Vaginal Birth After Cesarean Section: Outcomes of Women Receiving Midwifery Care in Ontario

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ABSTRACT

Providing care to women with a history of cesarean section is within the scope of practice of Canadian midwives, and midwifery care may be of benefit to women who plan a vaginal birth after cesarean section. This retrospective cohort study describes the birth outcomes of women with a history of cesarean section cared for by a midwife in Ontario between April 1, 2003 and March 31, 2008 (n= 3262). The primary outcome was cesarean section, and the secondary outcome was perinatal mortality. The overall rate of cesarean section in this cohort was 46.1%, but among women who laboured the rate of cesarean section was 28.8%. There was not a statistically significant difference in perinatal mortality (excluding congenital anomalies and stillbirth prior to labour) when women with a history of cesarean section (0.18%) were compared to those without (0.20%), p=0.99. This study demonstrates positive outcomes for both mothers and babies when midwives are primary care providers during the intrapartum period for women with a history of cesarean section. There is a need to explore the factors contributing to the high rate of planned repeat cesarean section in this cohort.

KEY WORDS

Vaginal birth after cesarean, VBAC, midwifery, cesarean section, Ontario

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INTRODUCTION

Between 1995-96 and 2005-06, cesarean section rates in Canada rose from 17.6% to 26.3%.[1, 2] As a result a growing proportion of pregnant women in Canada have a history of cesarean section. Providing care to women with a history of cesarean section is within the scope of practice of Canadian midwives and several elements of the Canadian model of midwifery, such as the time spent with women prenatally to develop a relationship of trust, continuity of care, continuous presence in labour, and the use of non-pharmacologic methods to support laboring women may be of benefit to women who plan a vaginal birth after cesarean section.[3,4] However, no published studies were identified that describe the clinical outcomes of women with a previous cesarean section who receive midwifery care in Canada.

A limited amount of research examining the outcomes of women with a history of cesarean section who receive midwifery care has been conducted in the United States and Germany.[5-8] A pilot study using retrospectively collected data from eight midwifery practices in the United States found that 72% of women gave birth vaginally.[5] The remaining studies describe the outcomes of women receiving midwifery care and planning to give birth at home[7] or in a birthing center.[6, 8] The rates of vaginal birth after cesarean section (VBAC) ranged from 72% to 94.5% in these studies. While some of these studies have reported on various measures of perinatal mortality and morbidity, small sample sizes have limited the conclusions that can be drawn regarding these outcomes.

A descriptive analysis of the clinical outcomes of women with a history of cesarean section who receive midwifery care is useful for several reasons. It can help to demonstrate the safety and efficacy of midwifery care for this population, which may be of particular interest in settings where hospitals restrict midwives' scope of practice in this area. It provides information for women with a history of cesarean section which may assist them in making decisions about who their care provider will be and where they will give birth. It also encourages reflective practice for midwives as we try to understand the patterns revealed by the data and reflect on how we might continue to provide the best possible care and support to women with a history of cesarean section. For all of these reasons, I conducted an analysis to describe the birth outcomes of women with a history of cesarean section who are cared for by a midwife in Ontario.

METHODS

This study is a retrospective cohort study describing the outcomes of all women in Ontario with a history of cesarean section who were cared for by registered midwives between April 1, 2003 and March 31, 2008. The Ontario Midwifery Program (OMP), Ministry of Health and Long Term Care, established a database in 2003 to capture comprehensive clinical and administrative data regarding all women who receive care from a registered midwife in Ontario. Data related to clinical variables are recorded contemporaneously by midwives on the clinical record. This information is entered by the midwife or a midwifery practice group administrator to a standardized electronic data-collection tool (called the "Ontario Maternal Newborn Health Reporting Form-Midwifery") by the end of each course of care at six weeks postpartum. The data form must be submitted before a midwife is compensated for the care she has provided and completion of all data fields is mandatory. Data accuracy is validated by the OMP. Changes to the data set were made on April 1, 2006, so for some variables data is only available for 2003-06 or for 2006-08.

The primary research question was *"What is the rate of cesarean section for women with a history of cesarean section who received midwifery care through the intrapartum period?"* Women whose pregnancies ended in miscarriage or abortion prior to twenty weeks gestation, and women who left midwifery care prior to giving birth were excluded from the analysis. Women were not excluded if they developed complications during pregnancy or labour that necessitated a transfer of care to a physician but continued to receive supportive care from a midwife. Outcomes were stratified by obstetrical history (no previous vaginal birth, previous vaginal birth but no VBAC, and previous VBAC). The OMP dataset does not capture whether a woman was planning a vaginal birth at the onset of the intrapartum period. In order to approximately examine the outcomes of women who were planning a VBAC at the onset of labour, a sub-group analysis that excluded women who did not labour was also conducted. The "labour type" variable used to identify this sub-group was only collected from 2006 onwards.

