

CATEGORY: Best Practice Statement

Birth after previous caesarean section

This statement has been developed and reviewed by the Women's Health Committee and approved by the RANZCOG Board and Council.

A list of Women's Health Committee Members can be found in Appendix A.

Disclosure statements have been received from all members of this committee.

Disclaimer This information is intended to provide general advice to practitioners. This information should not be relied on as a substitute for proper assessment with respect to the particular circumstances of each case and the needs of any patient. This document reflects emerging clinical and scientific advances as of the date issued and is subject to change. The document has been prepared having regard to general circumstances.

First endorsed by RANZCOG: July 2010

Current: March 2019

Review due: March 2024

Objectives: To provide women who have previously given birth by caesarean section, their partners, doctors and midwives with information regarding the benefits and risks of their options for delivery, vaginal birth or repeat elective caesarean section.

Target audience: Health professionals providing maternity care.

Values: The evidence was reviewed by the Women's Health Committee (RANZCOG), and applied to local factors relating to Australia and New Zealand.

Background: This statement was first developed by Women's Health Committee in July 2010 and most recently reviewed in March 2019.

Funding: The development and review of this statement was funded by RANZCOG.

Contents

1. Terminology	3
2. Plain language summary	3
3. Summary of recommendations	4
4. Introduction	5
5. Discussion and recommendations	6
5.1 Past history and suitability for VBAC	6
5.2 Success rates	7
5.3 Benefits and risks of VBAC	8
5.4 Benefits and risks of elective repeat Caesarean section at 39 weeks	8
5.5 Uterine rupture	8
5.6 Perinatal mortality	10
5.7 Hypoxic Ischaemic Encephalopathy (HIE)	10
5.8 Risks associated with ERCS	10
5.9 Intrapartum recommendations	11
5.10 Induction and augmentation in labour	12
6. Special Circumstances	14
6.1 Trial of labour after more than one previous caesarean section	14
6.2 Twin Gestation	14
6.3 Mid-trimester delivery	14
7. Conclusion	15
Useful links used in the writing of this statement	15
Links to other College Statements	16
References	16
Appendices	20
Appendix A Maternal Morbidity of Women Who Had Caesarean Deliveries Without Labour ⁵⁹	20
Appendix B Outcomes of VBAC comparing patients with one previous caesarean section with those multiple previous caesarean sections	20
Appendix C Women's Health Committee Membership	21
Appendix D Overview of the development and review process for this statement	22
Appendix E Full Disclaimer	23

1. Terminology

- **VBAC:** Successful vaginal birth following labour in a woman who has had a prior Caesarean section delivery.
- **PLANNED VBAC:** Planned labour with a view to safe vaginal birth in a woman who has had a prior Caesarean section delivery. Also referred to by some authors as Trial of Labour (TOL) or Trial of Labour after Caesarean (TOLAC) or Next Birth after Caesarean (NBAC).
- **ERCS:** Elective repeat Caesarean section. Planned Caesarean section in a woman who has had one or more previous Caesarean sections.
- **PERINATAL MORTALITY:** The combined number of still births (antepartum and intrapartum) and neonatal deaths (death of a live infant from birth to the age of 28 days).
- **HYPOXIC ISCHAEMIC ENCEPHALOPATHY (HIE):** Neurological changes caused by lack of sufficiently oxygenated blood perfusing brain tissue resulting in compromised neurological function manifesting during the first few days after birth. HIE may be associated with multiple organs damaged by similar perfusion injuries.
- **NEONATAL RESPIRATORY MORBIDITY:** The combined rate of transient tachypnoea of the newborn (TTN) and respiratory distress syndrome (RDS).
- **UTERINE RUPTURE:** A disruption of the uterine muscle extending to and involving the uterine serosa or disruption of the uterine muscle with extension into bladder or broad ligament.
- **UTERINE SCAR DEHISCENCE:** A disruption of the uterine muscle with intact uterine serosa.
- **PLACENTA ACCRETA:** Densely adherent placenta due to abnormally deep invasion of the placenta into the uterine muscle and sometimes growing through the full thickness of the uterine wall to the outside of the uterus.
- **LUSCS:** Lower Uterine Segment Caesarean Section.
- **RCOG:** Royal College of Obstetricians and Gynaecologists.
- **ACOG:** American Congress of Obstetricians and Gynaecologists.
- **SOGC:** Society of Obstetricians and Gynaecologists of Canada.

2. Plain language summary

Many women will need to decide on the mode of birth for subsequent pregnancies after a caesarean section. Each option – either labour with a view to safe vaginal birth, or planned Caesarean section - has both potential risks and benefits. Each individual woman's preferences and risk profiles will be different. Involvement of the woman and her family in this decision making is strongly supported. Those who provide maternity care - doctors and midwives - need to provide women and their partners with accurate and relevant information.

It can be challenging to explain and understand the risk of complications which occur rarely, but with very serious consequences when they happen. Attempting vaginal birth after a previous Caesarean section carries the additional risk for mother and baby of uterine scar rupture, an event that occurs approximately five to seven times in every 1000 attempts. If this does occur, there is approximately a one in seven chance of serious adverse outcome (death or brain injury) for the baby. When repeat elective Caesarean section is chosen there are the risks associated with major surgery, and a commitment to future Caesarean delivery is likely. As the number of her previous Caesarean section deliveries increases, so does the risk of rare but

serious complications. The benefits and risks of each birth option and the factors affecting the chances of success for planned VBAC are discussed in this statement.

An agreed plan of management for birth should be made during a woman’s pregnancy and be documented in the medical record. Women who choose to labour with a view to the safest possible vaginal delivery should be managed in an obstetric unit with trained staff and the appropriate equipment to monitor the mother’s and fetus' wellbeing continuously throughout the labour, and has the facility to proceed to urgent Caesarean section if required. Epidural analgesia may be used.

Some special circumstances such as women who have had more than one caesarean section, twin pregnancy and induction of labour in mid trimester are discussed.

Further information regarding birth after previous caesarean section can be found at:

<https://www.ranzcog.edu.au/Womens-Health/Patient-Information-Guides/Patient-Information-Pamphlets>

3. Summary of recommendations

Recommendation	Grade
Early in the postnatal period following a primary Caesarean delivery, women should be offered the opportunity to be debriefed and to discuss their birth experience, as well as their potential suitability for planned VBAC in future pregnancies.	Consensus-based recommendation
Recommendation 2	Grade
Women with a prior history of an uncomplicated lower segment Caesarean section, in an otherwise uncomplicated pregnancy, should be given the opportunity to discuss the birth options of planned VBAC or elective Caesarean section early in the course of their antenatal care.	Consensus-based recommendation
Recommendation 3	Grade
The risks and benefits of the birth options, considered in conjunction with an individual woman’s chances of success for VBAC, should be discussed with the patient and documented in the medical record. The provision of a patient information leaflet or other similar resource at the consultation is recommended.	Consensus-based recommendation
Recommendation 4	Grade
Respect should be given to the woman’s right to be involved in the decision making regarding mode of birth, considering her wishes, her perception of the risks and her plans for future pregnancies.	Consensus-based recommendation
Recommendation 5	Grade
Attempts should be made, where possible, to check the operative record of the previous Caesarean section, its indication and post-operative course.	Consensus-based recommendation
Recommendation 6	Grade
Women considering options for birth after a previous Caesarean section should be informed that ERCS may increase the risk of serious complications in future pregnancies.	Consensus-based recommendation
Recommendation 7	Grade
A final decision regarding mode of birth should be agreed between the woman and her obstetrician (and midwife where appropriate) before the expected/planned delivery date (ideally by 36 weeks gestation). A plan in	Consensus-based recommendation

the event of labour starting prior to the scheduled date should be agreed and documented.	
Recommendation 8	Grade
Women should be advised that a planned VBAC should be conducted in a suitably staffed and equipped delivery suite, with continuous intrapartum care and monitoring and with available resources for urgent Caesarean section and neonatal resuscitation should complications such as scar rupture occur.	Consensus-based recommendation
Recommendation 9	Grade
Continuous intrapartum care is required to monitor progress and to enable prompt identification and management of uterine scar rupture.	Consensus-based recommendation
Recommendation 10	Grade
Women should be advised to have continuous electronic fetal monitoring following the onset of uterine contractions and for the duration of the planned VBAC.	Consensus-based recommendation
Recommendation 11	Grade
Epidural anaesthesia is not contraindicated in a planned VBAC.	Consensus-based recommendation
Recommendation 12	Grade
Early diagnosis of the serious complication of uterine scar rupture followed by expeditious laparotomy and resuscitation is essential to reduce the associated morbidity and mortality for mother and infant.	Consensus-based recommendation
Recommendation 13	Grade
IOL increases the risk of uterine rupture when compared to spontaneous labour or repeat CS, therefore, the risks and benefits of IOL should be considered by the clinician and discussed with the patient.	Consensus-based recommendation
Recommendation 14	Grade
<u>Prostaglandins</u> increase the risk of uterine rupture when compared to other methods of induction of labour, therefore, the risks and benefits of prostaglandins should be considered by the clinician and discussed with the patient.	Consensus-based recommendation
Recommendation 15	Grade
Augmentation for lack of progress in labour with oxytocin in a planned VBAC should involve discussion with an obstetrician and the risks and benefits discussed with the patient then documented in the clinical record.	Consensus-based recommendation
Recommendation 16	Grade
Mode of birth after caesarean section should be subject to multi-disciplinary clinical audit, including assessment of the number of women opting for planned VBAC versus ERCS as well as the number achieving VBAC. Quality of adherence to agreed protocols should form part of the clinical audit.	Consensus-based recommendation

