

## REVIEW PAPER

# Non-clinical interventions that increase the uptake and success of vaginal birth after caesarean section: a systematic review

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## Abstract

**Aim.** The aim of this study was to review non-clinical interventions that increase the uptake and/or the success rates of vaginal birth after caesarean section.

**Background.** Increases in rates of caesarean section are largely due to repeat caesarean section in a subsequent pregnancy. Concerns about vaginal birth after caesarean section have centred on the risk of uterine rupture. Nonetheless, efforts to increase the vaginal birth rate in these women have been made. This study reviews these in relation to non-clinical interventions.

**Data sources.** Literature was searched up until December 2008 from five databases and a number of relevant professional websites.

**Review methods.** A systematic review of quantitative studies that evaluated a non-clinical intervention for increasing the uptake and/or the success of vaginal birth after caesarean section was undertaken. Only study designs that involved a comparison group were included. Further exclusions were imposed for quality using the Critical Skills Appraisal Programme.

**Results.** National guidelines influence vaginal birth after caesarean section rates, but a greater effect is seen when institutions develop local guidelines, adopt a conservative approach to caesarean section, use opinion leaders, give individualized information to women, and give feedback to obstetricians about mode of birth rates. Individual clinician characteristics may impact on the number of women choosing and succeeding in vaginal birth after caesarean section. There is inconsistent evidence that having private health insurance may be a barrier to the uptake and success of vaginal birth after caesarean section.

**Conclusion.** Non-clinical factors can have a significant impact on vaginal birth after caesarean section uptake and success.

**Keywords:** caesarean section, hospitals, intervention studies, literature review, maternity, midwifery, systematic review, vaginal birth after caesarean section

## Introduction

Caesarean rates have increased around the world in the past two decades (Lumbiganon *et al.* 2010). Most of the increase in rates of caesarean section (CS) is due to repeat CS in a subsequent pregnancy (Thomas *et al.*, 2001; Guise *et al.* 2003). The UK National Sentinel Caesarean Section Audit reported a mean vaginal birth after caesarean (VBAC) rate of 33%, with a range between units of 6–64% (Thomas *et al.*, 2001). In Australia in 2006, only 16.6% of women with a history of caesarean section gave birth vaginally (Laws & Hilder 2008). The reasons are not well researched but may include: fear of uterine rupture in a subsequent labour and birth; fear on the part of healthcare providers who do not offer any choice other than a repeat CS; and convenience for women and clinicians. There are also wide variations in practice guidelines (Foureur *et al.* 2010). An Australian study showed how discourses with women, positioned caesarean section as a preferential means of birth and as the safe and ordered option (Bryant *et al.* 2007).

There is no doubt obstetricians' fear of litigation and/or desire for convenience also contributes to rising rates of CS (Hopkins 2000). Other studies have suggested that maternal preference is a factor driving increasing rates of caesarean (Kerr-Wilson 2001) because women fear the pain of vaginal birth (Weaver *et al.* 2007), have concerns about postpartum sexual function (Lin & Xirasagar 2005) and the safety of the baby (Villar *et al.* 2007). A range of personal and societal reasons, including fear of birth and perceived inequality and inadequacy of care, underpins requests for repeat CS (Mccourt *et al.* 2007). The evidence for large proportions of women requesting CS in the absence of clinical indications has been shown to be weak in a recent study (Weaver *et al.* 2007). Psychological issues and maternal perceptions of risk were found to be significant factors in many maternal requests.

Caesarean section is not without risk to the woman and the infant in both the short and long term (Morrison *et al.* 1995, Macdorman & Singh 1998, Smith *et al.* 2004, Villar *et al.* 2006, Richter *et al.* 2007). There is also evidence that indicates women who give birth to their infants by caesarean section have more negative perceptions of their birth experience, themselves and their infants, exhibit poorer parenting behaviours and may be at higher risk for postpartum mood disturbance compared to women delivering their infants vaginally (Lobel & Deluca 2007). Therefore it is important to articulate those risks so that women can make an informed choice about a repeat caesarean section or attempt a vaginal birth in a subsequent pregnancy. Articulation of risk in a form that is useful to women and their care providers has not been successfully undertaken to date although recent Austra-

lian research has provided an insight into the different levels of risk in relation to vaginal birth over CS accepted by women and clinicians (doctors and midwives) (Shorten *et al.* 2005).

There is evidence that successful vaginal birth after a caesarean section has a probability of 73% (Landon *et al.* 2004) or greater and that trial of labour is more cost-effective and provides a higher quality of life (Traynor & Peaceman 1998, Guise *et al.* 2003). It is offered as a choice in many settings. Research that endeavours to understand the many factors that impact women's and healthcare provider choices and to understand which models of care or interventions provide the best chance of VBAC success is critical.

A number of evidence-based interventions have been shown to be effective in increasing women's knowledge about birth choices, increasing VBAC, and/or reducing CS rates (Shorten *et al.* 2005, Chaillet & Dumont 2007). These have been implemented sporadically, but for the most part, have not been widely disseminated into practice. No overall package of care has been created with the aim of increasing the rate of normal birth, and particularly VBAC.

Both clinical and non-clinical interventions are important regarding the uptake and/or success of VBAC. Clinical interventions involve practices directly affecting women before or during pregnancy or labour (e.g. induction of labour methods, epidural use, X-ray pelvimetry), and non-clinical interventions are those that influence VBAC in a more system-led way (e.g. use of practice guidelines, information for women and clinician characteristics). The distinction between non-clinical and clinical interventions is important as they both require different approaches from a range of disciplines to change practice and improve VBAC rates.

