Title Page

Title: A critical review of vaginal birth rates after a primary caesarean in Queensland hospitals.

1. Jocelyn Toohill, RM MMid PhD Candidate.
2. Jenny Gamble, RM PhD Professor.
3. Debra K. Creedy, RN PhD Professor.

Author Affiliations: Jocelyn Toohill, Jenny Gamble and Debra Creedy are in the Griffith Health Institute, Griffith University, Meadowbrook, Queensland, 4131. Australia.

Correspondence Details: Address correspondence to Jocelyn Toohill, School of Nursing & Midwifery, Griffith University, University Drive, Meadowbrook, Queensland, 4131. Australia. Telephone +61 (0)7 3382 1107. Fax +61 (0) 33821277.
j.toohill@griffith.edu.au

Competing Interests: There are no competing interests to declare for any of the three authors.

Title: A critical review of vaginal birth rates after a primary caesarean in Queensland hospitals.

Abstract:

Introduction: For women with a lower uterine incision without indication for repeat caesarean section (CS), vaginal birth for their next pregnancy is a safe option. Although these women should be encouraged to consider vaginal birth after a caesarean section (VBAC) it is not consistently supported in practice. There is relatively little information on the extent to which maternal preference, birthing decisions and outcomes match best available evidence.

Aim: To describe current VBAC rates for women in Queensland, Australia and compare this to safe, achievable VBAC rates reported in national and international studies.

Method: Perinatal data from 2004 to 2011 was reviewed to determine current VBAC rates following a primary CS for women birthing in Queensland. These were compared with VBAC rates reported in the literature.

Results: Queensland has a high overall CS rate and high repeat CS rate compared to the national average. In 2010, Queensland VBAC rates in next birth following primary CS were 14% (range 13% to 21% public sector; 7% to 11% private hospitals). This is substantially lower than achievable Australian rates of 24% and international rates.

Conclusion: Low VBAC rates reflect low numbers of women commencing labour in a pregnancy subsequent to a primary CS. There is unexplained variation in VBAC rates

between maternity facilities. Clinical reviews to support evidence-based practice are warranted.

(Key Words: Next birth after caesarean; VBAC; decision making; clinical review)

What is known about the topic? Repeat caesarean section is a major contributor to high caesarean section rates in industrialized countries.

What does this paper add? Following a primary caesarean section, women in Queensland are less likely to commence labour and achieve a vaginal birth compared to rates reported in national and international VBAC studies.

What are the implications for practitioners? Maternity clinicians need to be aware of best practice and contextualize the evidence for individual women to improve VBAC rates.

Introduction

Vaginal birth following primary caesarean section (CS) is safe and appropriate for most women in a subsequent pregnancy ⁽¹⁻²⁾. However, the number of women experiencing vaginal birth after CS is reported in the international literature as declining and coincides with an overall increase in CS rates ⁽²⁻³⁾. The purpose of this paper is to identify the current incidence of vaginal birth after primary CS in Queensland hospitals, and compare these to rates reported in the literature.

Contributing Factors to the VBAC Dilemma

Caesarean section rates in Australia exceed the World Health Organisation recommendation of 10%-15% of births ⁽⁴⁻⁵⁾. The Netherlands is the only OECD country to report CS rates below 15% ⁽⁶⁾. The incidence of CS in Australia increased from 18% in 1991 ⁽⁷⁾, to 25.4% in 2001 and 31.6% in 2010 ⁽⁸⁾, yet there is no evidence to justify the current high CS rates ⁽⁹⁾.

While primary CS is a major contributor to overall CS rates, the leading reason for CS in Australia and other developed countries is attributed to repeat CS which occurs in many women without an obvious indication for this intervention ^(3, 10-11). According to Australian perinatal data for 2010, the highest rates of repeat CS are in the states of Queensland (84.4%) and Western Australia (86.7%) compared with the national average (83.6%) ⁽⁸⁾.

Women choosing to labour in their next birth following a primary CS achieve vaginal birth rates (74%) and other clinical outcomes similar to primiparous women ⁽²⁻³⁾. This means that while primary CS is an underlying problem, the next birth is a crucial event because subsequent caesarean sections incrementally increase the risk of adverse outcomes including uterine rupture, haemorrhage, hysterectomy and life-threatening conditions of placenta praevia, placenta accreta and placenta percreta ⁽¹²⁻¹⁵⁾. VBAC after primary CS increases the likelihood of subsequent vaginal birth success, and reduces the risk of uterine rupture with each further vaginal birth achieved ⁽²⁾. Therefore, apart from avoiding initial CS, the next birth after primary caesarean is the ideal time to implement strategies to facilitate success in achieving vaginal birth in women without indication for repeat CS, and reduce dose related morbidity of repeat CS.