4. Introduction

In recent decades the Caesarean section rates have continued to rise; to 33% of births in Australia in 2015 and 25.5% of births in New Zealand in 2015.^{1,2} As a consequence there are increasing numbers of women who need advice regarding options for birth in subsequent pregnancies. Each option, elective Caesarean section or labour with a view to vaginal birth, has its benefits and risks. Patient differences give rise to a variation of patient preference, risk spectrum and of success rates for vaginal birth. Patients and clinicians conjointly need to consider the options with a view to planning mode and place of birth for each mother who has had a

previous Caesarean delivery. There are no large prospective randomised controlled trials assessing birth options.³ There are large numbers of reports which are mainly retrospective studies, predominantly originating in North America, the UK and Europe which provide some evidence of which to base decision making, but these are subject to variation both of population and management. There have been at least three Australian studies and two New Zealand studies reporting local outcomes.⁴⁻⁸

5. Discussion and recommendations

5.1 Past history and suitability for VBAC

5.1.1 That a woman should be well informed regarding mode of birth after previous Caesarean section and have the right to have her wishes respected is strongly supported by RANZCOG and other similar professional bodies.⁹⁻¹¹

5.1.2 It is appropriate that the counselling process begins after the primary caesarean section, ideally before discharge from hospital. Ideally, it should be conducted by the doctor who performed the caesarean section and, where appropriate, the midwife who cared for the patient during her labour. The reason for the caesarean section and any unexpected issues occurring before, during or after the surgery should be discussed, particularly any that would affect the woman's suitability for VBAC in future pregnancies. Advice which could increase the success and safety of planned VBAC, such as an inter-delivery (from birth to subsequent birth) interval of at least 18 months and weight reduction for overweight and obese patients should be provided.¹²⁻¹⁶ This debrief would also provide an opportunity to address any emotional needs, particularly for patients who found the experience traumatic. If a woman was not feeling ready for this discussion before discharge from hospital, a review early in the postnatal period would be worthwhile.

Recommendation 1	Grade
Early in the postnatal period following a primary Caesarean delivery, women should be offered the opportunity to be debriefed and to discuss their birth experience, as well as their potential suitability for planned VBAC in future pregnancies.	Consensus-based recommendation
Recommendation 2	Grade
Women with a prior history of an uncomplicated lower segment Caesarean section, in an otherwise uncomplicated pregnancy, should be given the opportunity to discuss the birth options of planned VBAC or elective Caesarean section early in the course of their antenatal care.	Consensus-based recommendation
Recommendation 3	Grade
The risks and benefits of the birth options, considered in conjunction with an individual woman's chances of success for VBAC, should be discussed with the patient and documented in the medical record. The provision of a patient information leaflet or other similar resource at the consultation is recommended.	Consensus-based recommendation

5.1.3 Studies of women who have faced the decision regarding mode of birth after previous caesarean delivery have reported that a significant number of women found the decision difficult – balancing their wishes against the interests of their child.¹⁷ The potential risks and benefits need to be discussed in the context of the woman's individual circumstances, including her personal motivation and preferences to achieve vaginal birth or ERCS, her attitudes to the risk of rare but serious adverse outcomes, her plans for future pregnancies and her chances of successful VBAC.

Recommendation 4	Grade
Respect should be given to the woman's right to be involved in the decision making regarding mode of birth, considering her wishes, her perception of the risks and her plans for future pregnancies.	Consensus-based recommendation
Recommendation 5	Grade
Attempts should be made, where possible, to check the operative record of the previous Caesarean section, its indication and post-operative course.	Consensus-based recommendation
Recommendation 6	Grade
Women considering options for birth after a previous Caesarean section should be informed that ERCS may increase the risk of serious complications in future pregnancies.	Consensus-based recommendation
Recommendation 7	Grade
A final decision regarding mode of birth should be agreed between the woman and her obstetrician (and midwife where appropriate) before the expected/planned delivery date (ideally by 36 weeks gestation). A plan in the event of labour starting prior to the scheduled date should be agreed and documented.	Consensus-based recommendation

5.2 Success rates

5.2.1 There has been a wide range of success rates (23 - 85%) reported for those achieving vaginal birth following a planned VBAC.^{4, 6, 18-21} Published studies of the outcomes for women attempting VBAC report a likelihood of success of between 60 and 80%.¹⁰ A study from Middlemore Hospital in New Zealand reported a 73% success rate, and one from 14 Australian hospitals reported a success rate of 43%.^{6, 7}

5.2.2 Factors affecting success

FAVOURING SUCCESS	REDUCING SUCCESS
<ul style="list-style-type: none"> • Previous safe vaginal birth. • Previous successful VBAC. • Spontaneous onset of labour. • Uncomplicated pregnancy without other risk factors. 	<ul style="list-style-type: none"> • Previous Caesarean section for dystocia. • Induction of labour. • Coexisting fetal, placental or maternal conditions²² • Maternal BMI greater than 30 Kg/m². • Fetal macrosomia of 4 kg or more. • Advanced maternal age. • Short stature. • More than one previous Caesarean section. • Risk factors associated with an increased risk of uterine scar rupture (see below).

5.2.3 Previous vaginal birth, especially successful VBAC, is the strongest predictor of success, with VBAC rates of 87-91% reported in that group.^{7, 18, 19, 22}

5.2.4 Induced labour, no previous vaginal birth, a BMI greater than 30 Kg/m², and previous Caesarean section for dystocia are factors that all reduce the success rate; Landon reported if all four are present then the success rate was only 40%.¹⁸

5.2.5 For the morbidly obese patient (BMI>40 Kg/m²) the chances of an unsuccessful VBAC and of uterine rupture are significantly increased. Hiddard, in a prospective observational study of 14,142 patients undergoing VBAC, reported unsuccessful trial of labour in 15.2% of those of normal weight (1344 women) compared to 39.3% for those with a BMI≥40 Kg/m² (1,344 women) (p< 0.001), with the incidence of uterine rupture/dehiscence being 0.9% compared to 2.1% (p=0,03).²³

5.2.6 Other factors which have been reported to adversely affect success rates are gestational age beyond 41 weeks, fetal macrosomia, advanced maternal age, short stature, and fetal malpresentation.^{18-21, 24}

Clinicians may find the online NICHD MFMU calculator for predicting successful VBAC useful. This resource can be accessed at:

<https://mfmunetwork.bsc.gwu.edu/PublicBSC/MFMU/VGBirthCalc/vagbirth.html>

This calculator estimates likelihood of VBAC success according to variables such as maternal age, BMI, and indication for previous Caesarean section, and is based on the equation published by NICHD MFM Units Network.²⁵ While other factors may influence likelihood of success, clinicians may find this calculator useful when counselling patients regarding their individualised likelihood of success.

5.3 Benefits and risks of VBAC

BENEFITS IF SUCCESSFUL VBAC	RISKS
<ul style="list-style-type: none"> • Less maternal morbidity for index pregnancy and future pregnancies. • Avoidance of major surgery and multiple caesarean sections in future pregnancies. • Earlier mobilisation and discharge from hospital. • Patient gratification in achieving vaginal birth if this is desired. 	<ul style="list-style-type: none"> • Increased perinatal loss compared with ERCS at 39 weeks(1.8 per 1000 pregnancies) • Stillbirth after 39 weeks gestation (due to longer gestation). • Intrapartum death or neonatal death (related to scar rupture in labour). • HIE risk (0.7 per 1000). • Related both to labour and vaginal birth and to scar rupture. • Increase morbidity of emergency Caesarean section compared to ERCS if unsuccessful in achieving VBAC.^{26, 27} • Pelvic floor trauma.

