not been routinely applied in the decision-making process and their precise role is yet to be established. A 2013 meta-analysis of these studies has concluded that further prospective research is required.[59]

Evidence level 2–

A VBAC score[100] has been used by some authors to predict the success of women attempting VBAC. The retrospective VBAC score was created by examining five features: admission Bishop score, age, previous caesarean delivery indication, body mass index (BMI) and previous vaginal birth. The higher the VBAC score, the higher the success rate; the success rate of women with a VBAC score of more than 16 was greater than 85%, in contrast to those with a VBAC score of 10 who had a 49% success rate.

Evidence level 2–

The use of specific population-based models to predict VBAC success needs further data,[101,102] although initial results are promising.

Evidence level 2+

Induced labour, no previous vaginal delivery, BMI greater than 30 and previous caesarean for labour dystocia are associated with an increased risk of unsuccessful VBAC. If all of these factors are present, successful VBAC is achieved in 40% of cases.[18,103]

Previous vaginal delivery, particularly previous successful VBAC, is the single best predictor for successful VBAC and is associated with a planned VBAC success rate of 85–90%.[103] Previous vaginal delivery is also independently associated with a reduced risk of uterine rupture.[54,96,104,105] Greater maternal height, maternal age less than 40 years, BMI less than 30, gestation of less than 40 weeks and infant birthweight less than 4 kg (or similar/lower birthweight than index caesarean delivery[106]) are associated with an increased likelihood of successful VBAC.[90,93,107–110] In addition, spontaneous onset of labour, vertex presentation, fetal head engagement or a lower station, and higher admission Bishop score also increase the likelihood of successful VBAC.[91,94,103,108,111] Successful VBAC is more likely among women with previous caesarean for fetal malpresentation (84%) compared with women with previous caesarean for either labour dystocia (64%) or fetal distress (73%) indications.[18,103] Younger women and those of white ethnicity experienced the highest success rate, in contrast to women of black ethnicity who experienced a lower success rate. Those who had an emergency caesarean delivery in their first birth also had a lower VBAC success rate, in particular those who experienced a failed induction of labour.[112] Despite a degree of data inconsistency, successful VBAC appears more likely among women with previous caesarean for dystocia at 8 cm or more compared with women with previous caesarean for dystocia at less than 8 cm.[113–115] A retrospective study concluded that the success rate for VBAC in women who had a prior caesarean delivery due to an unsuccessful instrumental delivery was high (61.3%). The risk factors that were associated with a failed VBAC in these women were occiput posterior position and prolonged second stage as the indication for instrumental vaginal delivery in the index pregnancy, maternal age older than 30 years at the time of subsequent delivery and a birthweight in the subsequent pregnancy that is higher than the birthweight in the index pregnancy. This information and the risk factors for VBAC failure can be used when counselling these women regarding mode of delivery in subsequent pregnancy.[116]

Evidence level 2–

8. Intrapartum management of planned VBAC

8.1 What delivery setting is appropriate for conducting planned VBAC?

Women should be advised that planned VBAC should be conducted in a suitably staffed and equipped delivery suite with continuous intrapartum care and monitoring with resources available for immediate caesarean delivery and advanced neonatal resuscitation. ✓

Women with an unplanned labour and a history of previous caesarean delivery should have a discussion with an experienced obstetrician to determine feasibility of VBAC. ✓

Epidural analgesia is not contraindicated in a planned VBAC, although an increasing requirement for pain relief in labour should raise awareness of the possibility of an impending uterine rupture. D

Women should be advised to have continuous electronic fetal monitoring for the duration of planned VBAC, commencing at the onset of regular uterine contractions. D

There should be continuous monitoring of the labour to ensure prompt identification of maternal or fetal compromise, labour dystocia or uterine scar rupture. Consequently, all women in established VBAC labour should receive:

- supportive one-to-one care
- intravenous access with full blood count and blood group and save
- continuous electronic fetal monitoring
- regular monitoring of maternal symptoms and signs
- regular (no less than 4-hourly) assessment of their cervicometric progress in labour.