Common clinical considerations for women undertaking VBAC relate to complications of uterine rupture for the mother and as a consequence, possible permanent harm to the baby ⁽¹⁶⁻¹⁷⁾. While uterine rupture is a risk in subsequent pregnancies following a lower segment uterine incision, it is a rare event. In an Australian study (n=29,008), the risk of complete uterine rupture was low for women having a repeat elective CS (0.01%) and for those women experiencing spontaneous labour (0.15%) ⁽¹⁸⁾. This risk increased three to five fold for women whose labour was induced and fourteen fold where spontaneous labour was augmented (1.91%). However researchers in another Australian study indicated that to avoid the harm of uterine rupture in labour for one woman following primary CS, 25,000 additional CS were required ⁽¹⁹⁾. These population based Australian studies were not included in a recent systematic review sponsored by the National Institutes of Health (NIH) which found the overall incidence for uterine rupture is 0.3% ⁽²⁾. Only one study ⁽²⁰⁾ within the NIH review concerned women birthing at term with one prior lower uterine CS incision (n=1408), finding a combined risk of 0.4% of uterine rupture for spontaneous, induced and augmented labours compared to 0% for elective repeat CS (p 0.5) ⁽²⁾.

The NIH found perinatal mortality for term infants in a subsequent pregnancy to a CS was lower in elective repeat CS compared with women who laboured (0.05% VS 0.13%) ⁽²⁾. However this finding included women with underlying medical complications at greater risk of adverse outcome regardless of labour or elective CS. Evidence assessed by the NIH indicated that 0.41 more perinatal deaths occurred among women attempting labour ⁽²⁾. Absolute risk of perinatal death associated with a labour following previous CS is low (12.9 per 10,000 births), and similar to that of nulliparous women in

labour (n=137,160; OR 1.3; 95% CI, 0.8-2.1) ⁽²¹⁾. No differences in perinatal mortality for women who chose vaginal birth compared to women who elected repeat caesarean section were reported in a recent Australian study (n=2,345), although two stillbirths and higher short term neonatal morbidity were reported in the vaginal birth group (CI, 0.2-0.8; $p=0.014$) ⁽²²⁾. This prospective study was criticized however, for analysing data by intention to treat rather than by actual mode of birth ⁽²³⁾. Therefore, while primary CS is the catalyst for increased risk of uterine rupture and perinatal death in subsequent pregnancies, quantifying the incidence remains imprecise given the many confounding factors and the large numbers of births required to investigate these rare events.

Adverse neonatal outcomes are often cited as a reason not to attempt VBAC. Hypoxic ischemic encephalopathy (HIE) in the newborn, for example, can occur as a consequence of interruption to cerebral blood supply and oxygenation to the fetal brain intrapartum, and may lead to significant impaired motor and neurodevelopment disorders or neonatal death ⁽¹⁶⁾. While studies identify HIE as a concern in VBAC particularly as a sequel to uterine rupture, the NIH reported the incidence to be low, and that it was not possible to determine a true relationship of HIE in babies born by caesarean compared to vaginal birth in the birth following a primary CS ^(2, 16, 22, 24).

To date, two randomised controlled trials (RCT) have compared outcomes of planned elective repeat CS to planned VBAC. The first investigated psychological outcomes for women and found that repeat CS offered no improved benefit for women ⁽²⁵⁾. The second, a nested RCT (n=22) was insufficiently powered to determine differences in obstetric outcomes ⁽²²⁾.

VBAC rates

Over a decade ago, an Australian multi-centre audit found variable VBAC rates (11%-44%) across the country and attributed improved VBAC rates at that time to the enthusiasm of some clinicians ⁽¹⁷⁾. One hospital safely improved VBAC rates from 28% to 52% over the four year audit period, consistent with an audit in the U.K. achieving rates of 30% to 50% ^(17, 26). However a recent Australian study in women who either preferred a vaginal birth or an elective repeat caesarean section showed an overall lower VBAC rate of 24%, and low rate of women (spontaneous or induced labour) achieving (43%) vaginal birth (n=1,237) ⁽²²⁾. In contrast a RCT conducted in China (n=298) ⁽²⁵⁾ along with two further systematic reviews of published international research reported successful vaginal births for >70% of women ⁽³⁾. This successful vaginal birth rate in women who do labour has remained constant internationally for more than two decades ⁽³⁾ and indicates when women are supported to labour they have a high chance of vaginal birth success.

Previously, a multi-centred RCT investigating a decision aid for women medically eligible for VBAC found women's preference for birth at 36 weeks was at odds with their actual birth outcome, and that birth mode remained consistent with usual practice of the facility ⁽²⁷⁾. Organisation of care and impact of this on workplace culture influences the level of support women will receive for VBAC ⁽²⁸⁻³⁰⁾. An Australian audit of midwife and obstetric staff (n=956) views on VBAC, found that almost half (47%) of respondents believed labour should not be actively encouraged ⁽³¹⁾. Eden et al., ⁽³⁾ identified that maternity system barriers limit women's access to VBAC with up to 70% of repeat CS being unnecessary. These findings pose an interesting question about typical practice,

but specifically prompted a review of VBAC trends in Queensland given concern for continued increases in CS rates despite professional guidelines affirming VBAC as a safe option for most women ^(12, 32-33).