5.4 Benefits and risks of elective repeat Caesarean section at 39 weeks

BENEFITS	RISKS
<ul style="list-style-type: none"> • Avoid late stillbirth (after 39 weeks). • Reduced perinatal mortality and morbidity (especially HIE) related to labour, delivery and scar rupture. • Reduced maternal risks associated with emergency Caesarean section. • Avoidance of trauma to the maternal pelvic floor. • Convenience of planned date for birth. 	<ul style="list-style-type: none"> • Surgical morbidity and complications both with index pregnancy and further pregnancies. • Increased risk of neonatal respiratory morbidity – low incidence ≥ 39 weeks gestation. • Associated with lower rates of initiating breast feeding²⁸⁻³⁰

5.5 Uterine rupture

5.5.1 Uterine rupture in an unscarred uterus is extremely rare, with incidence rates estimated at 0.5-2.0 per 10,000 deliveries, and occurrence mainly confined to multiparous patients in labour.³¹ The incidence of

scar rupture in a patient undergoing VBAC has been reported between 22 and 74 per 10,000 births.^{9, 32, 33}

5.5.2 Chauhan *et al* reviewed maternal and perinatal complications from 142,075 patients who attempted vaginal birth after Caesarean section delivery.³⁴ They reported a uterine rupture rate of 6.2/1,000 trials of labour. The uterine rupture-related complication rate was 1.5 per 1,000 for pathological fetal acidosis (a cord pH < 7.00), 0.9/1000 for hysterectomy, 0.4/1,000 for perinatal death, and 0.02/1,000 for maternal death. These figures are consistent with a large Australian retrospective analysis and review of 10 international series where the likelihood of uterine rupture of attempted vaginal delivery after previous lower segment Caesarean section was estimated at 5/1,000, and the perinatal death from uterine rupture at 0.7/1,000 women attempting VBAC.⁴ Landon, in a prospective observational study from 19 academic centres in the United States, reported a symptomatic uterine rupture rate of 7/1,000 from a total of 17,898 women who planned VBAC, and the occurrence of HIE in seven babies related to uterine rupture (0.4/1000).³² The overall complication rates related to scar rupture per 1000 women attempting VBAC for the three series is summarised in the table below:^{4 32, 34}

TABLE 1: The complication rates related to scar rupture per 1000 women attempting VBAC^{4, 32, 34}

COMPLICATION	RISK/ 1,000 ATTEMPTED VBAC
• Uterine rupture	5-7/1,000
• Perinatal death	0.4-0.7/1000
• Maternal death	0.02/1000
• Major maternal morbidity	Approximately 3/1000
○ Hysterectomy	0.5-2/1000
○ Genitourinary injury	0.8/1000
○ Blood transfusion	1.8/1000
• Major perinatal morbidity	Approximately 1/1000
○ Fetal acidosis (cord pH <7.0)	1.5/1000
○ HIE	0.4/1000

5.5.3 A previous vaginal birth reduces the risk of uterine scar rupture.^{35, 36}

5.5.4 The risk of uterine rupture is increased with previous classical Caesarean section (20 to 90/1,000), previous 'inverted T' or 'J' incisions (19/1,000), and low vertical incision (20/1,000).⁹ Obtaining the record of the operative note from a previous Caesarean section to define the nature of previous scar and any significant uterine tears may be helpful in assessing the risk of future uterine rupture. A higher incidence of scar rupture has also been reported with induction of labour and augmentation of labour.^{5, 37-40} The risk of scar rupture is further increased when prostaglandins are used to induce labour.³⁷⁻³⁹

5.5.6 A two to three-fold increase (2.3-4.8% vs 1.1-1.3%) in the incidence of scar rupture has been reported if the interval between caesarean section and the subsequent birth has been less than 18 months¹² or less than 24 months.^{12, 15} More recent data suggest that the incidence of scar rupture at intervals between 18 and 24 months is not significantly greater than a longer interval⁴¹. There is conflicting evidence as to whether single layer compared to double layer uterine closure increases the risk of scar rupture in subsequent planned VBAC.^{12, 42}

5.5.7 Unfortunately, ultrasound measurement of myometrial thickness has not been demonstrated to be sufficiently predictive, or protective, of uterine rupture to be useful in clinical practice. Studies measuring the lower segment thickness by ultrasound in late pregnancy have reported a low incidence of subsequently detected scar defects (rupture or dehiscence) occurring with a greater frequency in

patients whose ultrasound reported a very thin lower segment; however there are many other factors that can affect the incidence of uterine scar rupture.⁴³⁻⁴⁷

5.6 Perinatal mortality

Women electing trial of labour have an increased risk of perinatal mortality compared to those undergoing ERCS.⁴⁸ However, much of this is attributable to the often understated background rate of perinatal death after 39 weeks gestation. Where 0.4/1,000 may have a perinatal death related to uterine rupture, a further 1.4/1,000 may be expected to have an antenatal, intrapartum or neonatal death after 39 weeks gestation.^{34, 49} It is appropriate that this increase in perinatal mortality (1.8/1,000) be acknowledged in counselling about birth options, even though mostly not a direct consequence of uterine rupture.

5.7 Hypoxic Ischaemic Encephalopathy (HIE)

Landon reported 12 cases of HIE amongst 17,898 women undergoing planned VBAC (0.7/1,000), seven cases were related to uterine rupture and five to hypoxia in labour.³² In the same study there were no cases of HIE in 15,801 women undergoing ERCS ($p < 0.001$). Children with long term neurological impairment following uterine rupture have also been reported but the frequency is almost impossible to determine given the absence of long term follow-up data in these retrospective series.^{50, 51}

5.8 Risks associated with ERCS

While Elective Caesarean section reduces the risks of some serious adverse outcomes for the baby, the mother is exposed to surgical risks which increase with each Caesarean section that she has

5.8.1 Neonatal perspective

Elective Caesarean section removes the risk of late perinatal loss of the baby (1.8/1000), the risk of HIE related to labour (0.7/1000) and reduces the risk of significant traumatic fetal injury. The risk of fetal injury at elective Caesarean delivery is 5/1000, with the majority (71%) being a superficial skin laceration.⁵² The risk of fetal intracranial injury at ERCS is very low (1:2750) when compared with assisted vaginal delivery, forceps (1:664) and vacuum (1:860), and spontaneous vaginal delivery (1:1900).⁵³ The risk of brachial plexus injury from shoulder dystocia is significantly lower at Caesarean section.⁵⁴

When compared to vaginal birth, Caesarean section without labour has been associated with increased neonatal respiratory morbidity including transient tachypnoea of the newborn, surfactant deficiency and pulmonary hypertension. This incidence is inversely related to gestation and after 40 weeks gestation there is no difference in the incidence.⁵⁵ In response to this, deferring elective caesarean delivery in uncomplicated singleton pregnancies until 39 weeks gestation or later is recommended by some international obstetric bodies.⁵⁶⁻⁵⁸

5.8.2 Maternal perspective

Repeat elective Caesarean section exposes the mother to surgical risk in her current pregnancy, the risk increasing with each subsequent Caesarean section. In a large prospective study of 30,132 women who had caesarean delivery without labour, a total of 1202 significant complications occurred in 15,808 patients electively undergoing their second Caesarean section. As the patient's number of caesarean deliveries increased there was statistically significant increase in the serious complications of severe haemorrhage (requiring more than four units of blood transfused), hysterectomy, bladder and bowel injury and requirement for postoperative ventilation.⁵⁹ Details of these findings are presented in Appendix A.

5.8.3 Subsequent pregnancies

An important issue to be considered in the decision analysis for many women is the intended future family size. Silver found that placenta accreta was present in 0.24%, 0.31%, 0.57%, 2.1% and 2.3% and 6.7% of women undergoing their first, second, third, fourth, fifth and six or more Caesarean section deliveries respectively.⁵⁹ This is a consequence both of an increasing incidence of placenta praevia with repeated Caesarean sections and an increased likelihood of placenta accreta where the placenta is located over the uterine scar. The abnormally adherent placenta associated with placenta accreta is a potentially life threatening obstetric complication that may require interventions such as hysterectomy and high volume blood transfusion.