This paper reviews randomized trials and non-randomized studies that evaluated any non-clinical intervention designed to either increase the proportion of women choosing a VBAC or increase the VBAC success rate. This was undertaken to identify which interventions could be tested together in an overall package of care. Clinical interventions which influence the uptake and success of VBAC are reported elsewhere (Catling-Paul *et al.* 2010).

## Method of review

### Aim

The aim of this review was to identify the most effective ways to increase the rate of VBAC. The focus was on identifying the most effective interventions (before and during pregnancy and during labour) that would increase both the uptake of attempted VBAC and/or the rate of successful VBAC.

## Design

A systematic review of quantitative studies was carried out using the Cochrane Guidelines for a Systematic Review (Higgins & Green 2009) with specific adaptations. Due to the scarcity of Randomised Controlled Trials (RCT), a greater range of studies was chosen for inclusion in the review. The Critical Appraisal Skills Programme (CASP) (Public Health Resource Unit, 2007) for quantitative studies was used to critique papers for quality.

## Search methods

The PICO principles (population, intervention, comparison and outcome) were used to formulate clinical questions that guided the search strategy (Richardson *et al.* 1995). The questions were: What is the uptake and success rates of VBAC (O) for women who have had a previous caesarean section (P) comparing a range of interventions (I) compared with no intervention or different interventions (C). Essentially, we were interested in what makes a difference to the VBAC uptake and success rates.

An unrestricted search of CDSR (Cochrane Database of Systematic Reviews), CINAHL (Cumulative Index to Nursing & Allied Health), Ovid MEDLINE(R), MIDIRS (Maternity and Infant Care), and PsycINFO was undertaken to determine any studies that evaluated an intervention for VBAC. Government health websites and obstetric and midwifery professional organization websites were searched. Reference lists of relevant articles, including any guidelines and reviews, were also examined. All studies that evaluated an intervention for increasing either the uptake of and/or the success of VBAC were considered for inclusion. Only study designs that involved a comparison group were considered appropriate (randomized controlled trials, cohort studies, case control studies and before and after studies). Studies that did not report VBAC uptake or success rates were excluded. All studies were considered up to December 2008. Systematic reviews were used to source further publications but were not included as part of this review. Only primary sources were considered appropriate for this review.

Keywords used: 'Intervention' and 'Pregnancy Outcome' with 'Vaginal Birth After C(a)esarean/Caesarian', 'VBAC', 'Trial of Labo(u)r', 'C(a)esarean/Caesarian Section', and 'C(a)esarean/Caesarian Section, repeat'.

## Quality appraisal

Studies were rated using the Critical Appraisal Skills Programme (CASP) (Public Health Resource Unit, 2007).

CASP is a specifically developed internationally used programme designed to encourage an evidence-based approach to health and social care. Scores were given related to quality: < 5 – Poor, 6–9 – Fair, and 10–12 – Good. Studies deemed poor were evaluated by a second reviewer to confirm the rating and thus their exclusion. This resulted in two studies moving from poor to fair. Finally, 31 studies were deemed good, 30 fair and 17 poor. Hence, there were 61 good or fair included studies, 27 covering non-clinical interventions and 34 covering clinical interventions to either increase the uptake and/or success of VBAC (Figure 1). The 27 studies reporting non-clinical interventions are included in this review.

## Data abstraction and synthesis

Three independent reviewers extracted data that described a non-clinical intervention to increase the uptake and/or success of VBAC, and had a comparison group. Papers were then grouped into three major categories and a narrative summary was undertaken. A meta-analysis was not appropriate due to the heterogeneity and lack of studies.

Studies were included that did not report full statistical data on their outcomes. The inclusion of studies with inadequate statistical reporting is recognized as a possible potential for bias, and a weakness of the study. However, given the lack of research in this field, exclusion of these studies would have restricted this review.

## Findings

The search found five RCTs concerning non-clinical interventions for increasing VBAC uptake or success. There were nine retrospective and one prospective cohort studies, one case-control study and eleven before and after studies (Table 1). Characteristics of the studies are summarized in Table 2. The findings are presented in the next section by topic or thematic category. The main headings are Information/guidelines for providers, Context/style of care, and Information for women.