The secondary research question was *"How do the neonatal outcomes of women with a history of cesarean section compare to those of other women who received midwifery care?"* Given the limited size of the cohort and the infrequent nature of adverse neonatal outcomes, a composite measure of perinatal mortality was used to address this question rather than comparing stillbirth and neonatal death separately. Perinatal mortality was defined as stillbirth or neonatal death in the first 28 days of life (excluding death prior to the onset of labour or in the presence of congenital anomalies). For births in 2003-06 only congenital anomalies categorized as major or life-threatening were excluded. For births in 2006-08 all congenital anomalies were excluded because the dataset no longer captured information about the severity of anomalies. Two measures of severe neonatal morbidity are also reported: apgar < 4 at five minutes, and resuscitation with chest compressions (both reported for live births only). Other meaningful long term measures of severe neonatal morbidity (e.g., hypoxic ischemic encephalopathy) could not be reported because data on these outcomes is not included in the OMP dataset. The measures of perinatal mortality and neonatal morbidity reported for this study are similar to the components of the composite neonatal outcome used by Hutton et al. to examine clinical outcomes

associated with homebirth using OMP data.[9]

In order to provide additional descriptive information about the clinical outcomes of women with a history of cesarean section that may be of interest to women and midwives, several other variables were analyzed and reported, including rates of common prenatal complications (gestational diabetes, large-for-gestational age, pregnancy induced hypertension, non-cephalic presentation at 38 weeks), additional neonatal outcomes (preterm birth, birth weight >4500 grams), measures of maternal morbidity (postpartum hemorrhage, third or fourth degree lacerations, placenta previa, retained placenta), rates of induction of labour and of planned homebirth as well as the rates of cesarean section associated with each, and indications for cesarean section. Comparative data regarding midwifery clients without a history of cesarean section is provided

Although uterine rupture is an outcome of interest with respect to women with a history of cesarean section, this outcome could not be accurately reported for this data set. A "uterine rupture/dehiscence" variable was added to the data set in 2006 but it captures both catastrophic rupture and clinically insignificant dehiscence within a single variable. This variable has not been validated at the clinical record level by the OMP, and preliminary analysis revealed that in all but one case one minute apgar scores associated with the variable were eight or higher suggesting the clinical significance of the variable would be difficult to interpret.

Statistical analyses were conducted using SPSS 16.0, and GraphPad Software QuickCalcs online calculator. Descriptive statistics are used to report all outcomes. Comparisons of categorical outcomes were reported with the Relative Risk (RR) and the 95% confidence interval (CI). For comparisons of continuous variables, the p-value calculated using unpaired t-tests is shown. For the comparison of perinatal mortality, the p-value calculated by Chi-square with Yates' continuity correction was reported in addition to the relative risk and its associated confidence interval.

Ethical approval was obtained from the Laurentian University Research Ethics Board.

RESULTS

Between April 1, 2003 and March 31, 2008, 47, 923 births occurred to women receiving care from Ontario midwives. The actual number of women who received midwifery care was smaller than this because some women gave birth more than once during this time period; however, the de-identified data set available for this research did not include the variables which would allow for calculation of the exact number of women as opposed to number of births. Of the total births, 3262 births occurred to women with a history of cesarean section. The majority of these women had not had a previous vaginal birth (n=2338). A small portion had only given birth vaginally prior to having a cesarean section (n=292), and the remainder had had at least one previous successful VBAC (n=632).

General Characteristics

Table 1 compares maternal age at birth, number of weeks gestation at birth and the baby's birth weight in the current pregnancy for women with a history of cesarean section and those without a history of cesarean section. Mean maternal age of women with a previous cesarean section was slightly higher compared to other multiparous women (32.2 vs. 31.4). Despite a slightly lower mean gestational age at birth, the mean birth weight of infants born to women with a history of cesarean section was nearly 100 grams more than that of other infants.