5.8.4 Emergency caesarean risk compared to elective caesarean section

The maternal morbidity associated with emergency Caesarean section is significantly greater than rates reported for elective Caesarean section. Severe complications were reported in 179/1355 (13.2%) emergency Caesarean sections, compared with 80/1,141 (7%) of those delivered by elective Caesarean section ($p < 0.001$) in a prospective multicentre study from Finland.²⁶ Similar results were reported in a large Canadian study of nulliparous patients comparing outcomes of 17,714 women in spontaneous labour at term with 721 women delivered by elective Caesarean section.²⁷

This increased risk of associated with the emergency Caesarean delivery needs to be considered, especially for those patients with relatively low chance of successful VBAC, and particularly for those women with co-existing medical morbidities.

5.8.5 Impact on the initiation of breastfeeding

Several studies have demonstrated significantly lower rates of successful initiation of breastfeeding among women having ERCS compared to those who delivered vaginally or who have attempted vaginal birth.²⁸⁻³⁰ It is difficult to adjust for all potential confounding variables that may contribute to these results. Nevertheless, in view of these findings it is recommended that all possible steps are taken to assist women having caesarean section to initiate breastfeeding. This includes promoting skin to skin contact in theatre and supporting women to breastfeed as soon as practicable after delivery, including in recovery.

5.9 Intrapartum recommendations

Recommendation 8	Grade
Women should be advised that a planned VBAC should be conducted in a suitably staffed and equipped delivery suite, with continuous intrapartum care and monitoring and with available resources for urgent Caesarean section and neonatal resuscitation should complications such as scar rupture occur.	Consensus-based recommendation

5.9.1 All women electing to labour after previous Caesarean section should have ready access to Obstetric, Neonatal, Paediatric, Anaesthetic, operating theatre and resuscitation services (including availability of blood products) in the event that complications occur.

5.9.2 Where, by virtue of remote location, these on-site services cannot be provided, patients should be informed of limitations of services available and the implications for care should a uterine rupture occur. In most circumstances this will result in either an elective repeat Caesarean section or alternatively antenatal transfer to a centre with more comprehensive services for a trial of labour.

Recommendation 9	Grade
Continuous intrapartum care is required to monitor progress and to enable prompt identification and management of uterine scar rupture.	Consensus-based recommendation
Recommendation 10	Grade
Women should be advised to have continuous electronic fetal monitoring following the onset of uterine contractions and for the duration of the planned VBAC.	Consensus-based recommendation

- 5.9.3 A woman undergoing planned VBAC should be assessed in early labour. Members of the care team should be notified in a timely manner of the admission and of the relevant clinical circumstances.
- 5.9.4 There should be continuous midwifery support and continuous electronic fetal monitoring.
- 5.9.5 Intravenous access should be established once labour is established. The conduct of labour and the possible need for blood products in an emergency situation should be considered with specific guidelines to be determined by the healthcare service.
- 5.9.6 Oral intake should be restricted to clear fluids because of the greater than normal probability of needing an immediate Caesarean section under general anaesthetic.
- 5.9.7 A trial of labour mandates vigilant assessment of progress of labour with vaginal examinations at least four hourly in the active phase of labour and more frequently as full dilatation approaches. Two hourly assessments from 7cm dilated can be helpful to detect a secondary arrest of labour. There needs to be evidence of progress in labour in both first and second stage. Lack of progress should trigger clinical reassessment by an experienced obstetrician.

Recommendation 11	Grade
Epidural anaesthesia is not contraindicated in a planned VBAC.	Consensus-based recommendation
Recommendation 12	Grade
Early diagnosis of the serious complication of uterine scar rupture followed by expeditious laparotomy and resuscitation is essential to reduce the associated morbidity and mortality for mother and infant.	Consensus-based recommendation

5.10 Induction and augmentation in labour

Recommendation 13	Grade
IOL increases the risk of uterine rupture when compared to spontaneous labour or repeat CS, therefore, the risks and benefits of IOL should be considered by the clinician and discussed with the patient.	Consensus-based recommendation
Recommendation 14	Grade
Prostaglandins increase the risk of uterine rupture when compared to other methods of induction of labour, therefore, the risks and benefits of prostaglandins should be considered by the clinician and discussed with the patient.	Consensus-based recommendation
Recommendation 15	Grade
Augmentation for lack of progress in labour with oxytocin in a planned VBAC should involve discussion with an obstetrician and the risks and benefits discussed with the patient then documented in the clinical record.	Consensus-based recommendation

- 5.10.1 Induction of labour for maternal or fetal indications remains an option for women undergoing planned VBAC, however induction of labour reduces the success rate of achieving VBAC and increases the rate of uterine rupture. Induced labour is less likely to result in VBAC than spontaneous labour and an unfavourable cervix at induction decreases the chances of success.^{18, 39, 40, 60-63}
- 5.10.2 In the large NICHD study of 17,898 women undergoing planned VBAC, the rates of intrapartum Caesarean section were 33%, 26% and 18% for induced, augmented and spontaneous labour groups respectively. The risk of uterine rupture per 10,000 planned VBAC's was 102, 87, and 36 for induced, augmented and spontaneous labour groups.^{18, 32}
- 5.10.3 Several studies have reported high rates (1.4 to 2.45%) of uterine rupture when labour has been induced using prostaglandins.^{32, 37, 39} Practitioners should be aware that when they prescribe prostaglandins, they will be using it against the manufacturer's instructions and should only use it in clinical situations after obtaining and documenting informed consent from the woman.
- 5.10.4 Information regarding the effectiveness and safety of transcervical catheters in planned VBAC is limited due to small sample sizes in the studies and valid conclusions are not possible.³ Two studies showed no risk of uterine rupture, whereas another reported an increased risk compared to women in spontaneous labour.^{20, 39, 64} It is not clear whether any increased risk may be associated with an unfavourable cervix.
- 5.10.5 The use of oxytocin for augmentation of contractions, separate from induction of labour during planned VBAC, has been examined in several studies. Some have found an association between oxytocin augmentation and the uterine rupture where others have not.^{5, 32, 62, 63} In an Australian retrospective cohort study Dekker reported a 14 fold difference in the adjusted odds ratio for uterine rupture in planned VBAC patients in spontaneous onset of labour augmented with Syntocinon (12/628, 1.9%) compared to those without augmentation with Syntocinon (16/8221, 0.19%).
- 5.10.6 The decision to augment labour in planned VBAC appropriately should involve a consultant Obstetrician after clinical assessment of the case and discussion with the patient. Oxytocin should be titrated in such a way that adequate uterine activity is obtained but that there be no more than four contractions in 10 minutes. Careful cervical assessments, preferably by the same person, are required to show adequate progress thereby allowing augmentation to continue. The interval for serial vaginal examinations and selected parameters of progress that would necessitate discontinuing the labour should be consultant led decisions.
- 5.10.7 When informing a woman about induction and/or augmentation of labour, clear information regarding potential risks and benefits should be provided. Some women who are contemplating future pregnancies may accept short term additional risks associated with induction and/or augmentation in view of the reduced risk of serious complications for future pregnancies if they achieve a successful VBAC.

Table 2: Planned VBAC and IOL considerations⁶⁵

IOL consideration	Per 1,000 women (95% CI)	
	VBAC achieved	Uterine rupture
Any induction method	630 (590-670)	12 (9-16)
Any gestational age	-	10
Term VBACs and IOL	-	15
Post term and IOL	-	32

Mechanical – transcervical catheter and / or artificial rupture of membranes (ARM)	(i) 612 (ii) 540 (490-590)	(i) 6.3 (0.8-22.4) (ii) -
Prostaglandin (PGE ₂)	(i) 514 (ii) 630 (580-690)	(i) 6.8 (1.9-17.4) (ii) 20 (11-35)
Prostaglandin and Oxytocin	(i) 602	(i) 17.7 (4.8-44.7)
Oxytocin	(i) 645 (ii) 620 (530-700)	(i) 8.2 (3-17.7) (ii) 11 (9-15)
Oxytocin and indication for prior CS:	-	-
FTP and CPD	540 (480-600)	-
Fetal distress	600 (490-690)	-
Malpresentation / breech	750 (600-860)	-

- (i) Australian Review ⁵
- (ii) International systematic review ⁶⁶

6. Special Circumstances

6.1 Trial of labour after more than one previous caesarean section

Studies comparing outcomes of planned VBAC for patients who have had two or more Caesarean sections generally have reported significantly lower success rates for achieving VBAC, higher rates of uterine rupture or scar dehiscence, and a greater incidence of major maternal morbidity when compared to patients with only one previous Caesarean section. A meta-analysis published in 2009 reported a significantly lower success rate for VBAC (71% vs 77%, $p < 0.001$) and higher rupture rate (1.6% vs 0.7%, $p < 0.001$) when the outcomes of planned VBAC after two previous caesarean sections were compared to those patients with one previous caesarean section. The meta-analysis reported a similar maternal morbidity for the patients undergoing VBAC after two previous caesarean sections compared with those undergoing a third ERCS.⁶⁷ The details of some individual studies are summarised in [Appendix B](#).