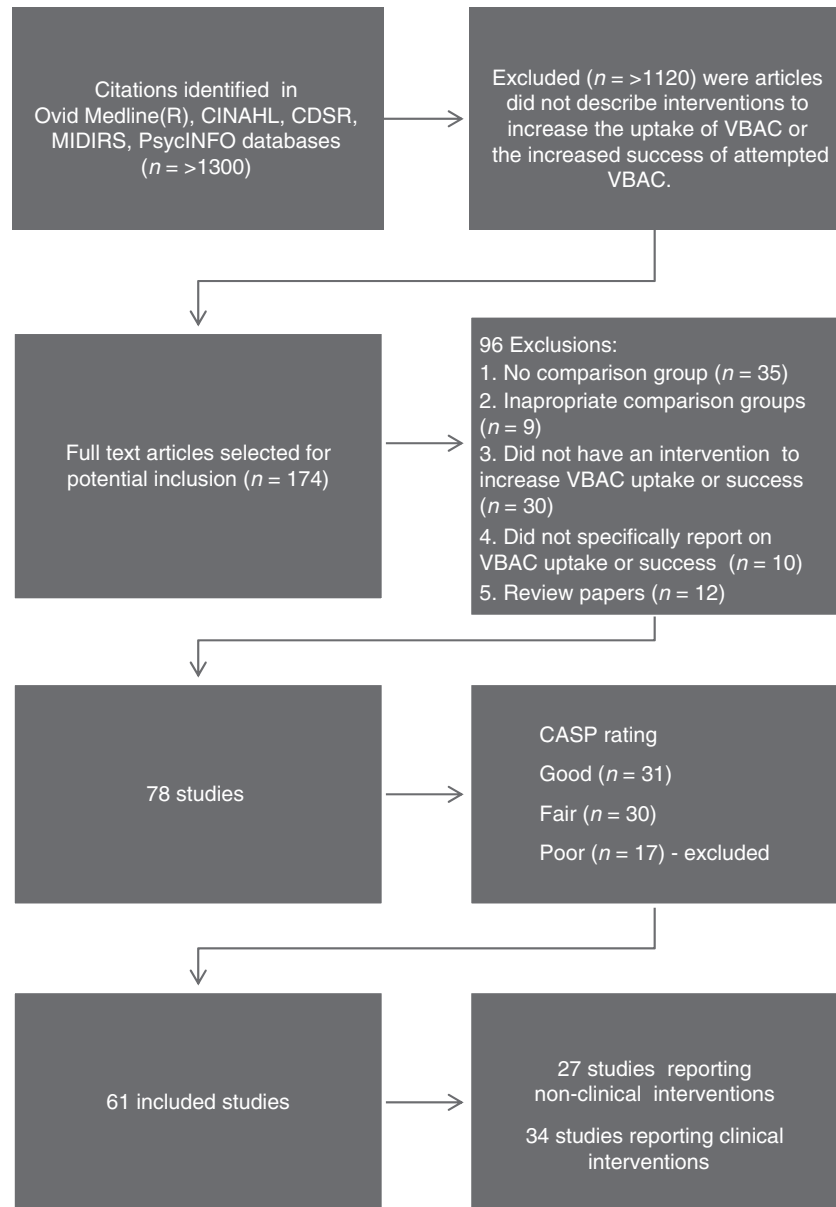
### Information/guidelines for providers

This category examined studies that looked at the effectiveness of information and/or guidelines addressing the practices surrounding VBAC provided to healthcare providers.

Twelve papers were included.

### Guidelines

Nine studies (Kosecoff *et al.* 1987, Myers & Gleicher 1988, 1993, Lomas *et al.* 1989, Iglesias *et al.* 1991, Santerre 1996,



**Figure 1** A flowchart of excluded and included studies. Non-Clinical interventions = practices indirectly affecting women’s VBAC uptake/success (e.g. hospital guidelines). Clinical interventions = practices directly affecting women’s VBAC uptake/success (e.g. induction of labour methods).

Studnicki *et al.* 1997, Sanchez-Ramos *et al.* 2000, Blanchette *et al.* 2001) (all before and after studies) assessed the impact of new guidelines, policies or programmes for CS or VBAC (either local or national) on the uptake, success or overall rate of VBAC. Seven of these (Kosecoff *et al.* 1987, Myers & Gleicher 1988, 1993, Iglesias *et al.* 1991, Santerre 1996, Studnicki *et al.* 1997, Sanchez-Ramos *et al.* 2000) reported an increase in VBAC rates to varying degrees.

National guidelines increased the VBAC rate in three studies. Studnicki *et al.* (1997) reported an increase in VBAC rates from 22% to 31% when state legislation was changed to mandate the distribution of practice guidelines about CS to all obstetricians (Florida, USA). Santerre (1996) demonstrated that the distribution of the American College of

Obstetricians and Gynecologists (ACOG) guidelines on VBAC across 55 hospitals led to an increase in VBAC rates from 12.6% to 18.5%. Lomas *et al.* (1989) when assessing the impact of Canadian national guidelines in 140 hospitals, reported no change in VBAC rates when hospital data were analysed, although the majority of obstetricians and hospitals surveyed claimed a decrease in their use of repeat CS. Kosecoff *et al.* (1987) analysed the effect of the NIH Consensus Development Program on the VBAC rates in 10 hospitals in the United States of America (USA) and found that VBAC uptake increased from 11% to 29% and the overall VBAC rate rose from 6% to 16%. Iglesias *et al.* (1991) showed a remarkable increase in VBAC uptake (from 7% of eligible women to 79%) when a small community