Rates of four common prenatal complications in the current pregnancy were examined in the 2006-08 dataset, and are presented in Table 2. When compared to other multiparous women, women with a history of cesarean section had higher rates of pregnancy-induced hypertension and of non-cephalic presentation at 38 weeks gestation. Rates of gestational diabetes and large-for-gestational-age fetuses were also higher in women with a history of cesarean section than in all other women in midwifery care.

Cesarean section

The rate of cesarean section for women with a history of cesarean section who gave birth under the care of an Ontario midwife during the study period was

Table 1: General Characteristics

	Women with a History of Cesarean (n=3262)	Women with no History of Cesarean (n=44625)	t-test p-value
Mean maternal age[a] (SD)	32.2 (4.56)	31.4 (4.78)	<0.0001
Mean gestational age at birth (SD)	39.2 (0.04)	39.3 (0.02)	<0.0001
Mean birth weight (SD)	3616.6 (582.4)	3524.9 (644.8)	<0.0001

[a] *For this comparison only multiparous women were included in the "Women with no History of Cesarean" Group (n=23654).*

46.1%. The overall rate of cesarean section for all women under the care of an Ontario midwife during the study period was 15.2% (22.8% for primiparous women and 4.3% for multiparous women with no history of cesarean section). Women with a history of cesarean section were much more likely to give birth by cesarean section than all other women (RR=3.55, CI=3.40-3.71).

The rate of cesarean section was substantially lower for women with a history of cesarean section when only those who laboured were examined. In 2006-08, 1095 (71.3%) of the 1536 women with a history of cesarean section laboured. The rate of cesarean section among these women was 28.8%. Among women with a history of cesarean section, those who had previously had a VBAC were most likely to labour (92.5%), followed by those with a previous vaginal birth but no previous VBAC (78.3%), and then those with no previous vaginal birth (65.3%). Table 3 shows the birth outcomes of women who laboured broken down by obstetrical history.

Table 2: Prenatal Complications (2006-08 only)

	Women with a History of Cesarean (n=1536)	Women with no History of Cesarean (n=20480)	RR (95% CI)
Gestational Diabetes	30 (2.0%)	267 (1.3%)	1.50 (1.03-2.18)
LGA	33 (2.2%)	233 (1.1%)	1.89 (1.32-2.71)
Pregnancy Induced Hypertension[a]	47 (3.1%)	214(2.0%)	1.56 (1.14-2.13)
Non-cephalic presentation at 38 weeks[a]	61 (4.0%)	212 (1.9%)	2.04 (1.55-2.70)

[a] *For this comparison only multiparous women were included in the "Women with no History of Cesarean" Group (n=10911).*

Neonatal Complication

Neonatal outcomes are shown in Table 4. There was not a statistically significant difference in perinatal mortality when women with a history of cesarean section (0.18%) were compared to those without (0.21%), p=0.95, nor were there statistically significant differences in the two measures of severe neonatal morbidity. Women with a history of cesarean section were more likely to give birth to an infant weighing 4500g or more (145/3262 (4.5%) vs. 1272/44661 (2.9%), RR=1.56, CI=1.32-1.84). There was no significant difference in the rate of preterm labour (131/3262 (4.0%) vs. 2033/44661 (4.5%), RR=0.88, CI=0.74-1.05).

No statistically significant difference was found in the rates of placenta previa and retained placenta among women with a history of cesarean section compared to those without.

Maternal Complications

Among women who gave birth vaginally between 2003-08, women with a history of cesarean section were significantly more likely to have a third or fourth degree laceration (102/1757 (5.8%) vs. 993/38813 (2.6%), RR= 2.27, CI=1.86-2.77). Women with a history of cesarean section were more likely than all other women to have a total blood loss of more than 1000 mL (36/1713 (2.1%) vs. 294/24044 (1.2%), RR =1.72, CI=1.22-2.42, 2003-06 only). No statistically significant difference was found in the rates of placenta previa and retained placenta among women with a history of cesarean section compared to those without (8/1536 (0.52 %) vs., 85/20480 (0.42%), and 9/784 (1.1%) vs. 224/17764 (1.3%), respectively, 2006-08 only).