Attitudes of obstetricians and patients may vary in different regions. RCOG state that a patient with two previous uncomplicated caesarean sections in an uncomplicated pregnancy at term, “who has been fully informed by consultant Obstetrician may be considered suitable for planned VBAC”.⁹ However, RCOG recommends that three previous Caesarean sections is a contraindication to planned VBAC. SOGC state “available data suggests that a trial of labour with more than one previous Caesarean section is likely to be successful, but is associated with a higher risk of uterine rupture”.¹¹

6.2 Twin Gestation

A cautious approach is advocated in twin pregnancies who are considering planned VBAC. There is some uncertainty regarding the safety and efficacy of planned VBAC in a twin pregnancy.

Success rates of vaginal birth of between 64% and 76% without an increase in scar rupture or perinatal morbidity have been reported in three small studies; Varner (n=412), Cahill (n=535) and Miller (n=210).⁶⁸⁻⁷⁰ The largest study reported a successful VBAC rate of 45% of 1850 twin pregnancies undergoing planned VBAC and a scar rupture rate of 0.9%. This study did not provide any neonatal outcome data.⁷¹

6.3 Mid-trimester delivery

Patients who have previously been delivered by Caesarean section and require delivery in the mid-trimester due to fetal abnormality or fetal demise have three options: hysterotomy; dilatation and evacuation (D&E); or, medical induction of labour. There have been no randomised trials comparing the outcomes from these options.

Misoprostol, a synthetic analogue of Prostaglandin E₁, has been successful when used in the mid-trimester both for patients with an unscarred uterus and for those with a scarred uterus.⁷²⁻⁷⁴ Goyal, in a 2009 systematic review of 16 studies, reported a rupture rate of 1/2384 (0.04%) in patients with no uterine scar and 2/722 (0.28%) in patients with one or more prior Caesarean sections. When misoprostol was the sole agent used to induce labour (seven studies) there were no uterine ruptures in 256 patients with prior caesarean delivery. When the more recent studies of Gulec (2013) and Berghella (2009) are combined a scar rupture rate of 2/104 (1.9%) occurred in patients with one previous caesarean section and 3/79 (3.7%) in those with two or more caesarean sections. There has been a wide variation in dosage and method of administration of misoprostol in the reported series.^{73, 74}

Due to the limitations of the studies available Dodd and Crowther in a Cochrane review 2010 entitled “Misoprostol for induction of labour to terminate pregnancy in the second or third trimester for women with a fetal abnormality or after intrauterine fetal death” stated “important information regarding maternal safety, in particular the occurrence of rare outcomes such as uterine rupture, remains limited.”⁷⁵ Use of misoprostol (alone or combined with mifepristone) to induce labour in the second trimester would appear to be a reasonable option in women with prior caesarean delivery. Another option is mechanical cervical ripening with a balloon catheter (alone or combined with mifepristone) and carefully monitored syntocinon induction of labour. The decision between these methods will be determined by gestational age, cervical favourability, number and type of caesarean section scar/s and clinician experience. These labours require close surveillance and senior clinical oversight.

7. Conclusion

Recommendation 16	Grade
Mode of birth after caesarean section should be subject to multi-disciplinary clinical audit, including assessment of the number of women opting for planned VBAC versus ERCS as well as the number achieving VBAC. Quality of adherence to agreed protocols should form part of the clinical audit.	Consensus-based recommendation

Useful links used in the writing of this statement

RCOG Greentop Guidelines No.45 (2007); Birth after Previous Caesarean section.
https://www.rcog.org.uk/globalassets/documents/guidelines/gtg_45.pdf

ACOG Clinical Management Guidelines (Vaginal Birth after Previous Caesarean Section 2010);
<http://www.acog.org/Resources-And-Publications/Practice-Bulletins/Committee-on-Practice-Bulletins-Obstetrics/Vaginal-Birth-After-Previous-Cesarean-Delivery>.

SOGC Clinical Practice Guidelines; Guidelines for Vaginal Birth after Previous Caesarean Birth (2004);
<http://sogc.org/wp-content/uploads/2013/01/155E-CPG-February2005.pdf>.

SA Perinatal Practice Guidelines; (Birth options after Caesarean Section);
http://www.sahealth.sa.gov.au/wps/wcm/connect/98d6ab804ee1e002ad49add150ce4f37/Birth+options+aft+er+caesarean+sectionPPG_june+2014.pdf?MOD=AJPERES&CACHEID=98d6ab804ee1e002ad49add150ce4f37.

Links to other College Statements

[Intrapartum Fetal Surveillance Clinical Guideline \(3rd edition\)](#)

[Placenta Accreta \(C-Obs 20\)](#)

[Timing of Elective Caesarean Section \(C-Obs 23\)](#)

[Delivery of the Fetus at Caesarean Section \(C-Obs 37\)](#)

[Caesarean Delivery on Maternal Request \(CDMR\) \(C-Obs 39\)](#)

[Perinatal Anxiety and Depression \(C-Obs 48\)](#)

References

1. Australian Institute of Health and Welfare (AIHW). Australia's Health 2018:in brief.Cat no AUS 222.Canberra:AIWH. 2018.
2. Ministry of Health. New Zealand Maternity Clinical Indicators 2015. Wellington: Ministry of Health. 2016. Available from: <https://www.health.govt.nz/publication/new-zealand-maternity-clinical-indicators-2015>.
3. Jozwiak M, Dodd JM. Methods of term labour induction for women with a previous caesarean section. The Cochrane database of systematic reviews. 2013;3:CD009792.
4. Appleton B, Targett C, Rasmussen M, Readman E, Sale F, Permezel M. Vaginal birth after Caesarean section: an Australian multicentre study. VBAC Study Group. Aust N Z J Obstet Gynaecol. 2000;40(1):87-91.
5. Dekker GA, Chan A, Luke CG, Priest K, Riley M, Halliday J, et al. Risk of uterine rupture in Australian women attempting vaginal birth after one prior caesarean section: a retrospective population-based cohort study. BJOG : an international journal of obstetrics and gynaecology. 2010;117(11):1358-65.
6. Crowther CA, Dodd JM, Hiller JE, Haslam RR, Robinson JS, Birth After Caesarean Study G. Planned vaginal birth or elective repeat caesarean: patient preference restricted cohort with nested randomised trial. PLoS Med. 2012;9(3):e1001192.
7. van der Merwe AM, Thompson JM, Ekeroma AJ. Factors affecting vaginal birth after caesarean section at Middlemore Hospital, Auckland, New Zealand. The New Zealand medical journal. 2013;126(1383):49-57.
8. Wise MR, Anderson NH, Sadler L. Ethnic disparities in repeat caesarean rates at Auckland Hospital. Aust N Z J Obstet Gynaecol. 2013;53(5):443-50.
9. Royal College of Obstetricians and Gynaecologists. Birth after Previous Caesarean section 2007. Available from: <https://www.rcog.org.uk/globalassets/documents/guidelines/gtg4511022011.pdf>.
10. American College of Obstetricians and Gynaecologists (ACOG). Clinical Management Guidelines Vaginal Birth after Previous Caesarean Section 2010. Available from: <http://www.acog.org/Resources-And-Publications/Practice-Bulletins/Committee-on-Practice-Bulletins-Obstetrics/Vaginal-Birth-After-Previous-Cesarean-Delivery>.
11. The Society of Obstetricians and Gynaecologists of Canada (SOGC). Guidelines for Vaginal Birth after Previous Caesarean Birth 2004. Available from: <http://sogc.org/wp-content/uploads/2013/01/155E-CPG-February2005.pdf>.
12. Bujold E, Mehta SH, Bujold C, Gauthier RJ. Interdelivery interval and uterine rupture. American journal of obstetrics and gynecology. 2002;187(5):1199-202.
13. Esposito MA, Menihan CA, Malee MP. Association of interpregnancy interval with uterine scar failure in labor: a case-control study. American journal of obstetrics and gynecology. 2000;183(5):1180-3.
14. Huang WH, Nakashima DK, Rumney PJ, Keegan KA, Jr., Chan K. Interdelivery interval and the success of vaginal birth after cesarean delivery. Obstetrics and gynecology. 2002;99(1):41-4.
15. Shipp TD, Zelop CM, Repke JT, Cohen A, Lieberman E. Interdelivery interval and risk of symptomatic uterine rupture. Obstetrics and gynecology. 2001;97(2):175-7.
16. Callegari LS, Sterling LA, Zelek ST, Hawes SE, Reed SD. Interpregnancy body mass index change and success of term vaginal birth after cesarean delivery. American journal of obstetrics and gynecology. 2014;210(4):330 e1-7.