Trial (author and date)	Country	Design	CASP rating
Information/guidelines for providers ( <i>n</i> = 12)			
Bickell <i>et al.</i> (1996)	USA	Cluster RCT	GOOD
Lomas <i>et al.</i> (1991)	Canada	Cluster RCT (3 groups)	GOOD
Kosecoff <i>et al.</i> (1987)	USA	Before and after (retrospective)	FAIR
Lomas <i>et al.</i> (1989)	Canada	Before and after (prospective)	FAIR
Myers & Gleicher (1988)	USA	Before and after (prospective)	FAIR
Myers & Gleicher (1993)	USA	More long term outcomes from 1988 study	FAIR
Iglesias <i>et al.</i> (1991)	Canada	Before and after (retrospective)	GOOD
Studnicki <i>et al.</i> (1997)	USA	Before and after (retrospective)	FAIR
Santerre (1996)	USA	Before and after (retrospective)	GOOD
Blanchette <i>et al.</i> (2001)	USA	Before and after (prospective)	GOOD
Naiden & Deshpande (2001)	USA	Before and after (retrospective)	FAIR
Sanchez-Ramos <i>et al.</i> (1990)	USA	Before and after (retrospective)	FAIR
Context/style of care ( <i>n</i> = 11)			
Chang <i>et al.</i> (2008)	USA	Retrospective cohort	GOOD
Defranco <i>et al.</i> (2007)	USA	Retrospective cohort	GOOD
Dunsmoor-Su <i>et al.</i> (2003)	USA	Retrospective cohort	GOOD
Lagrew & Adashek (1998)	USA	Retrospective cohort	FAIR
Misra (2008)	USA	Before and after (retrospective)	FAIR
Paterson & Saunders (1991)	UK	Retrospective cohort	FAIR
Russillo <i>et al.</i> (2008)	Canada	Retrospective cohort	GOOD
Wagner & Metts (1999)	USA	Retrospective cohort	FAIR
Stafford (1991)	USA	Retrospective cohort	GOOD
Hanley <i>et al.</i> (1996)	USA	Retrospective cohort	FAIR
Goldman <i>et al.</i> (1993)	Canada	Case-control study	GOOD
Information for women ( <i>n</i> = 4)			
Fraser <i>et al.</i> (1997)	Canada	RCT	GOOD
Montgomery <i>et al.</i> (2007)	UK	RCT	GOOD
Shorten <i>et al.</i> (2005)	Australia	RCT	GOOD
Cleary-Goldman <i>et al.</i> (2005)	USA	Prospective cohort	GOOD

**Table 1** Details and CASP rating of included studies by category area

hospital changed its guidelines in line with the National (Canadian) Consensus Conference on Aspects of Caesarean Birth (NCCACB) for vaginal birth after CS.

Three studies examined the influence of local guidelines, two of which showed a beneficial impact on VBAC rates. Sanchez-Ramos *et al.* (1990) showed a statistically significant improvement in both the uptake of VBAC (32–84%) and the success of VBAC (65–83%) when clinicians were encouraged to take a more conservative approach to CS. Myers and Gleicher published two studies demonstrating the short- and long-term impact of a hospital initiative to reduce its CS rate (Myers & Gleicher 1988, 1993). Following the changes, the uptake of VBAC in the hospital increased from 45% to 86%, and remained high after 6 years despite the fact that the proportion of women presenting with a repeat CS doubled (7–14%). Likewise, the success rates of VBAC improved from 53% to 70% and continued to improve to 78% 6 years later.

The only study in this category to report a negative result was Blanchette *et al.* (2001), who demonstrated that, despite

encouraging all obstetricians to promote VBAC more often, there was a 7% decline in VBAC rates in the 4-year study period. This was consistent with national trends of declining VBAC at the time, and demonstrates that hospital management and policies are not the sole driving forces behind obstetric decision-making.

#### *Audit and feedback*

Three studies (Lomas *et al.* 1991, Bickell *et al.* 1996, Naiden & Deshpande 2001) (two RCTs and one before and after study) assessed the impact of regular audits and feedback to clinicians regarding CS rates. Bickell *et al.* (1996) in a cluster randomized controlled trial demonstrated no difference between hospitals that underwent the audit process and those that did not, although an overall increase in VBAC rates was observed in all hospitals across the period studied.

Lomas *et al.* (1991) also conducted a cluster RCT where hospitals were randomly allocated to one of three groups: no intervention (*n* = 8); opinion leader intervention (*n* = 4); or,

**Table 2** Characteristics of included studies

Trial (author and date)	Intervention	Sample size and comparison group	Uptake of VBAC	Impact on VBAC success rates	Statistical values
Information/guidelines for providers ( <i>n</i> = 12) Bickell <i>et al.</i> (1996)	Audit and feedback	165 hospitals • 45 reviewed • 120 non-reviewed	NA	No difference • 14.6% increase in VBAC at reviewed hospitals • 12.7% increase at non-reviewed	NR
Lomas <i>et al.</i> (1991)	Opinion leader education, audit and feedback, and control	16 hospitals • 4 audit and feedback • 4 opinion leader education • 8 control	Opinion leader education group had 50.5% uptake of VBAC	Opinion leader education group had 33% VBAC success rate (93 and 142% higher than rate in comparison groups)	Opinion leader education groups uptake of VBAC – CI 42–59, and VBAC rate CI 2.6–40.
Kosecoff <i>et al.</i> (1987)	National Institutes of Health Consensus Development Program (conference)	10 hospitals	Increased uptake of VBAC after the conference • 11% before • 29% after	Overall rate of VBAC success • 6% before • 16% after	Uptake of VBAC – $P \leq 0.001$ VBAC success $P \leq 0.05$
Lomas <i>et al.</i> (1989)	Canadian national guidelines for CS	• 140 hospitals • 316 obstetricians	67% obstetricians claimed less use of repeat CS. 78% hospitals claimed less use of repeat CS	VBAC success was 31 and 49% lower (in the year before and the second year after the intervention) than the estimates self-reported from obstetricians	NR
Myers & Gleicher (1988)	Hospital initiative to reduce CS	A large teaching hospital population in Chicago	VBAC uptake: • 45% before intervention • 86% after intervention	VBAC success • 53% before intervention • 70% after intervention	Uptake of VBAC – $P \leq 0.05$ VBAC success – $P \leq 0.05$
Myers & Gleicher (1993)			VBAC uptake remained high • 69% in 1988 • 74% in 1989 • 77% in 1990 • 85% in 1990 • 82% in 1991	VBAC success remained high • 69% in 1988 • 74% in 1989 • 77% in 1990 • 78% in 1991	NR
Iglesias <i>et al.</i> (1991)	National Consensus Conference and hospital VBAC policy	137 women	VBAC uptake for 'eligible' women: • 7% in 1985 • 79% in 1989	VBAC success (overall) rate 81% Little variation during study period	NR
Studnicki <i>et al.</i> (1997)	Guidelines to reduce CS	366,246 women	NR	Overall VBAC success rates: • 22% in 1990 • 26% in 1991 • 27% in 1992 • 31% in 1993	NR