Provision of Maternity Care in Australia

Australian women have access to publicly funded health care through the Medicare system. Within this public health system 69% of Queensland women access free hospital maternity care provided by doctors and midwives working rostered shifts ⁽³⁴⁾. The majority of remaining women choose private obstetric care (30%), with less than 1% of women accessing private midwifery care ⁽³⁴⁾. Women accessing private obstetric care have higher rates of CS compared to women receiving public care (48.6% vs. 27.7%) ⁽³⁵⁾ that is not explained by the risk profiles of Australian women accessing these services ⁽³⁶⁻³⁷⁾.

Method

VBAC rates for women following a primary CS with no intervening pregnancies and a gestation greater than 20 weeks have been reported biennially since 2004 in the state of Queensland, Australia ⁽³⁸⁾. Hospitals are de-identified and facilities with similar birthing numbers (<500, 500 – 999, 1000 – 1999, >2000) are only identified as public or private. In the first instance this publically available data for the years 2004 to 2010 were retrieved from the Queensland Health website ⁽³⁹⁻⁴²⁾ (Table 1).

To gain an understanding of VBAC rates the number of women who entered labour for the years 2006 to 2011 was obtained from the Perinatal Statistics Unit, Queensland (Personal communication Queensland Health May 19th, 2011 & November 16th, 2012).

Public and private hospital rates were provided for the number of women who achieved VBAC, the number of women with spontaneous onset or induced labour, and those with no labour (Table 2). Outcomes are reported for each public hospital with more than 1,000 births per year, but combined for all public hospitals with less than 1,000 births per annum by the Perinatal Statistics Unit and therefore vary in format and content to the biennial data. Data was analysed using the program VassarStats ⁽⁴³⁾. Chi-square and Yate's Correction for Continuity derived odds ratios (OR). A p-value less than 0.05 was considered statistically significant as determined by two-tailed Fisher Exact test.

Results

VBAC rates for women in Queensland hospitals following a primary CS decreased from 16% in 2004 (Public 23%, Private 8.9%) to 14% (Public 20%, Private 7%) in 2010 (OR 0.87, $p < 0.01$, CI 0.79-0.96) (Table 1). A significant drop in VBAC rates (OR 0.79, $p < 0.0001$, CI 0.71-0.88) occurred between the years 2004 (16.1%) and 2006 (13.2%) with rates remaining stable since that time (Table 1). Women receiving public maternity care between 2004 and 2010 were three times more likely to achieve VBAC in their next birth than women receiving private care (OR 3.11, $p < 0.0001$, C.I. 2.88 – 3.36). Higher VBAC rates for women in public care remained unchanged for the period 2006 to 2010 (OR 3.15, $p < 0.0001$; C.I. 2.88 – 3.45) (Table 1).

Across Queensland public hospitals the number of women in their next birth following a primary CS increased by 16% (3,539 to 4,120) compared to a 12% overall increase in births for the period 2006 to 2011 (Table 2). Private hospitals had an increase of 8%

(2,944 to 3,170) women compared to a 4% overall increase in births within this sector over the same period, however the number of women accessing private sector care peaked in 2008. Women having a next birth after primary CS comprised 12.9% to 13.3% (public = 9.1% to 9.4%; private = 16.6% to 17.2%) of the total Queensland birthing population across the years 2006 to 2011. Over this period there was no change in the number of women who commenced labour after primary CS (spontaneous or induced) in either sector of care (Public hospitals 36.6% to 35.2%, OR 0.94, p 0.19, CI 0.86-1.03; Private hospitals 19.9% to 19%, OR 0.94, p 0.36, CI 0.83-1.09). However, women in public care were twice as likely to commence labour (spontaneous or induction) than women in private hospitals (OR 2.3, p <0.0001, CI 2.07-2.58).

For women who commenced labour, there was a non statistically significant reduction in the number of vaginal births achieved in public hospitals for the period 2006 to 2011 (52.3% to 50.4%, O.R. 0.92, p 0.35, C.I. 0.80-1.08) but a significant improvement in vaginal birth success rates within the private sector (30.3% to 40%, OR 1.53, p<0.001, CI 1.21-1.95) (Table 2). However trial of labour success remained higher in public care compared to the private sector although the difference reduced over time (Year 2006 OR 2.5, p<0001, CI 2.04-3.09; Year 2011 OR 1.5, p<0001, CI 1.26-1.85). VBAC rates varied by hospital and facility size, with VBAC rates in public hospitals ranging from 8% to 27% in 2011 (Table 1, Figure 1).

Discussion

Australian CS rates continue to climb with Queensland rates consistently higher than the national average and higher rates in private hospitals ^(8, 11). In 2001 Robson ⁽⁴⁴⁾ developed a Ten Group Obstetric Classification Scheme to examine groups of women who experience CS. The scheme differentiated women by parity, gestation, previous CS scar, lie and presentation of baby, and course of the woman's labour. Following a review of Queensland CS trends for the period 1997-2006 and based on Robson's Classification Scheme, analysis confirmed that the major contributor (17.6%) to overall CS rates was a previous CS even though most women are likely candidates for VBAC ⁽¹⁰⁾. VBAC rates increased across selected Australian hospitals from 24% to 30% due to clinician support of VBAC ⁽¹⁷⁾. This indicates that clinical culture is an important driver to reducing CS rates particularly following primary CS.

