






# The outcomes for women planning a VBAC at a private hospital in Australia

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## Abstract

**Background:** Rates of cesarean birth (CBs) are steadily increasing and account for 36.7% of all births in New South Wales (NSW), with primary cesareans driving the increase. NSW Health guidelines recommend women attempt a vaginal birth after a previous CB (VBAC); however, rates of VBAC are decreasing, particularly within the private hospital setting. This study aimed to determine the rates of adverse outcomes for women who planned a VBAC (pVBAC) compared with women who planned an elective repeat CB (pERCB) at one private hospital in Sydney, Australia.

**Method:** This retrospective data review evaluated patient records over a 10-year period (2010–2019). Records ( $n = 2039$ ) were divided into four groups: pVBAC, pVBAC + EMCB, labor + ERCB (lab + ERCB), and pERCB. The incidence of adverse maternal and neonatal outcomes is reported as counts and percentages. Regression and chi-squared tests were used to compare groups. Significance was determined at a  $p$ -value of  $<0.05$ .

**Results:** Overall, very low rates ( $N = 148$ , 7.3%) of women had a VBAC compared with a repeat CB at this private hospital over the 10-year period. The incidence of adverse outcomes was low regardless of study group. Outcomes differed significantly between groups for postpartum hemorrhage (pERCB seven times less likely than VBAC group) and special care nursery admission (pVBAC + EMCB is 4.6 times more likely than in the VBAC group).

**Conclusion:** Overall, it is safe to attempt a VBAC at this private hospital, and labor after a cesarean should be recommended, yet very few women had a VBAC at the study site. The incidence of adverse outcomes was low compared with other published research.

## KEYWORDS

cesarean, maternal adverse outcomes, neonatal adverse outcomes, private hospital, VBAC

## 1 | INTRODUCTION

Increasing rates of medical management in pregnancy and birth have resulted in increased rates of cesarean birth (CB),<sup>1</sup> particularly within the private hospital setting.<sup>2</sup> National and international reviews of maternity services call for a reduction in the alarming rise of CB rates.<sup>3,4</sup> In addition, the first CB a woman has impact rates of repeat CB, and this is the main driver for the overall rise in rates of CB.<sup>5</sup> In 2020, 36.7% ( $n = 33,446$ ) of all births in New South Wales (NSW), Australia's most populous State, were via CB.<sup>6</sup> According to healthcare insurance status, 33.1% ( $n = 23,842$ ) of births at public hospitals and 50.6% ( $n = 9604$ ) of births at private hospitals were via CB.<sup>6</sup> The WHO recommends a CB rate between 10% and 15%, for optimal outcomes for both mother and baby, observing that rates less than 10% or greater than 15% contribute to increased rates of morbidity and mortality.<sup>7</sup> These rates are influenced by patients' decisions, which are heavily guided by clinician-based advice and knowledge.<sup>8</sup>

With a previous CB, women can either plan a vaginal birth after cesarean (VBAC)—as long as there are no contraindications—or plan an elective repeat CB (pERCB). Planned VBACs may result in either a completed VBAC or an intrapartum repeat emergency CB (lab + EMCB). Currently, the most common mode of birth after CB is an ERCB, with 86% of pregnant women with previous CBs having a subsequent cesarean.<sup>9</sup> According to the 2022 Mothers and Babies Reports, over the last 10 years (2011–2020), the overall number of VBACs has been decreasing, down from 17.0% to 13.9% (1711–1530) in NSW, and from 14.5% to 5.9% (32–14) at the private hospital where this study was conducted, despite a lack of data to indicate any increase in risk.<sup>6,10</sup>

Current *Next Birth After Caesarean* guidelines from NSW Health encourage women to plan a VBAC, based on more favorable morbidity and mortality outcomes for both women and neonates compared with a pERCB/EMCB.<sup>9,11,12</sup> Women experience decreased rates of infection, operative injuries, and future placental location abnormalities, as well as decreased risk of intra-abdominal adhesions with VBAC compared with pERCB/EMCB.<sup>11,12</sup> Women also report experiencing greater satisfaction and less traumatic birthing experiences with VBAC.<sup>11–13</sup> In addition, neonates experience significant consequences without the stimulus of a vaginal birth, including impaired lung function, reduced thermogenic response, altered metabolism, and altered breastfeeding, as well as increased risk of long-term conditions such as type 1 diabetes, obesity, and asthma.<sup>14–18</sup> Therefore, current guidelines suggest that all birthing people should be counseled about access to VBAC services and be provided with advice and

information about their birthing options before the 16th week of pregnancy.<sup>19</sup>