Table 2 (Continued)

Trial (author and date)	Intervention	Sample size and comparison group	Uptake of VBAC	Impact on VBAC success rates	Statistical values
Santerre (1996)	ACOG guideline	55 hospitals (47,480 births)	Overall VBAC increased 12.6–18.5%, but was increasing before guideline distribution	The model found a sustained increase in VBAC of 5.6% attributable to the guidelines	Minimum Chi-squared regression estimates presented for the three models
Blanchette <i>et al.</i> (2001)	Change to local policy to promote VBAC	1481 women	VBAC uptake did not increase over the 4-year period	VBAC rate NR in relation to intervention	NR
Naiden & Deshpande (2001)	Audit of VBAC rates and feedback over 10 years	Number of VBAC eligible women not stated	VBAC uptake: • 35.6% at beginning of study • 54.5% at end	VBAC success: • 82% at beginning of study • 78% at end	VBAC uptake: $\chi^2 = 75.199$ ; $P < 0.001$
Sanchez-Ramos <i>et al.</i> (1990)	New hospital guidelines for CS	Hard to determine for VBAC	VBAC uptake: • 32% in 1986 • 84% in 1989	VBAC success • 65% in 1986 • 83% in 1989	VBAC uptake: $P < 0.0001$ VBAC success: $P < 0.0001$
Context/style of care ( $n = 11$ )					
Chang <i>et al.</i> (2008)	Tertiles of hospital VBAC volume	12,844 women from 17 hospitals	NR	Slightly lower VBAC success in large volume hospitals	$\chi^2 = 5.67$ ; $P = 0.01$
Defranco <i>et al.</i> (2007)	Types of hospitals	17 hospitals (25,065 women) • University hospitals • Community hospitals • Ob/Gyn residency • No Ob/Gyn residency	VBAC uptake: • 61% in University hospital • 50% in Community hospitals • 56% with Ob/Gyn residency • 51% without Ob/Gyn residency	No difference	VBAC uptake: • University vs. Community hospital – adjusted OR (95% CI) 0.68 (0.64–0.72) • Ob/Gyn residency vs. no Ob/Gyn residency – 0.88(0.82–0.95)
Dunsmoor-Su <i>et al.</i> (2003)	Teaching status, tertiary care status, level of neonatal intensive care unit within hospitals	17 hospitals: 15,172 women	VBAC uptake: • Variation in practice between sites independent of patient mix (38–66%) • White women had lower rates	NR	Lower VBAC uptake in white women Chi-squared test performed; $P = 0.001$
Lagrew & Adashek (1998)	Obstetricians who have a < 15% CS rate (target group) compared with > 15% (control)	1427 women • 23 physicians as control group • 5 physicians as target group	VBAC uptake: • Control group: 45% • Target group: 76%	VBAC success: • Control group 66% • Target group 83%	VBAC uptake: OR 3.78, 95% CI 2.75–5.19; $P < 0.00001$ VBAC success: OR 2.50, 95% CI 1.62–3.88; $P = 0.00001$

Table 2 (Continued)

Trial (author and date)	Intervention	Sample size and comparison group	Uptake of VBAC	Impact on VBAC success rates	Statistical values
Misra (2008)	Medicaid managed care vs. private health insurance	128,743 total births (VBAC numbers not specific)	No difference	No difference	Women with Medicaid insurance more likely to have VBAC: OR 0.75, 0.65–0.84 CI; $P < 0.001$
Paterson & Saunders (1991)	Different hospital care	1059 women	VBAC uptake: rates varied between 35% and 77%	VBAC success rate: 47–87%	Greater success rates in units where women are 'allowed to labour longer' $r = 0.51$ , $P < 0.05$
Russillo <i>et al.</i> (2008)	Obstetricians and Family Physician care	3694 women	VBAC uptake: • Obstetricians – 51% • Family Physicians – 81%	VBAC success rates: • Obstetricians – 64% • Family Physicians – 76%	Student <i>t</i> -tests, Chi-squared, and Fisher exact tests performed as appropriate VBAC uptake – $P < 0.001$ VBAC success – $P = 0.002$
Wagner & Metts (1999)	Public vs. Private health insurance	878 women • 321 Medicaid • 655 Private insurance	VBAC uptake: • Medicaid – 64% • Private insurance – 50%	VBAC success: • Medicaid – 62% • Private insurance – 60%	VBAC uptake – $P = 0.0001$ , OR 1.6 VBAC success – $P = 0.51$ OR 1.9
Stafford (1991)	Hospital and non-clinical characteristics	45,425 births from 316 hospitals	NR	VBAC success: • Hospital ownership varied 5–29% • Hospital Teaching Level varied 7–23% • Source of payment: 8–25% • Obstetric Volume 5–17% • Neonatal ICU presence 7–14%	Adjusted OR (95% CI) reported on 22 variables
Hanley <i>et al.</i> (1996)	Private insurance vs. pay-for-service or Medicaid	376 women	VBAC uptake: Overall – 67%	VBAC success: Overall – 66% Privately insured seven times more likely to have elective repeat CS.	Statistical analysis reported, but not for VBAC uptake or success



Table 2 (Continued)