The current Queensland VBAC rate of 14% contrasts with Australian rates achieved within dedicated VBAC studies of 25% in the year 1997, and 21% following primary CS in the years 1998-2000, and 24% in the years 2002-2007 ^(17-18, 22). VBAC rates of between 9% - >50% (USA and other OECD countries) and 49% - 87% (countries outside USA) have been reported without explanation for this variation ^(3, 45). Similarly in our review, disparate VBAC rates (8% and 27%) were found between two public regional hospitals with similar birthing numbers, and Queensland tertiary centres (13% and 23%) for the year 2011.

Our review of available data, found that the percentage of women in next birth following primary CS exceeds the growth in birthing numbers and indicates the cumulative effect

on CS rates if VBAC is not addressed and improved. Although Queensland perinatal data does not provide direct comparison of women in next birth after caesarean section to women included in dedicated studies, it does indicate significant missed opportunity to improve vaginal birth rates. This becomes more obvious from our review of Queensland data when in 2011 around one in eight birthing women (public = 9.4%; private = 17.2%) were in their next birth after primary caesarean section with more than two-thirds of these women having elective repeat CS (public = 64.8%; private = 81%). Success rates for women achieving vaginal birth who elect to labour in next birth after caesarean section is around 74% ^(8, 33-35). However the current Queensland outcome is substantially lower at 45% (public = 50.4%; private = 40%; Table 2) and also lower than recent Australian studies where vaginal birth was successful for between 55 to 66% of next birth after caesarean section women ^(18, 22, 46). The recent systematic literature review of VBAC outcomes by NIH prompted the release of a consensus statement calling on organizations to facilitate access to VBAC ^(2, 47). Subsequently U.S., Australian and U.K. groups updated their professional guidelines albeit containing recommendations for birth to occur in facilities with ready emergency support services despite lack of evidence for this caveat ^(12, 33, 48). Furthermore, restricting place of birth has contributed to the downturn in VBAC rates ⁽⁴⁹⁾.

U.S. and Australian professional guidelines do not definitively restrict access to VBAC yet they do not explicitly recommend VBAC over repeat CS, and this may create a barrier to VBAC uptake and a belief that either mode of birth are reasonable options ^(12, 48). This reserved approach allows for application of guidelines to include women who may have higher risks, but also has the potential to play down both short and long term

effects of CS in women with minimal risk, and the importance of decision-making in next birth after CS for future childbearing. While there are tradeoffs between determining VBAC or repeat CS for mother and baby, the U.K. guideline makes clear that poor outcomes are very rare ⁽³³⁾. Decisions around mode of birth may increase morbidity for women who experience an unplanned CS in labour compared to those who have an uncomplicated VBAC or elective repeat CS ⁽¹²⁾. However in the absence of clear advice, women may have difficulty determining the best birth pathway, and clinicians may lack confidence to support vaginal birth.

In 2009, a Queensland clinical guideline indicated that women be counseled in their VBAC option ⁽³²⁾. However, in 2011 only three of the twelve hospitals with more than one thousand births per year demonstrated improved VBAC rates (Figure 1). Despite evidence indicating that women can achieve vaginal birth if supported to do so ⁽⁵⁰⁾ clinicians perceive VBAC as “risky” even though there is little difference in the absolute risk for morbidity and mortality for women who labour and those who elect repeat CS ^(16, 22, 33). How information is conveyed and choices interpreted or accepted by women depend on different situational factors. These include previous birth outcomes, insurance status and model of maternity care, literacy level and communication skills, philosophical and socio-cultural backgrounds. Nevertheless opportunities to improve vaginal birth and decrease CS rates appear to be largely neglected. Consistent with international trends, Australian studies indicate that women attempting labour after caesarean has steadily declined over the last decade, resulting in lower VBAC rates and contributing to increasing CS rates ^{3, 45, 51-52}. This is despite the majority of women preferring vaginal birth both prior to, and following a caesarean section ^(27, 46, 53).

For Queensland in the year 2011, 27% of women entered labour with 45% of those women achieving vaginal birth compared to an international rate of 64% commencing labour and 74% having a successful trial of labour ³. Improved trial of labour outcomes within the private sector in our review is encouraging, however higher CS rates and low VBAC rates in Queensland are pronounced in private sector care. Our review indicates labour is less likely to be supported in Queensland compared to international rates ³. However Queensland (as does Western Australia) covers large geographic areas whereby facilities supporting VBAC may be limited.