For all labours, a meta-analysis showed that epidural analgesia increased the risk of second stage delay and operative instrumental vaginal delivery.[117] It is appropriate to consider early placement of the epidural catheter so that it can be used later for labour analgesia or for anaesthesia should an operative delivery become necessary.[118]

One study (NICHD[103]) suggested that planned VBAC success rates were higher among women receiving epidural analgesia; two other studies reported the opposite finding.[23,54] A recent case–control study showed frequent epidural dosing to be an independent risk factor for impending uterine rupture in VBAC labour.[119] The increasing pain and analgesia requirement that is likely to precede uterine rupture may explain the association between uterine rupture and increasing epidural dosing in VBAC labour that progresses to uterine rupture. Evidence level 3

The presence of any of the features in the list below is suggestive of uterine rupture. Abnormal cardiotocography (CTG) is the most consistent finding in uterine rupture and is present in 66–76% of these events. However, over half of cases present with a combination of findings (most often abnormal CTG and abdominal pain).[20,23,120] The diagnosis is made at emergency caesarean delivery or postpartum laparotomy. Most uterine ruptures (more than 90%) occur during labour (the peak incidence being at 4–5 cm cervical dilatation), with around 18% occurring in the second stage of labour and 8% being identified post vaginal delivery.[23]

The clinical features associated with uterine scar rupture include:

- abnormal CTG
- severe abdominal pain, especially if persisting between contractions
- acute onset scar tenderness
- abnormal vaginal bleeding
- haematuria
- cessation of previously efficient uterine activity
- maternal tachycardia, hypotension, fainting or shock
- loss of station of the presenting part
- change in abdominal contour and inability to pick up fetal heart rate at the old transducer site.

The risk of uterine rupture in an unscarred uterus is extremely rare at 2 per 10 000 (0.02%) deliveries and this risk is mainly confined to multiparous women in labour.[20,23,121] The risk of uterine rupture in planned VBAC is approximately 20–50 per 10 000 (0.2–0.5%) and in ERCS the risk is 2 per 10 000 (0.02%) (Appendix V).[9,20,22,73] Early diagnosis of uterine scar dehiscence or rupture followed by expeditious laparotomy and neonatal resuscitation are essential to reduce associated morbidity and mortality. An observational study indicated a potential upper limit for nonhypoxic neonatal delivery of 18 minutes from suspected uterine rupture to delivery.[122] It is important to note that scar dehiscence may be asymptomatic in up to 48% of Evidence level 3

women, and the classic triad of a complete uterine rupture (pain, vaginal bleeding, fetal heart rate abnormalities) may present in less than 10% of cases.[123]

Evidence level 3

8.2 How should women with a previous caesarean birth be advised in relation to induction or augmentation of labour?

Women should be informed of the two- to three-fold increased risk of uterine rupture and around 1.5-fold increased risk of caesarean delivery in induced and/or augmented labour compared with spontaneous VBAC labour.

D

A senior obstetrician should discuss the following with the woman: the decision to induce labour, the proposed method of induction, the decision to augment labour with oxytocin, the time intervals for serial vaginal examination and the selected parameters of progress that would necessitate discontinuing VBAC.

✓

Clinicians should be aware that induction of labour using mechanical methods (amniotomy or Foley catheter) is associated with a lower risk of scar rupture compared with induction using prostaglandins.

D

Although induction and augmentation are not contraindicated in women with previous caesarean delivery, there remains considerable disagreement among clinicians on their use. Induction (particularly in women with an unfavourable cervix or by prostaglandin method) or augmentation of VBAC labour are associated with a two- to three-fold increased risk of uterine rupture and around a 1.5-fold increased risk of caesarean delivery compared with spontaneous VBAC labour (Appendix V). Studies evaluating oxytocin use in VBAC labour have not recorded the indication for oxytocin use. However, it would seem plausible to assume that uterine rupture would be more likely to occur if oxytocin was used to overcome delayed progress when uterine activity appeared to be adequate (appropriate strength/frequency uterine contractions) compared with when uterine activity was absent or inadequate (infrequent/weak strength contractions). Furthermore, a case–control study has shown that utilising higher dose oxytocin (exceeding 20 milliunits/minute) during VBAC augmentation increases the risk of uterine rupture by four-fold or greater.[124,125]