Trial (author and date)	Intervention	Sample size and comparison group	Uptake of VBAC	Impact on VBAC success rates	Statistical values
Goldman <i>et al.</i> (1993)	Hospital and physician characteristics	3228 women in 77 hospitals	Specific uptake rates NR Women more likely to have VBAC in hospitals with: • Intermediate or high 'obstetric resource capacity' (compared with low) • Intermediate or high 'degree of obstetrical and neonatal specialization' • Female physician • Obstetrician (compared with GP) • In hospitals with lower CS rates • In 'lower risk' hospitals and in hospitals with annual deliveries > 50.	Specific success rates NR	Statistical analysis reported for variables, but not for VBAC uptake or success
Information for women ( <i>n</i> = 4)					
Fraser <i>et al.</i> (1997)	Verbal, individualized discussion programme	1275 women • Document group • Verbal group	VBAC uptake: • Document group – 69% • Verbal group – 73%	VBAC success: • Document group – 49% • Verbal group – 53%	VBAC uptake: RR and 95% CI – 1.1 (1.0–1.1) VBAC success: 1.1 (1.0–1.2) VBAC success – <i>P</i> = 0.66
Montgomery <i>et al.</i> (2007)	Two computer-based decision aids and usual care	742 women • Usual care-247 • Information program-250 • Decision analysis-245	NR	VBAC success: • Usual care 30% • Info program – 29% • Decision analysis – 37%	
Shorten <i>et al.</i> (2005)	A decision-aid booklet presenting risks and benefits of VBAC v El CS and follow-up	227 women at two sites • Intervention – 115 • Control – 112	VBAC preference: • Intervention – 51% • Control – 49%	VBAC success: • VBAC – 49% • El CS – 51%	NR
Cleary-Goldman <i>et al.</i> (2005)	VBAC counselling programme	316 women • Intervention – 95 • Control – 221	VBAC uptake: • Control – 38% • Intervention – 63%	VBAC success: • Control – 82% • Intervention – 27%	NR in relation to VBAC success or uptake

Note: The statistics are presented as they were reported in the original publications. OR, odds ratio; CI, confidence interval; NR, not reported.

audit and feedback intervention ( $n = 4$ ). The opinion leader intervention included having self-identified physician leaders in the hospitals. These physicians attended a 1½-day workshop on evidence for the practice guideline on VBAC produced by the Society of Obstetricians and Gynecologists of Canada and ongoing contact over a 12-month period that consisted of regular information on topics that might have been of concern to the opinion leaders and their colleagues, the hosting of a meeting with an expert speaker and encouraging of educational contacts and opportunities. The audit and feedback intervention consisted of having criteria for the indication for CS in women with a prior CS, medical audits of the charts of all women with a previous CS and holding regular meetings of the entire department for feedback and discussion about the audit results and the disparities between the criteria and actual practice. There were statistically significant differences in the rates of women offered a VBAC (opinion leader 74%, audit and feedback 56%, no intervention 51%,  $P = 0.002$ ), rates of women attempting a VBAC (opinion leader 38%, audit and feedback 21%, no intervention 28%,  $P = 0.007$ ), VBAC rates (opinion leader 25%, audit and feedback 12%, no intervention 14%,  $P = 0.003$ ), and elective CS rate (opinion leader 54%, audit and feedback 70%, no intervention 67%,  $P = 0.001$ ). There were no statistically significant differences in rates of emergency CSs. While multiple comparisons were not made to determine exactly which groups differed from one another, opinion leaders seem to have a greater impact in increasing both the uptake of VBAC and the VBAC success rates than audit and feedback.

The final study assessing audit and feedback to clinicians was a prospective before and after study by Naiden and Deshpande (2001). Individual obstetricians were audited for the CS rates and those with high rates were often asked to defend their decisions. Over a 10-year period the overall CS rate in the hospital fell from 16.6% to 10.9% of all births and remained low. This was primarily due to a reduction in the repeat CS rate, and an increase in VBAC uptake from 35.6% to 54.5%. There was no difference in the success rates of women attempting a VBAC in this period, demonstrating that a significant contribution to increasing the overall VBAC rates comes by increasing the uptake.

### Context/style of care

This category examined different hospital (e.g. size, tertiary or non-tertiary) and physician characteristics (e.g. obstetrician or GP), and health insurance status in relation to VBAC uptake and/or success. Eleven studies were included in this category.

### Hospital and/or physician characteristics

Eight studies (Paterson & Saunders 1991, Stafford 1991, Goldman *et al.* 1993, Lagrew & Adashek 1998, Dunsmoor-Su *et al.* 2003, Defranco *et al.* 2007, Chang *et al.* 2008, Russillo *et al.* 2008) (seven cohort and one before and after study) assessed the impact of hospital/clinician characteristics on the attempted and successful VBAC rate. Two studies reported that VBAC was more likely to occur in university/teaching hospitals (Stafford 1991, Defranco *et al.* 2007), with one study (Dunsmoor-Su *et al.* 2003) reporting no difference. Chang *et al.* (2008) reported lower VBAC success rates in large volume hospitals, although they did report on the levels of uptake of VBAC by hospital type. Interestingly, one study (Paterson & Saunders 1991) reported that, although VBAC uptake varied from hospital to hospital, hospitals which 'allowed women to labour longer' had higher rates of successful VBAC, regardless of uptake.