Induction of Labour

Women with a history of cesarean section were less likely to undergo induction of labour than other

Table 3. Birth Outcomes of Women with a History of Cesarean Section who Labour, by Obstetrical History (2006-08 only)

	Spontaneous Vaginal Birth	Assisted Vaginal Birth	Cesarean Section
All women with a history of cesarean section who labour (n=1095)	718 (65.6%)	61 (5.6%)	315 (28.8%)
No previous vaginal birth (n=724)	393 (54.3%)	51 (7.0%)	280 (38.7%)
Previous vaginal birth but no previous VBAC (n=100)	77 (77.0%)	3 (3.0%)	19 (19.0%)
Previous VBAC (n=271)	248 (91.5%)	7 (2.6%)	16 (5.9%)

Table 4: Perinatal Mortality and Severe Neonatal Morbidity

Outcome	Women with History of C/S (N=3262)	Women without History of C/S (N=44661)	Chi-square p value	RR (95 % CI)
Perinatal Mortality[a,b] Stillbirth[a] Neonatal Death[b]	6 (0.18%) 4 (0.12%) 2 (0.06%)	92 (0.21%) 30 (0.07%) 62 (0.14%)	0.95	0.89 (0.39 - 2.04)
Apgar <4 at 5 minutes[c]	4 (0.12%)	121 (0.27%)		0.45 (0.17-1.22)
Chest Compressions[c]	8 (0.25%)	172 (0.39%)		0.64 (0.31-1.29)

[a] *Excludes fetal demise prior to onset of labour and fetal anomalies*
[b] *Excludes congenital anomalies*
[c] *Excludes stillbirths*

women (305/3262 (9.4%) vs. 7113/44621 (15.9%), RR=0.59, CI=0.52-0.65). Among women with a history of cesarean section who gave birth in 2006-08, those who were induced were more likely to have a cesarean section than those who labored spontaneously (55/141 (39.0%) vs. 261/954 (27.4%), RR=1.43, CI=1.13-1.80).

Homebirth

Overall during the study period, 25.3% of all women cared for by midwives were planning to give birth at home at the beginning of labour. Just over 10% of women with a history of cesarean section (n=331) planned to give birth at home. The rate of planned homebirth among women with a history of cesarean section decreased significantly between 2003-06 and 2006-08, from 11.8% to 8.7% (RR=0.74, CI=0.60-0.91). Among all women planning to give birth at home at the onset of labour, women with a history of cesarean were less likely than other women to actually give birth at home (63.5% vs. 75.4%, RR=0.84, CI=0.78-0.91).

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Overall the rate of cesarean section for women with a history of cesarean section who planned a homebirth was 18.1%. Table 5 shows the rates of cesarean section for women with a history of cesarean section who were planning a homebirth at the onset of labour, broken down by obstetrical history. Women with a previous VBAC were much more likely to plan to give birth at home (22.8%) than women with a history of cesarean section who had not had previous VBAC (7.1%) (RR=3.20, CI=2.63-3.91).

Indications for cesarean section

The frequencies of the most common indications for cesarean section are shown in Table 6 for three groups of women who gave birth in 2006-2008 (women with a history of cesarean section who did not labour, women with a history of cesarean section and no previous vaginal birth who laboured, and primiparous women). Although all of the births to women in the first group would be considered elective cesarean sections (i.e., cesarean was planned prior to the onset of labour), only a third of cases listed

Table 5: Birth Outcomes of Women with a History of Cesarean Section who Plan Homebirth, by Obstetrical History

	Spontaneous Vaginal Birth	Assisted Vaginal Birth	Cesarean Section
All women with a history of cesarean section (n=331)	255 (77.0%)	14 (4.2%)	60 (18.1%)
No previous vaginal birth (n=164)	100 (61.0%)	12 (7.3%)	51 (31.1%)
Previous vaginal birth but no previous VBAC (n=23)	20 (87.0%)	0 (0%)	3 (13.0%)
Previous VBAC (n=144)	135 (93.8%)	2 (1.4%)	6 (4.2%)

Table 6: Frequent Indications for Cesarean Section (2006-08 only)

Indication	Women with a History of Cesarean who do not Labour (n=435)	Women with a History of Cesarean and No Previous Vaginal Birth who Labour (n=280)	Primiparous Women who Labour (n=1768)
Non-progressive Labour	N/A	66.4%	68.7%
Non-reassuring FHR	2.3%	26.1%	35.2%
Previous Cesarean Section	66.4%	24.3%	n/a
Elective	32.9%	3.9%	0.4%
Breech	11.3%	2.1%	6.2%
LGA	6.3%	1.1%	2.4%
PROM	4.3%	3.2%	2.5%

**Multiple indications are possible. Less frequent indications are not shown.*

"elective" as an indication. Less than half of the cesarean sections in this first group provided one or more clinical indication for cesarean other than "previous cesarean section" (not all indications are shown in Table 6). The most common indication for cesarean section among women with a history of cesarean section and no previous vaginal birth who laboured was non-progressive labour (i.e., dystocia) and this indication accounted for roughly two-thirds of cesarean sections in both women with a previous cesarean section and in primiparous women. Non-reassuring fetal heart rate was the second most common indication for cesarean section in these two groups.