Evidence level 3

The decision to induce or augment VBAC labour should be determined following careful obstetric assessment and be made by senior obstetricians in consultation with the women. As part of informed consent, women should be made aware of the increased risks (uterine rupture and emergency caesarean delivery) associated with induction and/or augmentation of VBAC labour, and of the alternative option of caesarean delivery. Women who are contemplating many future pregnancies may be prepared to accept the additional risks associated with induction and/or augmentation in an effort to avoid the potential long-term surgical risks associated with multiple repeat caesarean deliveries.

Women with previous caesarean delivery who have not previously given birth vaginally and those who have labour induced with prostaglandins are at increased risk of uterine rupture and the same two factors are associated with an increased risk of perinatal death due to uterine rupture.[105] In the NICHD study,[18] prostaglandin induction compared with non-prostaglandin induction (e.g. amniotomy or intracervical Foley catheter) was associated with a higher uterine rupture risk (87 per 10 000 [0.87%] versus 29 per 10 000 [0.29%]) and a higher risk of perinatal death due to uterine rupture (11.2 per 10 000 [0.11%] versus 4.5 per 10 000 [0.045%]). Hence, careful consideration should be given to using prostaglandins and, if prostaglandins are to be used, to restricting the dose of total prostaglandin exposure in accordance with locally agreed guidelines, or considering another method of induction, such as an intracervical Foley catheter.[126]

Evidence level 3

Two retrospective studies[127,128] have suggested that low-dose prostaglandin E_2 is a safe option for induction of labour in women undergoing VBAC, with no appreciable increase in rates of uterine rupture or maternal and perinatal mortality when compared with women undergoing a spontaneous VBAC. However, a Cochrane review[129] suggested that there is insufficient evidence from randomised controlled trials to determine the lowest risk method of induction of labour with a previous caesarean delivery.

Evidence level 2–

9. Planning and conducting ERCS

9.1 What elements are involved in the perioperative, intraoperative and postoperative care for ERCS?

ERCS delivery should be conducted after 39^{+0} weeks of gestation. A

Antibiotics should be administered before making the skin incision in women undergoing ERCS. B

All women undergoing ERCS should receive thromboprophylaxis according to existing RCOG guidelines. ✓

Early recognition of placenta praevia, adopting a multidisciplinary approach and informed consent are important considerations in the management of women with placenta praevia and previous caesarean delivery. ✓

Recommended practice relating to planning and conducting ERCS is provided in the NICE caesarean section guideline.[6] In addition to standard perioperative measures for conducting ERCS, there are further specific issues that warrant discussion.

Women considering ERCS should be counselled that delaying delivery by 1 week from 38^{+0} to 39^{+0} weeks enables around a 5% reduction (6% versus 1%) in the risk of respiratory morbidity (particularly reducing the risk of transient tachypnoea of the newborn),[78–81,130] but this delay may be associated with a 5 per 10 000 (0.05%) increase in the risk of antepartum stillbirth.[76] Should there be a need to perform ERCS prior to 39 weeks, consideration should be given to administering maternal corticosteroids.[6,130] A randomised controlled trial demonstrated a 50% reduction in respiratory morbidity by administering prophylactic betamethasone to women having elective caesarean deliveries beyond 37^{+0} weeks (steroid versus control 2.4% versus 5.1%; relative risk 0.46, 95% CI 0.23–0.93) and this treatment effect was still apparent at 39^{+0} weeks of gestation (steroid versus control, 0.6% versus 1.5%).[82]