A large study by Goldman *et al.* (1993) assessed the hospital and physician characteristic that affected VBAC rates. Women were more likely to have a VBAC in hospitals with intermediate or high 'obstetric resource capacity' (i.e. presence of obstetricians, number of births a year, number of beds), with intermediate or high 'degree of obstetrical and neonatal specialization', with a female physician, with an obstetrician rather than a GP, in hospitals with lower overall CS rates, and in hospitals with more than 50 births per year. Conversely, Russillo *et al.* (2008) found that women under the care of a family physician were much more likely to attempt a VBAC (81% vs. 51%) and were more likely to be successful (76% vs. 64%). Similarly, Lagrew and Adashek (1998) found that, in a cohort of women who were under the care of an obstetrician, women were much more likely to attempt (76% vs. 45%) and achieve (83% vs. 66%) VBAC if their obstetrician had an overall CS rate below 15% compared with those whose overall rate was greater than 15%.

### Health insurance status

Three studies (Hanley *et al.* 1996, Wagner & Metts 1999, Misra 2008) examined the effect of health insurance status on women's uptake or success of VBAC. All were retrospective cohort studies and all compared women with private health insurance to women under the public system or the Medicaid system (the USA's health programme for eligible individuals and families with low incomes and resources).

Misra (2008) reported no difference between the groups concerning uptake or success of VBAC. Wagner and Metts (1999), reported that privately insured women were less likely to attempt VBAC (50% vs. 64%) with lower success rates. Similarly Stafford (1990) found VBAC rates were

significantly lower in privately insured women (8.1%) compared with women using the public system (25%). Hanley *et al.* (1996) reported that privately insured women were seven times more likely to have an elective repeat CS following a previous CS.

Santerre (1996) also reported on the effects of private health insurance and found no differences in the rates of VBAC with privately insured or women in public system. This review was primarily about the effect of guidelines on practice and was placed in the category 'information/guidelines for providers'.

### Information for women

This category addressed the effectiveness of ways to provide information to women about VBAC and elective CS to observe whether VBAC uptake or success was increased.

The impact of the provision of information to women about VBAC was addressed in four studies, three of which were RCTs (Fraser *et al.* 1997, Shorten *et al.* 2005, Montgomery *et al.* 2007). One study was a prospective cohort (Cleary-Goldman *et al.* 2005).

The first trial was designed to assess whether a prenatal education and support programme promoting vaginal birth after caesarean delivery increased the probability of vaginal birth (Fraser *et al.* 1997). The trial was conducted in 11 hospitals in Canada and one in the USA. Women were randomized to either a verbal-based (individualized discussion) programme or a document-based (pamphlet) prenatal programme for those attempting a VBAC. Although statistically non-significant, the VBAC rate was higher in the verbal-based programme compared with those in the document-based programme (53% and 49%, respectively; RR, 1.1; 95% CI, 1.0–1.2).

The second trial was conducted in the United Kingdom (UK). The trial examined the effects of two computer-based decision aids on decisional conflict and mode of birth among 742 women with a previous CS (Montgomery *et al.* 2007). There were two intervention groups and one control group who had usual care. Both interventions were delivered using a laptop computer after brief instructions from a researcher. The first intervention was an information program that provided descriptions and probabilities of clinical outcomes for mother and baby associated with planned vaginal birth, elective CS, and emergency CS. The second intervention was a decision analysis which recommended a mode of birth based on utility assessments performed by the woman combined with probabilities of clinical outcomes in a concealed decision tree. Women in the intervention groups had reduced decisional conflict compared with women in the

usual care group. The rate of VBAC was higher for women in the decision analysis group compared with the usual care group although this was not statistically significant (37% and 30%, respectively; Adjusted OR, 1.42; 95% CI 0.94–2.14).

The third trial was conducted in Australia. Shorten *et al.* (2005) aimed to determine whether a decision-aid for women who have a previous caesarean facilitated decision-making about birth options in the subsequent pregnancy in a trial of 227 women. Women randomized to the intervention group were given a decision-aid booklet at 28 weeks' gestation describing the risks and benefits of elective repeat CS and trial of labour. The intervention group had a statistically significant reduction in decisional conflict about choice of birth; however, the decision-aid did not significantly affect the rate of uptake of trial of labour or elective repeat CS.

Finally, a prospective cohort study assessed the impact of an antenatal counselling programme on women's choice for VBAC (Cleary-Goldman *et al.* 2005). There were 316 women in the study, 95 of whom participated in the counselling programme and 221 who acted as the control group. Sixty three percent of women in the counselling programme attempted VBAC compared with only 38% in the control group. Of those electing a VBAC in the study group, there was a success rate of 59%. Interestingly 82% of the women electing VBAC in the control group had a successful VBAC.

### Discussion

The studies included in this systematic review cover a 20-year time span. We are mindful that during this time many practices around caring for women having a VBAC have changed. For example, practices have changed considerably around induction of labour in women who have had a previous caesarean. Also data quality and coding has changed over this time period. For example there have been inaccuracies reported with ICD-9 codes (American Medical Association, 1995; Reker *et al.* 2001), and as such, studies using these codes in their methods may be erroneous. A meta-analysis was not undertaken.

Non-clinical factors can have a significant impact on uptake and success rates of VBAC. Local ownership of the desire to reduce CS rates or increase VBAC rates may be the most influential non-clinical factor in improving uptake and success rates of VBAC. This would explain why studies assessing local hospital policies or guidelines about the management of women with a previous CS showed a greater impact on uptake and/or success rates than studies that assessed the impact of national guidelines for VBAC. The effect of national guidelines is diminished by institutions that choose not to follow them. Furthermore, the attitudes of

### What is already known about this topic

- A high proportion of the already high caesarean section rate around the world consists of women with a prior caesarean electing to have a repeat caesarean for a subsequent birth.
- Health institutions vary considerably in regard to their acceptance, uptake, support and success of women undergoing a vaginal birth after caesarean.