DISCUSSION

The differences in general characteristics and rates of prenatal complications between women with a history of cesarean section and those without as shown in Tables 1 and 2 suggest that there are likely clinical factors beyond just a history of cesarean section that increase the likelihood of cesarean section in the current pregnancy for the former group of women. Increased fetal size is a well established risk factor for repeat cesarean section, and there is some evidence to suggest that maternal disease (e.g., hypertension, diabetes, etc.) may be associated with a decreased likelihood of VBAC.[10]

Although rates of common prenatal complications were higher for women with a history of cesarean, it is worth noting that the absolute rates were low in both groups. This supports previous conclusions that non-medical factors such as practice guidelines, liability concerns, and client and provider preferences play a significant role in determining VBAC rates.[10] The indications for cesarean section for women who had elective repeat cesarean section also suggest that additional clinical factors do not always explain the decision to plan a repeat cesarean.

It is important that the cesarean section rate of women with a history of cesarean section who were cared for by midwives in this study be considered in light of the current context of maternity care in Ontario. The rate of repeat cesarean section has risen steadily in the province from 64.7% in 1995-96 to 84.3% in 2006-07.[1, 11] In 2006-07, only 31.3% of all women in the province with a history of cesarean section planned a vaginal birth, and 50.3% of these women ended up giving birth vaginally.[11] In contrast, among women cared for by midwives in 2006-08, approximately 71.3% of women with a history of cesarean section were planning a vaginal birth at the end of pregnancy and 71.2% of these women gave birth vaginally. The comparatively high rates of VBAC in the midwifery cohort were achieved without compromising neonatal well-being, as evidenced by the lack of any significant difference in perinatal mortality when women with a history of cesarean section were compared to all other women receiving midwifery care. When considered in light of existing evidence of reduced maternal mortality and morbidity associated with successful VBAC,[10] the results of this study suggest positive outcomes for both mothers and babies when midwives are primary care providers during the intrapartum period for women with a history of cesarean section.

The analyses of outcomes related to neonatal and maternal safety were limited by the size of the cohort, the rare nature of some outcomes, and the data contained in the OMP database. None of the findings raise concerns with respect to safety. The increased risk of third and fourth degree tears for women with a history of cesarean section who give birth vaginally is not unexpected given the rates of assisted vaginal birth and birth weight >4500g in this group. The higher rate of blood loss greater than 1000 mL for women with a history of cesarean section also makes sense given the much higher rate of cesarean section for this cohort. The association between abnormal placentation and previous cesarean is well established,[10, 12] and the lack of association found in this study is most likely a result of the small cohort size. Future research with a larger cohort might examine outcomes related to safety for the sub-group of women with a history of cesarean section who are planning a vaginal birth. It would also be informative use provincial perinatal data to compare these outcomes with those of women planning a VBAC who are cared for by physicians.

Women with a history of cesarean section who planned a homebirth were more likely to give birth vaginally than other women with a history of cesarean section who laboured and were cared for by midwives. Comparison between Tables 3 and 5

illustrates that although part of this overall difference is attributable to the difference in the profile of obstetrical histories among women who plan a homebirth, rates of cesarean section were lower within all obstetrical history groups for women who plan homebirth. The proportion of women with a history of cesarean section planning a homebirth who had previously given birth vaginally (50.5%) was similar to both American studies that have reported on outcomes of planned out of hospital births.[7, 8] The rates of transfer to hospital and cesarean section were higher in the Ontario cohort, which likely reflects the more cautious climate with respect to VBAC during this study period compared to the 1990s when the other two studies were conducted. The decline in the rate of planned homebirths within this cohort over the study period is further reflection of an increasingly cautious approach to VBAC. This change may have arisen from changes in the proportion of midwives who recommend hospital birth to all women planning a VBAC, particularly in light of the Society of Obstetricians and Gynaecologists of Canada VBAC guidelines which recommend continuous electronic fetal monitoring in labour (which is not normally available at home) as well as recommending birth in a hospital where timely cesarean section is available.[13] The primary safety concern with respect to out of hospital birth for women with a history of cesarean section is the potential delay in access to emergency cesarean section in the event of uterine rupture. A much larger cohort of out of hospital births would be needed to quantify this risk.