However, the current RCOG Green-top Guideline on antenatal corticosteroids[130] raises a caution that there is 'an absence of evidence available for the safety of antenatal corticosteroids in babies born after 36^{+0} weeks of gestation'; some research suggests the existence of potential long-term adverse effects in infants of mothers who received antenatal corticosteroids.[72,131] A follow-up study from the trial of steroids prior to term caesarean delivery demonstrated no long-term benefit of steroids, but found that glucocorticoid-exposed children were twice as likely to be identified as being in the lowest achievement group at school compared with controls (33/186 [17.7%] versus 14/164 [8.5%] respectively, relative risk 2.1, 95% CI 1.1–3.7, P = 0.01).[132] These issues should be discussed with women prior to the use of steroids and efforts should be directed to avoiding ERCS prior to 39^{+0} weeks rather than a more liberal use of earlier delivery and antenatal steroids.

Evidence level 1+

Perioperative preincision antibiotics achieve a greater reduction in the risk of maternal infection than prophylactic antibiotics administered after making the skin incision. No detrimental effects on the baby have been demonstrated. Ideally, the chosen antibiotic should protect against endometritis and urinary tract and wound infections: i.e. cefuroxime and metronidazole.[6]

Concerns about the use of co-amoxiclav in pregnancy were raised by the Overview of the Role of Antibiotics in Curtailing Labour and Early Delivery (ORACLE) studies, which demonstrated an increased incidence of necrotising enterocolitis when it was given in preterm prelabour rupture of membranes[133] and a nonsignificant increase when used during spontaneous preterm labour.[134] Extrapolating from these data, the NICE Guideline Development Group advise against its use as prophylaxis before skin incision or before cord clamping at the time of caesarean delivery, citing a hypothetical increased risk of necrotising enterocolitis by fetal exposure to co-amoxiclav.[135]

Evidence level 1+

The choice of method of thromboprophylaxis should be as per the RCOG guidance.[136]

The RCOG has published guidance on the diagnosis and management of placenta praevia in association with a caesarean delivery and placenta accreta[45] and its recommendations should be followed in women with a previous caesarean delivery and placenta praevia.

Evidence level 4

10. How should women in special circumstances be cared for?

Clinicians should be aware that there is uncertainty about the safety and efficacy of planned VBAC in pregnancies complicated by post-dates, twin gestation, fetal macrosomia, antepartum stillbirth or maternal age of 40 years or more. Hence, a cautious approach is advised if VBAC is being considered in such circumstances.

✓

Women who are preterm and considering the options for birth after a previous caesarean delivery should be informed that planned preterm VBAC has similar success rates to planned term VBAC but with a lower risk of uterine rupture.

B

41^{+0} weeks of gestation

The NICE induction of labour guideline recommends induction of labour from 41^{+0} weeks as this reduces perinatal mortality without an increase in caesarean delivery rates.[137] There are no adequate data to recommend whether such an approach is equally valid in women with previous caesarean delivery. The risk of stillbirth at or after 39 weeks is between 1.5- and two-fold higher in women with previous caesarean delivery compared with women without previous caesarean delivery (absolute risks 11 per 10 000 [0.11%] versus 5 per 10 000 [0.05%]).[76] Hence, the reduction in risk of perinatal death that occurs by delivering from 41 weeks is likely to be greater among women with previous caesarean delivery. However, in such women, induction of labour compared with spontaneous labour is associated with increased risks of emergency caesarean delivery (by 1.5-fold) and uterine scar rupture (by two- to three-fold).

Evidence level 3

A reasonable approach would be for women who planned VBAC to have a review by a senior obstetrician at 41^{+0} weeks of gestation if spontaneous onset of labour has not ensued (Appendix II). Such a review should assess her likelihood of successful VBAC (for example, favourable cervix, previous vaginal birth, absence of any obstetric or fetal complications), her understanding of the increased maternal and perinatal risks if induction is chosen, her preference for membrane sweep, spontaneous VBAC, induced (amniotomy or prostaglandin) VBAC or ERCS, and her future reproductive preferences. In practice, this may mean scheduling a 'provisional ERCS' at around 40^{+10} weeks and converting to induction of labour depending on further clinical and cervical assessment at 40^{+10} weeks.