### What this paper adds

- Non-clinical interventions such as guidelines, audit and feedback and characteristics of clinicians have an impact on vaginal birth after caesarean rates.
- Guideline changes that are implemented at a local level, and therefore perhaps more likely to be owned and driven by the clinicians working in the institution, appear to have a greater effect on practice than guidelines that are developed and distributed on a large scale.
- Providing evidence-based individual information about the issues related to repeat caesarean sections and vaginal birth after caesarean enables women to make easier decisions about mode of birth, and may increase vaginal birth after caesarean attempt and success.

### Implications for practice and/or policy

- Given the potential adverse health risks to both mothers and babies as a result of caesarean sections, further work towards lowering the rate of repeat caesareans is necessary.
- Health organizations should implement evidence-based local guidelines to increase the uptake and success of vaginal birth after caesarean.
- Health organizations should implement vaginal birth after caesarean decisional aids and develop specific clinics in existing antenatal clinics to address the need for clear and consistent, evidence-based information-sharing with women.

individual clinicians can influence VBAC outcomes. Opinion leaders may have a significant effect on VBAC rates in hospitals, and obstetricians with an overall CS rate of less than 15% are more likely to have higher VBAC rates. Whether or not an audit and feedback policy for obstetricians is of benefit is uncertain. Where there is a personal interest in increasing VBAC rates, feedback processes may be beneficial, but where individual obstetricians do not express a desire to

encourage or support VBAC then audit and feedback may prove to make no difference.

A few studies reported that VBAC was more likely to occur in teaching hospitals or hospitals that had higher levels of obstetric support. This probably represents hospitals that have a high emphasis on evidence-based practice, and those which have more experience in managing VBAC. It may also indicate the fear of many institutions and authorities regarding VBAC in smaller hospitals with less obstetric cover. For example, in 1999, a change in the uptake of VBAC was highly apparent in the USA after ACOG revised their guidelines and advised a more conservative approach towards VBAC. Roberts *et al.* (2007) reported that over 30% of services that were previously offering VBAC no longer did so after the change in guidelines. Smaller and more isolated hospitals were more likely to discontinue offering VBAC. Of those that continued to offer VBAC, the majority (68%) changed their policies in line with the provision of onsite surgical and anaesthetic staff. Similarly, in California, attempted VBAC fell from 24% to 13.5% following release of the new guidelines (Zweifler *et al.* 2006). International guidelines do not always provide consistent evidence either which complicates matters (Foureur *et al.* 2010).

Some studies show that private health insurance status negatively affects VBAC rates. This is a complex matter that other studies have shown to be false. Health insurance does not in and of itself impact VBAC rates, but it is likely a marker for other confounding variables such as the use of a private obstetrician, hospital characteristics, higher socio-economic status, older maternal age, and higher levels of maternal education. In general, Australian women are more likely to have intervention if attended by private obstetricians (Roberts *et al.* 2000), although this is also controversial (Robson *et al.* 2009).

Giving women information about their options for mode of birth following a CS is likely to be beneficial. Although the three included RCTs in this category did not show a statistically significant increase in VBAC uptake among women given information or support in pregnancy, two of the three (Frazer *et al.*, 1997; Montgomery *et al.* 2007) showed trends towards higher VBAC rates in the intervention group. Two (Shorten *et al.* 2005, Montgomery *et al.* 2007) also demonstrated a reduction in decisional conflict for women given decision-making tools in pregnancy to assist them in assessing their options. Reducing women's decisional conflict and involving women more fully in decision-making is an important aspect of obstetric and midwifery care. An intervention that reduces decisional conflict and provides women with evidence-based information about the options should be incorporated into the management of all women

with a previous CS. This could be through more widespread implementation of decisional aids and 'next birth after caesarean' clinics in existing antenatal clinics.

## Conclusion

National and local guidelines can have a significant impact on VBAC rates, particularly by increasing the number of women who attempt VBAC. Guideline changes that are implemented at a local level, and therefore perhaps more likely to be owned and driven by the clinicians working in the institution, appear to have a greater effect on practice than guidelines that are developed and distributed to large scale organizations.

Audit and feedback studies have the potential to make a significant difference in the uptake and success of VBAC. However, opinion leaders are more likely to guide a change of practice.

Hospital and physician characteristics vary markedly and may reflect cultural expectations, fear of liability, confidence and competence in certain skills and levels of importance placed on evidence based care. It is therefore not surprising that studies showed varying results regarding the impact of hospital and physician characteristics on the uptake and success of VBAC.

Women may have a higher uptake of VBAC, and have reduced decisional conflict about their chosen mode of birth when given information individually, especially verbally. Midwives can be pivotal to information delivery. The development of specific clinics to streamline the consistency of information to women who have had previous caesarean section is recommended.

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Maralyn Foureur and Caroline Homer are both members of the BACI Consortium.

## Author contributions

RJ, CR, MF & CH were responsible for the study conception and design. RJ, CR & CH performed the data collection.

CC-P, RJ, CR & CH performed the data analysis. CC-P, RJ, CR & CH were responsible for the drafting of the manuscript. CC-P, MF & CH made critical revisions to the paper for important intellectual content. MF obtained funding. CC-P, RJ, CR, MF & CH provided administrative, technical or material support. MF & CH supervised the study.

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There is no Supporting Information associated with this article.

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