17. Lundgren I, Begley C, Gross MM, Bondas T. 'Groping through the fog': a metasynthesis of women's experiences on VBAC (Vaginal birth after Caesarean section). *BMC Pregnancy Childbirth*. 2012;12:85.
18. Landon MB, Leindecker S, Spong CY, Hauth JC, Bloom S, Varner MW, et al. The MFMU Cesarean Registry: factors affecting the success of trial of labor after previous cesarean delivery. *American journal of obstetrics and gynecology*. 2005;193(3 Pt 2):1016-23.
19. Smith GC, White IR, Pell JP, Dobbie R. Predicting cesarean section and uterine rupture among women attempting vaginal birth after prior cesarean section. *PLoS Med*. 2005;2(9):e252.
20. Bujold E, Hammoud AO, Hendler I, Berman S, Blackwell SC, Duperron L, et al. Trial of labor in patients with a previous cesarean section: does maternal age influence the outcome? *American journal of obstetrics and gynecology*. 2004;190(4):1113-8.
21. Coassolo KM, Stamilio DM, Pare E, Peipert JF, Stevens E, Nelson DB, et al. Safety and efficacy of vaginal birth after cesarean attempts at or beyond 40 weeks of gestation. *Obstetrics and gynecology*. 2005;106(4):700-6.
22. Gyamfi C, Juhasz G, Gyamfi P, Stone JL. Increased success of trial of labor after previous vaginal birth after cesarean. *Obstetrics and gynecology*. 2004;104(4):715-9.
23. Hibbard JU, Gilbert S, Landon MB, Hauth JC, Leveno KJ, Spong CY, et al. Trial of labor or repeat cesarean delivery in women with morbid obesity and previous cesarean delivery. *Obstetrics and gynecology*. 2006;108(1):125-33.
24. Hollard AL, Wing DA, Chung JH, Rumney PJ, Saul L, Nageotte MP, et al. Ethnic disparity in the success of vaginal birth after cesarean delivery. *J Matern Fetal Neonatal Med*. 2006;19(8):483-7.
25. Grobman WA, Lai Y, Landon MB, Spong CY, Leveno KJ, Rouse DJ, et al. Development of a nomogram for prediction of vaginal birth after cesarean delivery. *Obstetrics and gynecology*. 2007;109(4):806-12.
26. Pallasmaa N, Ekblad U, Aitokallio-Tallberg A, Uotila J, Raudaskoski T, Ulander VM, et al. Cesarean delivery in Finland: maternal complications and obstetric risk factors. *Acta Obstet Gynecol Scand*. 2010;89(7):896-902.
27. Allen VM, O'Connell CM, Liston RM, Baskett TF. Maternal morbidity associated with cesarean delivery without labor compared with spontaneous onset of labor at term. *Obstetrics and gynecology*. 2003;102(3):477-82.
28. Regan J, Thompson A, DeFranco E. The influence of mode of delivery on breastfeeding initiation in women with a prior cesarean delivery: a population-based study. *Breastfeeding medicine : the official journal of the Academy of Breastfeeding Medicine*. 2013;8:181-6.
29. Zanardo V, Savona V, Cavallin F, D'Antona D, Giustardi A, Trevisanuto D. Impaired lactation performance following elective delivery at term: role of maternal levels of cortisol and prolactin. *J Matern Fetal Neonatal Med*. 2012;25(9):1595-8.
30. Prior E, Santhakumaran S, Gale C, Philipps LH, Modi N, Hyde MJ. Breastfeeding after cesarean delivery: a systematic review and meta-analysis of world literature. *Am J Clin Nutr*. 2012;95(5):1113-35.
31. Ofir K, Sheiner E, Levy A, Katz M, Mazor M. Uterine rupture: risk factors and pregnancy outcome. *American journal of obstetrics and gynecology*. 2003;189(4):1042-6.
32. Landon MB, Hauth JC, Leveno KJ, Spong CY, Leindecker S, Varner MW, et al. Maternal and perinatal outcomes associated with a trial of labor after prior cesarean delivery. *N Engl J Med*. 2004;351(25):2581-9.
33. Turner MJ, Agnew G, Langan H. Uterine rupture and labour after a previous low transverse caesarean section. *BJOG : an international journal of obstetrics and gynaecology*. 2006;113(6):729-32.
34. Chauhan SP, Martin JN, Jr., Henrichs CE, Morrison JC, Magann EF. Maternal and perinatal complications with uterine rupture in 142,075 patients who attempted vaginal birth after cesarean delivery: A review of the literature. *American journal of obstetrics and gynecology*. 2003;189(2):408-17.
35. Grobman WA, Lai Y, Landon MB, Spong CY, Leveno KJ, Rouse DJ, et al. Prediction of uterine rupture associated with attempted vaginal birth after cesarean delivery. *American journal of obstetrics and gynecology*. 2008;199(1):30 e1-5.
36. Zelop CM, Shipp TD, Repke JT, Cohen A, Lieberman E. Effect of previous vaginal delivery on the risk of uterine rupture during a subsequent trial of labor. *American journal of obstetrics and gynecology*. 2000;183(5):1184-6.

37. Lydon-Rochelle M, Holt VL, Easterling TR, Martin DP. Risk of uterine rupture during labor among women with a prior cesarean delivery. *N Engl J Med.* 2001;345(1):3-8.
38. Zelop CM, Shipp TD, Repke JT, Cohen A, Caughey AB, Lieberman E. Uterine rupture during induced or augmented labor in gravid women with one prior cesarean delivery. *American journal of obstetrics and gynecology.* 1999;181(4):882-6.
39. Ravasia DJ, Wood SL, Pollard JK. Uterine rupture during induced trial of labor among women with previous cesarean delivery. *American journal of obstetrics and gynecology.* 2000;183(5):1176-9.
40. Sims EJ, Newman RB, Hulseley TC. Vaginal birth after cesarean: to induce or not to induce. *American journal of obstetrics and gynecology.* 2001;184(6):1122-4.
41. Bujold E, Gauthier RJ. Risk of uterine rupture associated with an interdelivery interval between 18 and 24 months. *Obstetrics and gynecology.* 2010;115(5):1003-6.
42. Durnwald C, Mercer B. Uterine rupture, perioperative and perinatal morbidity after single-layer and double-layer closure at cesarean delivery. *American journal of obstetrics and gynecology.* 2003;189(4):925-9.
43. Rozenberg P, Goffinet F, Phillippe HJ, Nisand I. Ultrasonographic measurement of lower uterine segment to assess risk of defects of scarred uterus. *Lancet.* 1996;347(8997):281-4.
44. Bujold E, Jastrow N, Simoneau J, Brunet S, Gauthier RJ. Prediction of complete uterine rupture by sonographic evaluation of the lower uterine segment. *American journal of obstetrics and gynecology.* 2009;201(3):320 e1-6.
45. Naji O, Daemen A, Smith A, Abdallah Y, Saso S, Stalder C, et al. Changes in Cesarean section scar dimensions during pregnancy: a prospective longitudinal study. *Ultrasound Obstet Gynecol.* 2013;41(5):556-62.
46. Asakura H, Nakai A, Ishikawa G, Suzuki S, Araki T. Prediction of uterine dehiscence by measuring lower uterine segment thickness prior to the onset of labor: evaluation by transvaginal ultrasonography. *Journal of Nippon Medical School = Nippon Ika Daigaku zasshi.* 2000;67(5):352-6.
47. Gotoh H, Masuzaki H, Yoshida A, Yoshimura S, Miyamura T, Ishimaru T. Predicting incomplete uterine rupture with vaginal sonography during the late second trimester in women with prior cesarean. *Obstetrics and gynecology.* 2000;95(4):596-600.
48. Mozurkewich EL, Hutton EK. Elective repeat cesarean delivery versus trial of labor: a meta-analysis of the literature from 1989 to 1999. *American journal of obstetrics and gynecology.* 2000;183(5):1187-97.
49. Vashevnik S, Walker S, Permezel M. Stillbirths and neonatal deaths in appropriate, small and large birthweight for gestational age fetuses. *Aust N Z J Obstet Gynaecol.* 2007;47(4):302-6.
50. Jones RO, Nagashima AW, Hartnett-Goodman MM, Goodlin RC. Rupture of low transverse cesarean scars during trial of labor. *Obstetrics and gynecology.* 1991;77(6):815-7.
51. Scott JR. Mandatory trial of labor after cesarean delivery: an alternative viewpoint. *Obstetrics and gynecology.* 1991;77(6):811-4.
52. Alexander JM, Leveno KJ, Hauth J, Landon MB, Thom E, Spong CY, et al. Fetal injury associated with cesarean delivery. *Obstetrics and gynecology.* 2006;108(4):885-90.
53. Towner D CM, Eby-Wilkens E, Gilbert WM. Effect of mode of delivery in nulliparous women on neonatal intracranial injury. *N Engl J Med.* 1999;341:1709-14.
54. Hankins GD, Clark SM, Munn MB. Cesarean section on request at 39 weeks: impact on shoulder dystocia, fetal trauma, neonatal encephalopathy, and intrauterine fetal demise. *Semin Perinatol.* 2006;30(5):276-87.
55. Morrison JJ, Rennie JM, Milton PJ. Neonatal respiratory morbidity and mode of delivery at term: influence of timing of elective caesarean section. *Br J Obstet Gynaecol.* 1995;102(2):101-6.
56. ACOG Committee on Educational Bulletins. Assessment of fetal lung maturity. *Int J Gynaecol Obstet.* 1996;230(56):191-8.
57. Yee W AH, Wood S. Elective caesarean delivery, neonatal intensive care unit admission, and neonatal respiratory distress. *American journal of obstetrics and gynecology.* 2008;11:823-8.
58. National Institute of Health and Clinical Excellence. Cesarean Section CG132. November 2011.
59. Silver RM, Landon MB, Rouse DJ, Leveno KJ, Spong CY, Thom EA, et al. Maternal morbidity associated with multiple repeat cesarean deliveries. *Obstetrics and gynecology.* 2006;107(6):1226-32.