Twin gestation

Various studies, including the NICHD study (n = 186 twin pregnancies)[138] and three US retrospective studies (n = 535,[139] n = 1850,[140] n = 25[141] twin pregnancies), have reported similar successful rates of VBAC in twin pregnancies (45–84%) to those in singleton pregnancies.

Evidence level 3

Suspected fetal macrosomia

In relation to VBAC labour, birthweight of 4 kg or more is associated with an increased risk of uterine rupture (OR 2.62, 95% CI 1.001–6.85), unsuccessful VBAC (OR 2.47, 95% CI 1.82–3.34), shoulder dystocia (OR 25.13, 95% CI 9.31–67.86) and third- and fourth-degree perineal laceration (OR 2.64, 95% CI 1.66–4.19).[110] For women with no prior vaginal delivery undergoing VBAC labour when neonatal birthweight was 4 kg or higher, the VBAC success rate was reported as less than 50% and the uterine rupture rate was 3.6%.[142] A subgroup analysis of the NICHD study showed that, among women with previous caesarean delivery for dystocia, greater birthweight in the subsequent planned VBAC labour (relative to the first birthweight) was associated with a decreased likelihood of successful VBAC.[108] However, third trimester ultrasound is a poor predictor of macrosomia in decision making regarding VBAC.

Evidence level 2–

Antepartum stillbirth

Women with an antepartum stillbirth and a previous caesarean delivery undergo labour with a high VBAC success rate (87%). The care of these women should be in line with national guidelines.[143] However, because a proportion of cases required induction and/or augmentation, one study reported a uterine rupture rate of 2.4%.[144]

Evidence level 3

Maternal age of 40 years or more

Maternal age of 40 years or more is an independent risk factor for stillbirth[145] and unsuccessful VBAC.[103,146,147] Published advice suggests consideration of delivery of women aged 40 years or more by 39^{+0}–40^{+0} weeks to reduce the risk of adverse perinatal outcome (particularly stillbirth).[145] However, given the likely additive effects of previous caesarean delivery and raised maternal age on the risk of stillbirth, careful consideration should be given to the timing of the delivery in women aged 40 years or above who plan VBAC. There is insufficient evidence to recommend optimum timing of delivery in this subgroup of women.

Evidence level 4

Preterm VBAC

The NICHD study showed planned VBAC success rates for preterm and term pregnancies were similar (72.8% versus 73.3%). However, the rates of uterine rupture (34 per 10 000 versus 74 per 10 000 respectively) and dehiscence (26 per 10 000 versus 67 per 10 000 respectively) were significantly lower in preterm compared with term VBAC.[148] Perinatal outcomes were similar with preterm VBAC and preterm ERCS.

Evidence level 2–

11. Recommendations for future research

- Development, validation and pragmatic clinical evaluation of an antenatal- and/or intrapartum-based scoring system to identify women at high or low risk of unsuccessful VBAC.
- Determine the clinical value of antenatal and intrapartum ultrasound to predict the likelihood of successful VBAC or uterine rupture using specific (e.g. ultrasonographically measured myometrial scar thickness) or combination parameters.
- Investigate the aetiology and prevention (e.g. specific antenatal monitoring strategies, timing of delivery) of the increased risk of stillbirth in women with previous caesarean delivery in the presence or absence of other previous complications (e.g. pre-eclampsia, preterm delivery, small for gestational age).
- Investigate cervicometric progress in VBAC labour and determine the value of timing interventions to maximise VBAC success and minimise uterine rupture.
- Research into factors that may explain the regional and unit-based variation in uptake of VBAC and the factors that impact most on women accepting or declining VBAC (e.g. patient information

leaflet, previous childbirth experiences, desired family size, understanding the risk analysis during counselling, how to reduce any decisional conflict, variation in case mix).
- Investigate the use of mechanical dilators for induction of VBAC labour.