Decision-making or Decision-made

Despite the antenatal period being an opportune time to speak with women, listen to their preferences and provide information and evidence specific to women's personal circumstances, generalised advice is commonly provided due to the content of professional guidelines and organisation of care. Women are seldom afforded the opportunity to explore with their health care provider the events that transpired in their previous pregnancy and birth or to clarify strategies that may assist in achieving a different outcome in the current pregnancy ⁵⁴. Additionally, practitioners may have limited capacity to support women in securing a birth option outside organisational norms ²⁷.

Gaps have been identified in the literature around decision making in next birth after CS with recommendations that maternity service providers improve access, as well as understanding and application of evidence to care ^{2, 55}. It has been recently demonstrated that an antenatal midwife-led service dedicated to improving women's

experiences in their next pregnancy following a primary CS, safely increased VBAC rates from 46% to 57% in the years 2009-2011 ⁴⁶. Furthermore, evidenced based information and decision support resources are readily available ⁵⁶⁻⁵⁷. It is essential that these and other interventions are identified, evaluated and shared to enable women to make informed and supported decisions in their next birth after CS. However, maternity clinicians as guardians of safe birth need to assess their approach to balanced information sharing and re-engineer current maternity conventions to increase VBAC rates. A balanced representation of the most likely positive birth outcomes without trivialising or overstating significant but less likely adverse outcomes is required. Additionally where women are considered favourable to labour, this must be encouraged and then managed and monitored conservatively to ensure only necessary repeat CS occur.

Limitations

No demographic or complicating obstetric factors were provided for the annual or biennial data therefore the overall Queensland VBAC rate following a primary CS does not exclude women who may be considered ineligible for vaginal birth as would occur in dedicated studies. All births greater than 20 weeks gestation were included, therefore the number of successful preterm VBAC births is unknown and rates may contrast for term pregnancies. Comparison of outcomes between private obstetric services was not possible due to receiving cumulative data for all private hospitals. Annual data varies slightly from biennial data due to availability of completed data at time of publishing on the website, therefore some variation in numbers occur.

Conclusion

Reducing avoidable repeat CS in women eligible for vaginal birth is an important health strategy. Based on current repeat CS rates compared to achievable VBAC rates, women and their babies are avoidably exposed to morbidity.

VBAC following a primary CS is a relatively safe option for women without other complicating factors. Despite vaginal birth outcomes being similar in women with one previous CS to women in their first pregnancy, uptake of VBAC in Queensland is low, and for those who do labour the success rate is also low.

VBAC rates vary considerably between public and private obstetric care and between facilities of similar size without clear explanation for these variations. Maternity clinicians need to consider how their own practice, their ability to contextualize the evidence for individual women, and application of professional skills and guidelines may contribute to improving VBAC rates.

Table 1. VBAC following a primary caesarean section by public and private sector facility size.

	2004		2006		2008		2010		2004-2010	
No. of births	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
>2000	21.7% n 309	7% n 73	19.8% n 377	6.5% n 75	20.7% n 529	6.8% n 79	20.7% n 506	9.3% n 68	1721	295
1000-1999	27.4% n 264	8.9% n 62	21.1% n 208	4.7% n 47	18.8% n 173	4.5% n 53	20.6% n 249	4.9% n 85	894	247
500 - 999	19.1% n 42	10.2% n 56	21.4% n 37	8.9% n 49	19.6% n 26	12.2% n 96	14.9% n 10	11.4% n 65	115	266
<500	15.8% n 38	11.8% n 50	9.3% n 26	8.3% n 36	11.5% n 36	14.8% n 33	13.3% n 41	7% n 18	141	137
Sub-total	23% n 653	8.9% n 241	19.4% n 648	6.6% n 207	19.5% n 764	7.8% n 261	20% n 806	7.1% n 236	2871	945
									(O.R.3.11; p<0.0001)	
Denominator	2847	2705	3341	3136	3920	3342	4035	3307	14,143	12,490
Total VBAC	894/5552		855/6477		1025/7262		1042/7342		3816/26,633	
rate	16.1%		13.2%		14.1%		14.2%		O.R.0.87; p<0.01	

The rate of vaginal birth following primary Caesarean Section as a proportion of all mothers who had a previous primary Caesarean Section (%) in public and private facilities by facility size³⁹⁻⁴². *Excludes homebirths.