This study differs from similar studies that have examined the outcomes of women with a history of cesarean section who received midwifery care in other countries in terms of the manner in which the cohort was defined. Midwives in Ontario usually continue to provide supportive care to women whose care is transferred to an obstetrician late in pregnancy or during the intrapartum period, and whenever possible responsibility for care is returned to the midwife following the birth. Women whose care was temporarily transferred to an obstetrician or who received supportive midwifery care following a permanent transfer of care were included in this study. As a result, the cohort in this study likely differs in terms of its profile of obstetrical risk factors from cohorts which were limited to women whose primary intrapartum care provider was a midwife.[5-8] A disadvantage of this approach is that it dilutes the effect of having a midwife as the primary intrapartum care provider. On the other hand, the results of this study provide a complete picture of the outcomes of women with a history of cesarean section who enter midwifery care.

This study has several limitations. One of the most significant of these is that the dataset used does not include a variable which indicates whether or not a woman with a previous cesarean section was planning a VBAC at the beginning of the intrapartum period. This was compounded by what appears to be significant under-reporting of "elective" as an indication for cesarean section. Consequently, I was limited to reporting on women who laboured in order to estimate the outcomes of those planning a VBAC. A small portion of women who laboured had planned cesarean sections; 3.9% of all cesareans in this group were coded as "elective," but due to the apparent problems with this variable it is possible that an even higher portion of women who laboured actually had planned cesarean sections. The low frequency of "elective" as an indication for cesarean sections among women who did not labour suggests that this indication may be interpreted by those entering data to mean "maternal request." Improvements in data collection are needed to ensure that this variable is reliable. Another limitation of this study is that it can only describe outcomes rather than explaining causation. Differences in outcomes between women planning VBACs who planned a homebirth versus a hospital birth, who had spontaneous labour versus induction of labour, or who had midwifery care versus physician care may have been influenced by a wide range of variables not controlled for in this study.

The findings of this study raise several issues for further reflection and possible research. Over 60% of the repeat cesarean sections in this cohort were planned (i.e., elective) we need to understand what factors are driving this. One contributing factor is likely the reluctance to induce labour in women with a uterine scar, which was influenced by research published in the last decade which demonstrated increased risk of uterine rupture with induction of labour.[14] In some communities this has led to the

recommendation that all women with a history of cesarean section should have a repeat cesarean section at 41 weeks gestation if they do not go into labour spontaneously beforehand. Such circumstances illustrate how women's options and their decisions are likely to be influenced by both their midwives and consultant obstetricians. Although the outcomes in this study confirm previous research which suggests that the rate of VBAC is lower with induced labour than with spontaneous labour,[10] a sixty percent chance of having a vaginal birth may still be deemed by some women to be sufficient potential benefit to accept the risks of induction if induction is truly indicated. Further research is needed to explore how midwifery practice and clinical outcomes for midwifery clients are shaped by the broader practice environment, and to identify factors that support midwives to support choice for women who want a VBAC.

With respect to cesarean section rates for women who plan a VBAC, reluctance to use oxytocin may again be a contributing factor given that dystocia (non-progressive labour) was an indication for cesarean section in two-thirds of the repeat cesarean sections in this group. Recent findings from a very large meta-analysis suggest that there does not appear to be an increased risk of uterine rupture when oxytocin augmentation is used for women with a previous cesarean section in spontaneous labour;[15] however, in some communities consultants may be hesitant to order oxytocin when there is slow progress in a planned VBAC. Another explanatory factor for VBAC success rates that has been hypothesized by practicing midwives in Ontario is that women whose primary cesarean section occurred under midwifery care may have a higher chance of requiring a repeat cesarean section. This line of thinking is based on the assumption that women who have a primary cesarean section for dystocia under midwifery care are more likely to have had true dystocia than the rest of the population (and thus are at greater risk of dystocia in a subsequent pregnancy). Research to evaluate the influence of previous care provider as well as various other demographic and clinical factors on the clinical outcomes of women with a history of cesarean section may be of potential interest to both care providers and women. However, I would argue that we must be cautious to ensure that predictive models are not used to limit women's choices (i.e., to restrict who is supported to plan a VBAC). Finally, the relatively high rate of repeat cesarean section in this study and the even higher rate seen in the general population should encourage reflection among midwives about how we can best support and promote women's choice to give birth vaginally after cesarean section both in the work we do with individual women and in our culture at large.

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