12. Auditable topics

- Documented discussion of risks and benefits of VBAC versus ERCS/use of VBAC checklists (100%).
- Proportions of women experiencing successful versus unsuccessful spontaneous and induced planned VBAC (particularly with reference to the induction method).
- 100% reporting of serious maternal (e.g. uterine rupture, peripartum hysterectomy, mortality) and neonatal (e.g. antepartum stillbirth, HIE, intrapartum and neonatal mortality) morbidity/mortality consequent to VBAC versus ERCS via a local incident reporting system.
- Effectiveness of antenatal screening for placenta praevia and accreta, including frequency of 'missed' antenatal diagnoses against locally agreed standards.
- Use of continuous electronic fetal monitoring during VBAC labour (100%).
- Documentation of senior obstetrician involvement in induction and augmentation of VBAC labour (100%).

13. Useful links and support groups

- Caesarean Birth and VBAC Information [http://caesarean.org.uk].
- Royal College of Obstetricians and Gynaecologists. *Birth after a caesarean section: Information for you*. London: RCOG; 2015.

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Appendix I: Definitions of terms

Planned VBAC	Planned VBAC (vaginal birth after previous caesarean delivery) refers to the intended mode of delivery of any woman who has experienced a prior caesarean birth who plans to deliver vaginally rather than by elective repeat caesarean section (ERCS).
Successful and unsuccessful planned VBAC	A vaginal delivery (spontaneous or assisted) in a woman undergoing planned VBAC indicates a **successful** VBAC. Delivery by emergency caesarean during the labour indicates an **unsuccessful** VBAC.
Uterine rupture	Disruption of the uterine muscle extending to and involving the uterine serosa or disruption of the uterine muscle with extension to the bladder or broad ligament.
Uterine dehiscence	Disruption of the uterine muscle with intact uterine serosa.
Perinatal mortality	Combined number of stillbirths (antepartum and intrapartum) and neonatal deaths between 20 weeks of gestation and 28 days of life per 10 000 live births and stillbirths. Perinatal mortality rate will exclude deaths due to fetal malformation unless otherwise stated.
Term delivery-related perinatal death	Term delivery-related perinatal death is defined as the combined number of intrapartum stillbirths and neonatal deaths per 10 000 live births and stillbirths at or beyond 37^{+0} weeks of gestation. Birth-related perinatal mortality rates exclude antepartum stillbirths and deaths due to fetal malformation unless otherwise stated.
Neonatal respiratory morbidity	Combined rate of transient tachypnoea of the newborn and respiratory distress syndrome.

Appendix II: Example of a schedule of antenatal care

12^{+0} weeks	Provision of **written patient information** on delivery options (VBAC and ERCS).
18–21^{+0} weeks	**Ultrasonographer** to perform midtrimester scan for fetal anomaly and placental localisation. Reschedule ultrasound at 32–34 weeks for women identified to have a low-lying placenta with a history of previous caesarean delivery.
21–28 weeks	**Antenatal counselling appointment** for women with uncomplicated singleton pregnancies and single previous lower segment caesarean delivery. Documented counselling of risks and benefits of VBAC versus ERCS (facilitated by use of decision aid, pro forma or checklist). A review of the previous caesarean delivery, with access to the woman's previous obstetric medical record, should take place. Counselling should be undertaken by member(s) of the maternity team. **Midwifery review** for all pregnant women. Undertake routine reviews and completion of 28-week screening tests (e.g. full blood count, ABO rhesus D group status, administration of anti-D if appropriate).
32–34 weeks	**Obstetrician-led assessment** of women with previous caesarean delivery who are identified to have a low-lying placenta at 32–34-week obstetric ultrasound. The aim is to provide adequate time for investigation and management of possible placenta accreta. **Midwifery review** for women with normally sited placenta. Establish woman's preference for planned VBAC or ERCS and ensure suitability for planned VBAC (i.e. cephalic presentation, no other obstetric complications).
By 36 weeks	**Obstetrician-led assessment** to determine mode of delivery for women who opted for ERCS, are undecided on mode of delivery or have complicating obstetric and medical disorders (e.g. multiple pregnancy, delivery of a macrosomic infant [birthweight of 4 kg or more], small for gestational age and/or fetal growth restriction, pre-eclampsia). **Midwifery review** to confirm suitability and maternal preference for planned VBAC (i.e. woman understands all risks/benefits, has normally grown fetus with cephalic presentation, no other obstetric complications).
After 39 weeks	**Performing ERCS** If ERCS is required prior to 39^{+0} weeks for obstetric or medical indications then prophylactic antenatal corticosteroids may be considered to reduce the risk of neonatal respiratory morbidity (transient tachypnoea of the newborn, respiratory distress syndrome). However, concerns regarding the long-term safety should be discussed with the mother.
41^{+0} weeks	**Senior obstetrician-led assessment** for women who had opted for planned VBAC but have not gone into spontaneous labour. Risks and benefits of various options are discussed and documented. Options include membrane sweep, prostaglandin, amniotomy or Foley catheter induction of labour, ERCS or expectant management.