Table 2. Outcomes in Next Birth After Primary Caesarean in Queensland

Total Statewide Births by insurance status = n (%)	2006 Qld Births		2007 Qld Births		2008 Qld Births*		2009 Qld Births*		2010 Qld Births*		2011 Qld Births*	
	N = 56,708		N = 60,244		N = 61,402		N = 62,052		N = 62,032		N = 62,180	
	Pub= 39,024 (69%)		Pub= 41,853 (69%)		Pub=42,527 (69%)		Pub=43,139 (70%)		Pub=43,187 (70%)		Pub=43,768 (70%)	
	Priv= 17,682 (31%)		Priv=18,390 (31%)		Priv=18,872 (31%)		Priv=18,193 (30%)		Priv=18,845 (30%)		Priv=18,410 (30%)	
Women in Next Birth After Caesarean	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
	3,539 (9.1%)	2,944 (16.6%)	3,860 (9.2%)	3,060 (16.6%)	3,920 (9.2%)	3,347 (17.7%)	4,115 (9.5%)	3,354 (18.4%)	4,035 (9.3%)	3,315 (17.6%)	4,120 (9.4%)	3,170 (17.2%)
Caesarean No Labour	2,242 (63.4%)	2,357 (80.1%)	2,446 (63.4%)	2,439 (79.7%)	2,393 (61%)	2,644 (79%)	2,540 (61.7%)	2,705 (80.7%)	2,468 (61.2%)	2,694 (81.3%)	2,670 (64.8%)	2,568 (81%)
Induction or Spontaneous Labour	1,297 (36.6%)	587 (19.9%)	1,414 (36.6%)	621 (20.3%)	1,527 (39%)	703 (21%)	1,576 (38.3%)	649 (19.3%)	1,567 (38.8%)	621 (18.7%)	1450 (35.2%)	602 (19%)
Trial of Labour Success Rate	678 (52.3%)	178 (30.3%)	707 (50%)	264 (42.5%)	764 (50%)	266 (37.8%)	771 (48.9%)	260 (40%)	806 (51.4%)	244 (39.3%)	731 (50.4%)	241 (40%)
VBAC Rate (per 100 women in next birth after primary caesarean)	678 (19.2%)	178 (6%)	707 (18%)	264 (8.6%)	764 (19.5%)	266 (7.9%)	771 (18.7%)	260 (7.8%)	806 (20%)	244 (7.4%)	731 (17.7%)	241 (7.6%)

Source: Perinatal Data Collection Unit, Queensland Health (Personal Communication data extracted May 19, 2011 & November 16, 2012). *Includes VBAC homebirths.

Figure 1. Queensland public hospital VBAC rates by facility 2009 and 2011

*Hospital 13 is the combined rate of public facilities with less than 1,000 births per annum

References

1. Rossi AC, D'Addario V. Maternal morbidity following a trial of labor after cesarean section vs elective repeat cesarean delivery: a systematic review with metaanalysis. *Am J Obstet Gynecol*. 2008;199(3):224-31.
2. Guise J, Eden K, Emeis C, Denman M, Marshall N, Fu R, et al. Vaginal Birth After Cesarean: New Insights. Evidence Report/Technology Assessment No.191. (Prepared by the Oregon Health & Science University Evidence-based Practice Center under Contract No. 290-2007-10057-I). AHRQ Publication No. 10-E003. Rockville, MD: Agency for Healthcare Research and Quality 2010.
3. Eden KB, Denman MA, Emeis CL, McDonagh MS, Fu R, Janik RK, et al. Trial of Labor and Vaginal Delivery Rates in Women with a Prior Cesarean. *J Obstet Gynecol Neonatal Nurs* [serial on the Internet]. 2012: Available from: <http://dx.doi.org/10.1111/j.1552-6909.2012.01388.x>.
4. Gibbons L, Belizán J, Lauer J, Betrán A, Merialdi M, Althabe F. The Global Numbers and Costs of Additionally Needed and Unnecessary Caesarean Sections Performed per Year: Overuse as a Barrier to Universal Coverage. *World Health Report* (2010) Background Paper, No 30. World Health Organisation <http://www.who.int/healthsystems/topics/financing/healthreport/30C-sectioncosts.pdf>2010.
5. World Health Organization. Appropriate technology for birth. *Lancet*. 1985;2:436-7.
6. OECD. Caesarean sections, in OECD, *Health at a Glance 2009: OECD Indicators*. OECD Publishing; 2009; Available from: http://www.oecd-ilibrary.org/social-issues-migration-health/health-at-a-glance-2009/caesarean-sections_health_glance-2009-44-en.

7. Lancaster P, Huang J, Pedisich E. Australia's Mothers and Babies 1991, Australian Institute of Health and Welfare National Perinatal Statistics Unit Perinatal Statistics Series Number 11994.
8. Li Z, Zeki R, Hilder L, Sullivan E. Australia's mothers and babies 2010. Perinatal statistics series no. 27. Cat. no. PER 57. Canberra: AIHW National Perinatal Epidemiology and Statistics Unit. 2012.
9. Department of Health and Ageing. Improving Maternity Services in Australia -The Report of the Maternity Services Review. Canberra: Commonwealth of Australia; 2009.
10. Howell S, Johnston T, Macleod S-L. Trends and determinants of caesarean sections births in Queensland, 1997–2006. Aust N Z J Obstet Gynaecol. 2009;49(6):606-11.
11. Li Z, McNally L, Hilder L, Sullivan E. Australia's mothers and babies 2009. Perinatal statistics series no. 25. Cat. no. PER 52 Sydney: AIHW National Perinatal Epidemiology and Statistics Unit; 2011.
12. American College of Obstetricians and Gynecologists. Clinical Management Guidelines for Obstetrician - Gynecologists Vaginal Birth After Previous Cesarean Delivery. Practice Bulletin. 2010;116(2 Part 1, August):450-63.
13. Landon M, Spong C, Thom E, Hauth J, Bloom S, Varner M, et al. Risk of Uterine Rupture With a Trial of Labor in Women With Multiple and Single Prior Cesarean Delivery. Obstet Gynecol. 2006;108(1):12-20.
14. Silver R, Landon M, Rouse D, Leveno K, Spong C, Thom E, et al. Maternal Morbidity Associated With Multiple Repeat Cesarean Deliveries. Obstet Gynecol. 2006;107(6):1226-32.
15. Marshall N, Fu R, Guise J-M. Impact of multiple cesarean deliveries on maternal morbidity: a systematic review. Am J Obstet Gynecol. 2011;205(262):e1-8.