60. Delaney T, Young DC. Spontaneous versus induced labor after a previous cesarean delivery. *Obstetrics and gynecology*. 2003;102(1):39-44.
61. Macones GA, Cahill A, Pare E, Stamilio DM, Ratcliffe S, Stevens E, et al. Obstetric outcomes in women with two prior cesarean deliveries: is vaginal birth after cesarean delivery a viable option? *American journal of obstetrics and gynecology*. 2005;192(4):1223-8; discussion 8-9.
62. Horenstein JM, Phelan JP. Previous cesarean section: the risks and benefits of oxytocin usage in a trial of labor. *American journal of obstetrics and gynecology*. 1985;151(5):564-9.
63. Flamm BL, Goings JR, Fuelberth NJ, Fischermann E, Jones C, Hersh E. Oxytocin during labor after previous cesarean section: results of a multicenter study. *Obstetrics and gynecology*. 1987;70(5):709-12.
64. Hoffman MK, Sciscione A, Srinivasana M, Shackelford DP, Ekbladh L. Uterine rupture in patients with a prior cesarean delivery: the impact of cervical ripening. *Am J Perinatol*. 2004;21(4):217-22.
65. Vaginal birth after caesarean section (VBAC) [Internet]. 2015. Available from: https://www.health.qld.gov.au/_data/assets/pdf_file/0022/140836/g-vbac.pdf.
66. Guise JM, Eden K, Emeis C, Denman MA, Marshall N, Fu RR, et al. Vaginal birth after cesarean: new insights. *Evid Rep Technol Assess (Full Rep)*. 2010(191):1-397.
67. 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 : an international journal of obstetrics and gynaecology*. 2010;117(1):5-19.
68. Varner MW, Leindecker S, Spong CY, Moawad AH, Hauth JC, Landon MB, et al. The Maternal-Fetal Medicine Unit cesarean registry: trial of labor with a twin gestation. *American journal of obstetrics and gynecology*. 2005;193(1):135-40.
69. Cahill A, Stamilio DM, Pare E, Peipert JP, Stevens EJ, Nelson DB, et al. Vaginal birth after cesarean (VBAC) attempt in twin pregnancies: is it safe? *American journal of obstetrics and gynecology*. 2005;193(3 Pt 2):1050-5.
70. Miller DA, Mullin P, Hou D, Paul RH. Vaginal birth after cesarean section in twin gestation. *American journal of obstetrics and gynecology*. 1996;175(1):194-8.
71. Ford AA, Bateman BT, Simpson LL. Vaginal birth after cesarean delivery in twin gestations: a large, nationwide sample of deliveries. *American journal of obstetrics and gynecology*. 2006;195(4):1138-42.
72. Goyal V. Uterine rupture in second-trimester misoprostol-induced abortion after cesarean delivery: a systematic review. *Obstetrics and gynecology*. 2009;113(5):1117-23.
73. Kücükgöz Gülec U, Urunsak IF, Eser E, Guzel AB, Ozgunen FT, Evruke IC, et al. Misoprostol for midtrimester termination of pregnancy in women with 1 or more prior cesarean deliveries. 2003.
74. Berghella V, Airoidi J, O'Neill AM, Einhorn K, Hoffman M. Misoprostol for second trimester pregnancy termination in women with prior cesarean: a systematic review. *BJOG : an international journal of obstetrics and gynaecology*. 2009;116(9):1151-7.
75. Dodd JM, Crowther CA. Misoprostol for induction of labour to terminate pregnancy in the second or third trimester for women with a fetal anomaly or after intrauterine fetal death. *The Cochrane database of systematic reviews*. 2010(4):CD004901.

Appendices

Appendix A Maternal Morbidity of Women Who Had Caesarean Deliveries Without Labour ⁵⁹

Table 2. Maternal Morbidity of Women Who Had Caesarean Deliveries Without Labor

Morbidity	First CD*	Second CD	Third CD	Fourth CD	Fifth CD	≥ 6 CD	P [†]
No.	6,201	15,808	6,324	1,452	258	89	–
Placenta accreta	15 (0.24)	49 (0.31)	36 (0.57)	31 (2.13)	6 (2.33)	6 (6.74)	< .001
Hysterectomy	40 (0.65)	67 (0.42)	57 (0.90)	35 (2.41)	9 (3.49)	8 (8.99)	< .001
Any blood transfusion	251 (4.05)	242 (1.53)	143 (2.26)	53 (3.65)	11 (4.26)	14 (15.73)	.61
Blood transfusion ≥ 4 units	65 (1.05)	76 (0.48)	49 (0.77)	23 (1.59)	6 (2.33)	9 (10.11)	< .001
Cystotomy	8 (0.13)	15 (0.09)	18 (0.28)	17 (1.17)	5 (1.94)	4 (4.49)	< .001
Bowel injury	7 (0.11)	9 (0.06)	8 (0.13)	5 (0.34)	0 (0.00)	1 (1.12)	.02
Ureteral injury	2 (0.03)	2 (0.01)	1 (0.02)	1 (0.07)	1 (0.39)	1 (1.12)	.008
Placenta previa	398 (6.42)	211 (1.33)	72 (1.14)	33 (2.27)	6 (2.33)	3 (3.37)	< .001
Ileus	41 (0.66)	71 (0.45)	43 (0.68)	13 (0.90)	4 (1.55)	3 (3.37)	.01
Postoperative ventilator	62 (1.0)	33 (0.21)	15 (0.24)	10 (0.69)	2 (0.78)	1 (1.12)	< .001
Intensive care unit admission	115 (1.85)	90 (0.57)	34 (0.54)	23 (1.58)	5 (1.94)	5 (5.62)	.007
Operative time (min)	50.6 (24.0)	54.9 (23.2)	60.7 (25.6)	64.5 (32.7)	67.9 (32.6)	79.9 (53.4)	< .001 [‡]
Hospital days	5.6 (7.2)	3.9 (4.2)	3.8 (4.0)	4.2 (5.2)	4.1 (5.0)	5.5 (7.8)	< .001 [‡]
Wound infection	95 (1.53)	148 (0.94)	97 (1.53)	19 (1.31)	9 (3.45)	3 (3.37)	.09
Endometritis	371 (5.98)	404 (2.56)	178 (2.81)	43 (2.96)	4 (1.55)	6 (6.74)	< .001
Wound dehiscence	23 (0.37)	17 (0.11)	10 (0.16)	3 (0.21)	2 (0.78)	0	.18
Deep venous thrombosis	17 (0.27)	24 (0.15)	9 (0.14)	3 (0.21)	0	1 (1.12)	.42
Pulmonary embolus	13 (0.21)	18 (0.11)	5 (0.08)	4 (0.28)	1 (0.39)	1 (1.12)	.85
Reoperation	26 (0.42)	35 (0.22)	16 (0.25)	6 (0.41)	1 (0.39)	3 (3.37)	.57
Maternal death	12 (0.19)	11 (0.07)	3 (0.05)	1 (0.07)	0	0	.02

CD, cesarean delivery.