Appendix III: Clinical management of pregnant women who have had one or more caesarean birth(s)

Management of pregnant women who have one or more caesarean birth(s)
Any contraindications to VBAC
● Placental localisation – exclude praevia ± accreta.
● Review previous record and operative notes.
● Medical or obstetric conditions that preclude VBAC.
Antenatal counselling and shared decision-making process
● Explain risks and benefits of planned VBAC versus ERCS, including the individualised likelihood of VBAC success.
❍ For example, women with previous vaginal births should be informed that previous vaginal delivery, particularly previous VBAC, is the single best predictor of successful VBAC and is associated with planned VBAC success rates of 85–90%.
❍ Greater maternal height, maternal age less than 40 years, BMI less than 30, gestation of less than 40 weeks and infant birthweight less than 4 kg (or similar/lower birthweight to/than index caesarean delivery) are associated with an increased likelihood of successful VBAC.
❍ In addition, spontaneous onset of labour, vertex presentation, fetal head engagement or a lower station, and higher admission Bishop score also increase the likelihood of successful VBAC.
❍ Successful VBAC is more likely among women with prior caesarean for fetal malpresentation (84%).
● Elicit maternal choice for mode of delivery and how it fits with future reproductive preferences.
Intrapartum care for VBAC
● Delivery setting, monitoring, analgesia.
● Recognising failure to progress and/or uterine rupture.
● Caution if induction and/or augmentation is/are considered necessary.
Intrapartum care for ERCS
● Preferred gestational timing to conduct caesarean (from 39^{+0} weeks).
● Perioperative management.
Management of women in special circumstances
● VBAC in the presence of high-risk obstetric factors.

Appendix IV: Birth choices after caesarean delivery pathway

Likelihood of	Overall	Tick when discussed
Successful VBAC (one previous caesarean delivery, no previous vaginal birth)	3 out of 4 or 72–75%	☐
Successful VBAC (one previous caesarean delivery, at least one previous vaginal birth)	Almost 9 out of 10 or up to 85–90%	☐
Unsuccessful VBAC more likely in:		☐
Induced labour, no previous vaginal delivery, body mass index (BMI) greater than 30 and previous caesarean for labour dystocia. If all of these factors are present, successful VBAC is achieved in 40% of cases.		

Likelihood of	VBAC	ERCS	
	Maternal		
Uterine rupture	5 per 1000/0.5%	< 2 per 10 000/< 0.02%	☐
Blood transfusion	2 per 100/2%	1 per 100/1%	☐
Endometritis	No significant difference in risk		☐
Serious complications in future pregnancies	Not applicable if successful VBAC	Increased likelihood of placenta praevia/ morbidly adherent placenta	☐
Maternal mortality	4 per 100 000/0.004%	13 per 100 000/0.013%	☐
	Fetal/newborn		
Transient respiratory morbidity	2–3 per 100/2–3%	4–6 per 100/4–6% (risk reduced with corticosteroids, but there are concerns about potential long-term adverse effects)	☐
Antepartum stillbirth beyond 39^{+0} weeks while awaiting spontaneous labour	10 per 10 000/0.1%	Not applicable	☐
Hypoxic ischaemic encephalopathy (HIE)	8 per 10 000/0.08%	< 1 per 10 000/< 0.01%	☐