16. Go M, Emeis C, Guise J, Schelonka R. Fetal and Neonatal Morbidity and Mortality Following Delivery After Previous Cesarean. *Clin Perinatol*. 2011;38(2):311-9.
17. Appleton B, Targett C, Rasmussen M, Readman E, Sale F, Permezel M. Vaginal birth after caesarean section: an Australian multicentre study. *Aust NZ J Obstet Gynaecol*. 2000;40:87 - 91.
18. Dekker G, Chan A, Luke C, 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*. 2010;117(11):1358-65.
19. Taylor L, Simpson J, Roberts C, Olive E, Henderson-Smart D. Risk of complications in a second pregnancy following caesarean section in the first pregnancy: a population-based study. *Med J Aust*. 2005;183 (10): 515-9.
20. Loebel G, Zelop C, Egan J, Wax J. Maternal and neonatal morbidity after elective repeat Cesarean delivery versus a trial of labor after previous Cesarean delivery in a community teaching hospital. *J Matern Fetal and Neonatal Med*. 2004;15:243–6.
21. Smith G, Pell J, Cameron A, Dobbie R. Risk of Perinatal Death Associated With Labor After Previous Cesarean Delivery in Uncomplicated Term Pregnancies. *JAMA*. 2002;287(20):2684-90.
22. Crowther C, Dodd J, Hiller J, Haslam R, Robinson J. Planned vaginal birth or elective repeat caesarean: patient preference restricted cohort with nested randomised trial. *PLOS Med* [serial on the Internet]. 2012; 9(3).
23. Kotaska A. Quantifying VBAC Risk: Muddying the Waters. *Birth*. 2012;39(4):333-7.
24. Landon M, Hauth J, Leveno K, Spong C, Leindecker S, Varner M, 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.

25. Law L, Pang M, Chung T, Lao T, Lee D, Leung T, et al. Randomised trial of assigned mode of delivery after a previous cesarean section – Impact on maternal psychological dynamics. *J Matern Fetal and Neonatal Med.* 2010;23 (10):1106–13.
26. National Collaborating Centre for Women’s and Children’s Health. *Caesarean Section Clinical Guideline*, RCOG Press 2004 [cited 2011 14th April]; Available from: <http://www.nice.org.uk/nicemedia/live/10940/29334/29334.pdf>
27. Shorten A, Shorten B, Keogh J, West S, Morris J. Making choices for childbirth: a randomized controlled trial of a decision-aid for informed birth after cesarean. *Birth.* 2005;32(4):252-61.
28. Fenwick J, Gamble J, Hauck Y. Reframing birth: a consequence of cesarean section. *J Adv Nurs.* 2006;56(2):121-30.
29. Kamal P, Dixon-Woods M, Kurinczuk JJ, Oppenheimer C, Squire P, Waugh J. Factors influencing repeat caesarean section: qualitative exploratory study of obstetricians' and midwives' accounts. *BJOG.* 2005;112(8):1054-60.
30. McGrath P, Ray-Barruel G. The easy option? Australian findings on mothers' perception of elective Caesarean as a birth choice after a prior Caesarean section. *Int J Nurs Pract.* 2009;15:271–9.
31. Appleton B, Targett C, Rasmussen M, Readman E, Sale F, Permezel M. Knowledge and attitudes about vaginal birth after caesarean section in Australian hospitals. *Aust NZ J Obstet Gynaecol.* 2000;40:195 - 9.
32. Statewide Maternity and Neonatal Clinical Guidelines Program. *Vaginal birth after caesarean section (VBAC)*. Brisbane: Queensland Health; 2009; MN0911.12-V1-R11:[Available from: http://www.health.qld.gov.au/cpic/documents/mguide_VBACv4.pdf.
33. National Collaborating Centre for Women’s and Children’s Health. *Caesarean section, NICE clinical guideline*. 2nd Ed. London: RCOG Press 2011 [cited 2011 15th December]; Available from: <http://guidance.nice.org.uk/CG132/Guidance/pdf/English>.