However, few are offered or attempt VBAC, due to the risk of rare but serious adverse maternal outcomes including uterine rupture and postpartum hemorrhage (PPH) requiring blood transfusion.<sup>12</sup> Adverse neonatal outcomes for VBAC are associated with increased NICU admissions and may present an increased risk of maternal and perinatal complications.<sup>11,12,20</sup>

A multi-country European population study found a very low overall prevalence of uterine rupture (22 per 10,000 (0.002%)) in women with a previous CB.<sup>20</sup> A recent study from China also found that uterine rupture was rare (<0.1%), with no woman requiring a hysterectomy.<sup>21</sup> This study also found that induction of labor and increased lower segment uterine thickness (diagnosed by prior ultrasound) were associated with the likelihood of a completed VBAC.<sup>21</sup>

It is not known whether rates of VBAC and any associated safety outcomes in the private hospital setting differ from currently reported outcomes, which are usually reported from public hospitals. Therefore, this study aimed to evaluate rates of adverse outcomes for women who planned a VBAC at a private hospital in NSW, Australia. The primary objective was to assess safety outcomes by quantifying the rate of adverse maternal and neonatal outcomes in VBAC, repeat EMCB, and pERCB. The secondary objectives were to determine the rate of completed VBAC in this private hospital setting compared with published research data and NSW statistics.

## 2 | METHODS

### 2.1 | Study design

This study is a retrospective cohort study, examining electronic database records from a private hospital in Sydney, Australia. This hospital is located in the Northwest region of Sydney, with 1488 births in 2020.<sup>6</sup> The hospital serves a population with private hospital insurance, with a diverse background consisting of Australian-born citizens as well as mothers born in East Asia, Southeast Asia, and South Asian countries. Many of these service users live locally to the hospital and are generally from a background of higher socioeconomic status.

### 2.2 | Data source and population

The private hospital uses the K2 Medical system to record its electronic maternity records. These data were extracted by the hospital data custodian and de-identified. We then

conducted a retrospective analysis of data to evaluate the outcomes for all women having their next birth after a CB with their first birth, to determine the rate of VBAC and incidence of adverse maternal and neonatal outcomes over a 10-year period (January 1, 2010–December 31, 2019). The population included birthing people who were giving birth for the second time but may have been pregnant more than twice due to miscarriage (Gravida  $\geq 2$ , Parity 1, denoted GnP1), and who had experienced one previous CB in their first birth.

### 2.3 | Data collection and compilation

Patient records were obtained for 2338 women at the private hospital. A total of 2039 patient records met the inclusion criteria (Table 1). Two hundred and ninety-nine women were excluded because their parity was 0 or  $\geq 2$  or they were having multiple pregnancies.

Patients were divided into four study groups according to labor and birth characteristics: (1) Women who had a completed VBAC (VBAC), (2) women who planned VBAC which resulted in an emergency CB (pVBAC + EMCB), (3) women who experienced labor before their planned elective CB (lab + ERCB), and (4) women who completed an elective repeat CB (pERCB).

If there was a record of a CTG, vaginal examination, or examinations during labor and a record of progress in labor, then these women were deemed to have had an attempt at a planned VBAC. Those women without this information and who had a CB were deemed to have had a planned elective CB.

Adverse maternal outcomes included uterine rupture, PPH  $\geq 500$  mL, blood transfusion, hysterectomy, and death. Adverse neonatal outcomes included Apgar scores  $< 7$  at 5 min, the requirement for resuscitation, admission to a special care nursery (SCN), or neonatal intensive care unit (NICU) (Table 2). Blood loss during labor is recorded in the K2 Medical system as “delivery estimated blood loss” and “postpartum estimated blood loss.” Missing data for blood loss, either intra or postpartum for some patients, meant that for this study, combining intrapartum and postpartum blood loss into an estimated total blood loss provided a more accurate estimate. As reporting is required, neonates with missing data for resuscitation

and transfer to SCN or NICU were assumed to not have had those adverse outcomes and were recorded as such for this study. The overall sample is 2039, and where data are missing, the denominator ( $n$ ) was adjusted for the missing data.

### 2.4 | Data analysis

Data were analyzed using SPSS version 26.0.<sup>22</sup> Incidence of adverse outcomes was reported as counts and percentages. Binary and multimodal regression were used to compare study groups, and odds ratios (OR) for primary and secondary outcomes were determined by using the chi-squared test and Fisher exact test. Statistical significance was determined by  $p$ -values  $< 0.05$ .

## 3 | RESULTS

### 3.1 | Demographic data

The results from this study report on 2039 women in the period indicated. Demographic data are presented in Table 3. On average, participants were 33.5 years of age and had two to three prior pregnancies and an interbirth interval of 3.3 years. Most women were Australian-born ( $n = 1273$ , 62.4%), with those from Asia being next most common ( $n = 463$ , 23.0%), and 13 (0.6%) women who identified as having Aboriginal or Torres Strait Islander heritage. The average BMI was in the overweight category (BMI = 25–30).