Information leaflet(s) provided: VBAC ☐ ERCS ☐ Other ☐

Discussed:

Continuous electronic fetal monitoring at the onset of regular uterine contractions	☐
Birth on the labour suite	☐
Need for intravenous (IV) access in labour	☐

Comments:

Management plan in the event of:						
Preterm labour (< 37^{+0} weeks)	☐ VBAC	☐ Emergency caesarean delivery				
Spontaneous labour before ERCS date	☐ VBAC	☐ Caesarean delivery	☐ Depends on stage of labour – details below			
No spontaneous labour after 41 weeks – discussed with senior obstetrician	☐ Sweep	☐ Induction of labour (give details of agreed plan below)				☐ ERCS
Use of oxytocin in labour – discussed with senior obstetrician						
Details of induction of labour:						
ERCS booking details:						
Additional comments:						

Appendix V: VBAC success and uterine rupture risks of planned VBAC labours

		Spontaneous	Induced	Augmented
AHRQ meta-analysis[9]	VBAC success	*74% (95% CI 72–75%)	63% (95% CI 59–67%)	68% (95% CI 64–72%)
	Uterine rupture	*0.47% (95% CI 0.28–0.68%)	1.2% (95% CI 0.7–1.9%)	1.1% (95% CI 0.9–1.5%)
NICHD study[18,103] (n = 17 898 VBACs)	VBAC success	80.6%	67.4%	73.9%
	Uterine rupture	0.36%	1.02%	0.87%
Australian population study[22] (n = 10 958 VBACs)	VBAC success	52.6%	51.4%	61.6%
	Uterine rupture	0.15%	0.68%	1.91%
UK Obstetric Surveillance System case–control study[20]	Uterine rupture	0.13%	0.36%	0.28%

*refers to overall rates when spontaneous, induced and augmented labours are combined, although the large majority of data are derived from spontaneous labour.

Appendix VI: Explanation of guidelines and evidence levels

Clinical guidelines are: 'systematically developed statements which assist clinicians and patients in making decisions about appropriate treatment for specific conditions'. Each guideline is systematically developed using a standardised methodology. Exact details of this process can be found in Clinical Governance Advice No.1 *Development of RCOG Green-top Guidelines* (available on the RCOG website at http://www.rcog.org.uk/green-top-development). These recommendations are not intended to dictate an exclusive course of management or treatment. They must be evaluated with reference to individual patient needs, resources and limitations unique to the institution and variations in local populations. It is hoped that this process of local ownership will help to incorporate these guidelines into routine practice. Attention is drawn to areas of clinical uncertainty where further research may be indicated.

The evidence used in this guideline was graded using the scheme below and the recommendations formulated in a similar fashion with a standardised grading scheme.

Classification of evidence levels

1++	High-quality meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a low risk of bias
1–	Meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a high risk of bias
2++	High-quality systematic reviews of case–control or cohort studies or high-quality case–control or cohort studies with a very low risk of confounding, bias or chance and a high probability that the relationship is causal
2+	Well-conducted case–control or cohort studies with a low risk of confounding, bias or chance and a moderate probability that the relationship is causal
2–	Case–control or cohort studies with a high risk of confounding, bias or chance and a significant risk that the relationship is not causal
3	Non-analytical studies, e.g. case reports, case series
4	Expert opinion

Grades of recommendations

A	At least one meta-analysis, systematic review or randomised controlled trial rated as 1++, and directly applicable to the target population; or A systematic review of randomised controlled trials or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2++ directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+
C	A body of evidence including studies rated as 2+ directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++
D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+

Good practice point

✓	Recommended best practice based on the clinical experience of the guideline development group

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All RCOG guidance developers are asked to declare any conflicts of interest. A statement summarising any conflicts of interest for this guideline is available from: https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg45/.

The final version is the responsibility of the Guidelines Committee of the RCOG.

The review process will commence in 2018, unless otherwise indicated.