34. Queensland Health. Health Statistics Centre Perinatal Statistics 2010. 2012 [cited 2012 12th December]; Available from: <http://www.health.qld.gov.au/hic/Peri2010/perinatal10.asp>.
35. Humphrey M. Maternal and Perinatal Mortality and Morbidity in Queensland. Queensland Maternal and Perinatal Quality Council Report Brisbane: Queensland Health; 2011 [cited 2012 12th December]; Available from: <http://www.health.qld.gov.au/maternity/docs/qmpqc-report-2011.pdf>.
36. Miller YD, Prosser SJ, Thompson R. Going public: Do risk and choice explain differences in caesarean birth rates between public and private places of birth in Australia? *Midwifery*. 2012;28(5):627-35.
37. Dahlen H, Tracy S, Tracy M, Bisits A, Brown C, Thornton C. Rates of obstetric intervention among low-risk women giving birth in private and public hospitals in NSW: a population-based descriptive study *BMJ Open* 2012;0:e001723 doi:10.1136/bmjopen-2012-001723 2012. p. 8.
38. Queensland Health. Perinatal Data Collection. [cited 2011 19th May]; Available from: <http://www.health.qld.gov.au/hic/default.asp#perinatal>.
39. Queensland Health. Clinical Indicators for public and private facilities by facility size <http://www.health.qld.gov.au/hic/peri2004/RACOGCI.pdf>. 2004.
40. Queensland Health. Clinical Indicators for public and private facilities by facility size <http://www.health.qld.gov.au/hic/peri2006/RACOGCI.pdf>. 2006.
41. Queensland Health. Clinical Indicators for public and private facilities by facility size http://www.health.qld.gov.au/hic/peri2008/1_Clinical%20Indicators.pdf. 2008.

42. Queensland Health. Clinical Indicators for public and private facilities by facility size
http://www.health.qld.gov.au/hic/Peri2010/2_clinical%20ind_2010.pdf. 2010.
43. Lowry R. VassarStats Website for Statistical Computation. <http://vassarstats.net/index.html>. New York 1998 [cited 2013 24th May].
44. Robson MS. Can we reduce the caesarean section rate? Best Practice & Research Clinical Obstetrics & Gynaecology. 2001;15(1):179-94.
45. MacDorman M, Declercq E, Menacker F. Recent Trends and Patterns in Cesarean and Vaginal Birth After Cesarean (VBAC) Deliveries in the United States. Clin Perinatol. 2011;38(2):179-92.
46. Hall A, Hardwick T, Hauck Y. Women's satisfaction with the Next Birth After Caesarean service. Midwifery News. 2012;Winter, 12(2):7-9.
47. Cunningham FG, Bangdiwala S, Brown SS, Dean TM, Frederiksen M, Rowland Hogue CJ, et al. National Institutes of Health Consensus Development Conference Statement: Vaginal Birth After Cesarean: New Insights. March 8—10, 2010. Obstetrics & Gynecology. 2010;115(6):1279–95.
48. The Royal Australian and New Zealand College of Obstetricians and Gynaecologists. Planned Vaginal Birth after Caesarean Section (Trial of Labour) (C-Obs 38). Retrieved 27th November, 2011, from <http://www.ranzcog.edu.au/womens-health/statements-a-guidelines/college-statements/441-planned-vaginal-birth-after-caesarean-section-trial-of-labour-c-obs-38.html>. 2010.
49. Foureur M, Ryan CL, Nicholl M, Homer C. Inconsistent Evidence: Analysis of Six National Guidelines for Vaginal Birth After Cesarean Section. Birth. 2010;37(1):3-10.

50. Halvorsen L, Nerum H, Sorlie T, Oian P. Does counsellor's attitude influence change in a request for a caesarean in women with fear of birth? *Midwifery* 2010;26 45–52.
51. Homer C, Johnston R, Foureur M. Birth after caesarean section: changes over a nine-year period in one Australian state. *Midwifery*. [doi: DOI: 10.1016/j.midw.2009.04.009]. 2010;In Press, Corrected Proof.
52. Dodd J, Crowther C. Vaginal birth after Caesarean versus elective repeat Caesarean for women with a single prior Caesarean birth: A systematic review of the literature. *Aust N Z J Obstet Gynaecol*. 2004;44(5):387-91.
53. Gamble J, Creedy D, McCourt C, Weaver J, Beake S. A Critique of the Literature on Women's Request for Cesarean Section. *Birth*. 2007;34(4):331-9.
54. Gamble J, Creedy D. A counselling model for postpartum women after distressing birth experiences. *Midwifery*. 2009;25:e21-e30.
55. Chen MM, Hancock H. Women's knowledge of options for birth after Caesarean Section. *Women and Birth*. 2012;25(3):e19-e26.
56. Queensland Centre for Mothers and Babies. The Having a Baby in Queensland Book - Your choices during pregnancy and birth University of Queensland; 2010; Available from:
http://www.qcmb.org.au/the_having_a_baby_in_queensland_book/menu/research_projects.
57. Shorten A. My last birth was a caesarean? What are my options. The Women's - The Royal Women's Hospital Melbourne.
http://www.thewomens.org.au/uploads/downloads/HealthInformation/Publications/VBAC_2010.pdf. 2007.