Data are presented as n (%).

* Primary cesarean delivery.

[†] P values are from Cochran-Armitage test for trend unless otherwise indicated.

[‡] These P values are from Spearman rank correlation test.

Appendix B Outcomes of VBAC comparing patients with one previous caesarean section with those multiple previous caesarean sections.

STUDY	STRUCTURE (Numbers of patients undergoing planned VBAC)	SUCCESS RATE FOR VBAC (%)	STUDY	STRUCTURE (Numbers of patients undergoing planned VBAC)
LANDON et.al (2006)	Prospective (USA) 1 previous LUSCS (16,915)	74%	0.7% (NS) 0.9%	Yes
	≥ 2 previous LUSCS (648)	(p<0.001) 66%		
TAHSEEN AND GRIFFITHS (2009)	Literature Review (Case and Cohort Studies)	76%	0.72%	No

	1 previous LUSCS (50,685)	(p<0.001) 71%	(p<0.001) 1.59%	
	2 previous LUSCS (4,564)			
ASA KURA AND MYERS (1995)	Retrospective (USA) 1 previous LUSCS (1,110)	71% (p<0.05)	1.1% (NS)	No
	≥ 2 previous LUSCS (302)	64%	1.9%	
CAUGHEY et.al (1999)	Retrospective (USA) 1 previous LUSCS (3,757)	75% (p=0.001)	0.8% (p=0.001)	Yes
	2 previous LUSCS (134)	62%	3.7%	
MACONES et.al (2005)	Retrospective (USA) 1 previous LUSCS (12,535)	76% (NS)	0.9% (OR=2.0 95% CI 1.24 – 3.27)	Yes
	2 previous LUSCS (1,082)	75%	1.8%	

Appendix C Women's Health Committee Membership

Name	Position on the committee
Professor Yee Leung	Chair and Board Member
Dr Gillian Gibson	Deputy Chair, Gynaecology
Dr Scott White	Deputy Chair, Obstetrics and Subspecialties Representative
Associate Professor Ian Pettigrew	Member and EAC Representative
Dr Kristy Milward	Member and Councillor
Dr Will Milford	Member and Councillor
Dr Frank O'Keeffe	Member and Councillor
Professor Sue Walker	Member
Prof Steve Robson	Member
Dr Roy Watson	Member and Councillor
Dr Susan Fleming	Member and Councillor
Dr Sue Belgrave	Member and Councillor
Dr Marilyn Clarke	ATSI Representative
Associate Professor Kirsten Black	Member
Dr Thangeswaran Rudra	Member
Dr Nisha Khot	Member and SIMG Representative
Dr Judith Gardiner	Diplomate Representative
Dr Angela Brown	Midwifery Representative

Ms Ann Jorgensen	Community Representative
Dr Rebecca Mackenzie-Proctor	Trainee Representative
Prof Caroline De Costa	Co-opted member (ANZJOG member)
Dr Christine Sammartino	Observer

Appendix D Overview of the development and review process for this statement

i. Steps in developing and updating this statement

This statement was originally developed in July 2010 and was most recently reviewed in March 2019. The Women’s Health Committee carried out the following steps in reviewing this statement:

- Declarations of interest were sought from all members prior to reviewing this statement.
- Structured clinical questions were developed and agreed upon.
- An updated literature search to answer the clinical questions was undertaken.
- At the February 2019 committee meeting, the existing consensus-based recommendations were reviewed and updated (where appropriate) based on the available body of evidence and clinical expertise. Recommendations were graded as set out below in Appendix B part iii)

ii. Declaration of interest process and management

Declaring interests is essential in order to prevent any potential conflict between the private interests of members, and their duties as part of the Women’s Health Committee.

A declaration of interest form specific to guidelines and statements was developed by RANZCOG and approved by the RANZCOG Board in September 2012. The Women’s Health Committee members were required to declare their relevant interests in writing on this form prior to participating in the review of this statement.

Members were required to update their information as soon as they become aware of any changes to their interests and there was also a standing agenda item at each meeting where declarations of interest were called for and recorded as part of the meeting minutes.

There were no significant real or perceived conflicts of interest that required management during the process of updating this statement.

iii. Grading of recommendations

Each recommendation in this College statement is given an overall grade as per the table below, based on the National Health and Medical Research Council (NHMRC) Levels of Evidence and Grades of Recommendations for Developers of Guidelines. Where no robust evidence was available but there was sufficient consensus within the Women’s Health Committee, consensus-based recommendations were developed or existing ones updated and are identifiable as such. Consensus-based recommendations were agreed to by the entire committee. Good Practice Notes are highlighted throughout and provide practical guidance to facilitate implementation. These were also developed through consensus of the entire committee.

Recommendation category	Description	
Evidence-based	A	Body of evidence can be trusted to guide practice
	B	Body of evidence can be trusted to guide practice in most situations
	C	Body of evidence provides some support for recommendation(s) but care should be taken in its application
	D	The body of evidence is weak and the recommendation must be applied with caution

Consensus-based	Recommendation based on clinical opinion and expertise as insufficient evidence available
Good Practice Note	Practical advice and information based on clinical opinion and expertise

Appendix E Full Disclaimer

Purpose

This Statement has been developed to provide general advice to practitioners about women's health issues concerning Birth after previous Caesarean section and should not be relied on as a substitute for proper assessment with respect to the particular circumstances of each case and the needs of any person. It is the responsibility of each practitioner to have regard to the particular circumstances of each case. Clinical management should be responsive to the needs of the individual person with a birth after previous caesarean section and the particular circumstances of each case.

Quality of information

The information available in Birth after previous Caesarean section is intended as a guide and provided for information purposes only. The information is based on the Australian/New Zealand context using the best available evidence and information at the time of preparation. While the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) had endeavoured to ensure that information is accurate and current at the time of preparation, it takes no responsibility for matters arising from changed circumstances or information or material that may have become subsequently available. The use of this information is entirely at your own risk and responsibility.

For the avoidance of doubt, the materials were not developed for use by patients, and patients must seek medical advice in relation to any treatment. The material includes the views or recommendations of third parties and does not necessarily reflect the views of RANZCOG or indicate a commitment to a particular course of action.

Third-party sites

Any information linked in this statement is provided for the user's convenience and does not constitute an endorsement or a recommendation or indicate a commitment to a particular course of action of this information, material, or content unless specifically stated otherwise.

RANZCOG disclaims, to the maximum extent permitted by law any responsibility and all liability (including without limitation, liability in negligence) to you or any third party for inaccurate, out of context, incomplete or unavailable information contained on the third-party website, or for whether the information contained on those websites is suitable for your needs or the needs of any third party for all expenses, losses, damages and costs incurred.

Exclusion of liability

The College disclaims, to the maximum extent permitted by law, all responsibility and all liability (including without limitation, liability in negligence) to you or any third party for any loss or damage which may result from your or any third party's use of or reliance of this guideline, including the materials within or referred to throughout this document being in any way inaccurate, out of context, incomplete or unavailable for all expenses, losses, damages, and costs incurred.

Exclusion of warranties

To the maximum extent permitted by law, RANZCOG makes no representation, endorsement or warranty of any kind, expressed or implied in relation to the materials within or referred to throughout this guideline being in any way inaccurate, out of context, incomplete or unavailable for all expenses, losses, damages and costs incurred.

These terms and conditions will be constructed according to and are governed by the laws of Victoria, Australia.

Version	Date of Version	Pages revised / Brief Explanation of Revision
v1.1	June / 2010	WHC
v2.1	July / 2015	WHC/Dr J Harvey
v3.1	March / 2019	WHC/ Dr Ha Shin Lee

Policy Version:	Version # 3.1
Policy Owner:	Women's Health Committee
Policy Approved by:	RANZCOG Board
Review of Policy:	March / 2024