### 3.2 | Mode of birth

The results from this study indicate that in group 1, there were 148 (7.3%) women who planned and had a VBAC; in group 2, there were 174 (8.5%) women who planned a VBAC and had a repeat EMCB; in group 3, there were 235 (11.5%) women who had spontaneous labor + planned ERCB and; in group 4, there were 1482 (72.7%) women who had an pERCB (Table 4).

There were 322 (15.8%) women from a total of 2039 individuals who planned a VBAC, and of these, 148 (46.0%)

TABLE 1 Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> <li>• Women who gave birth to a singleton baby</li> <li>• Gave birth at this private hospital</li> <li>• Gave birth during the period January 1, 2010 to December 31, 2019</li> <li>• First birth via cesarean, that is, Gravida <math>\geq 2</math>, Parity = 1</li> </ul>	<ul style="list-style-type: none"> <li>• Parity <math>&lt; 1</math> or <math>&gt; 1</math></li> <li>• Multiple pregnancy</li> </ul>

Adverse maternal outcomes	Adverse neonatal outcomes
<ul style="list-style-type: none"> <li>• Uterine rupture</li> <li>• Postpartum hemorrhage (PPH)</li> <li>• Blood transfusion</li> <li>• Hysterectomy</li> <li>• Maternal death</li> </ul>	<ul style="list-style-type: none"> <li>• Apgar score &lt;7 at 5 min</li> <li>• Resuscitation required</li> <li>• Special care nursery (SCN) admission</li> <li>• Neonatal intensive care unit (NICU) admission</li> </ul>

TABLE 2 Adverse maternal and neonatal outcomes.

had a completed VBAC. Of the women who had a VBAC, 80 (54.1%) had a normal vaginal birth, and 68 (45.9%) had an instrumental vaginal birth.

Of the 267 (13.1%) who experienced labor, 216 (80.1%) had spontaneous onset of labor, and 51 (19.1%) women had their labors induced. Of the women who had spontaneous onset of labor, 109 (50.0%) had a VBAC, 52 (24.1%) had a pVBAC + EMCB, and 55 (25.5%) had a lab + ERCB. Of the women who had their labors induced, 38 (74.5%) had a VBAC, while 13 (25.5%) had a pVBAC + EMCB. Of the women who had a CB, 13 (0.7%) women were categorized as priority category 1 (urgent threat to life for the woman or fetus), 177 (9.4%) were in priority category 2 (maternal or fetal compromise but not immediately life-threatening), 219 (11.6%) were in priority category 3 (needing earlier than planned birth without currently evident maternal or fetal compromise), and 1482 (78.4%) were in priority category 4 (nonurgent, in a time that suits mother or team).

### 3.3 | Maternal adverse outcomes

Postpartum hemorrhage was reported in 23 (1.4%) participants ( $n=1702$ ). Of these, eight (5.4%) were in the VBAC group, three (1.7%) in the pVBAC + EMCB group, none (0%) in the spontaneous labor + planned ERCB group, and 12 (0.8%) in the pERCB group (Table 5). Women in the pERCB were seven times less likely to experience a PPH compared with the VBAC group (OR 0.149 [95% CI 0.060–0.373],  $p<0.001$ ). Out of these women, six (0.3%) proceeded to have a blood transfusion ( $p<0.05$ ; Table 5); one (0.7%) was transfused post-VBAC, two (1.7%) post-pVBAC + EMCB, and three (0.1%) post-ERCB.

One (<0.1%) uterine rupture was reported ( $n=2039$ ), which occurred in the pVBAC + EMCB group (Table 5). The type of uterine rupture was not recorded on K2 Medical records; therefore, it is not known whether it was a dehiscence or a complete uterine rupture. Two (0.1%) women from the pERCB group were reported to have had a postpartum hysterectomy due to PPH ( $n=2039$ ; Table 5). These numbers were too small to examine any differences via subgroup analysis.

### 3.4 | Neonatal adverse outcomes

For admission to SCN, 212 (10.4%) neonates had an admission ( $n=2031$ ). There were 10 (6.8%) neonate admissions in the VBAC group, 45 (25.9%) in the pVBAC + EMCB group, 38 (16.2%) in the spontaneous labor + planned ERCB group, and 119 (8.0%) in the pERCB group (Table 5). Neonates who were admitted to the SCN were 4.6 times more likely to be from the pVBAC + EMCB group (OR 4.641 [CI 2.243–9.601],  $p\leq 0.001$ ) and 2.5 times more likely to be in the spontaneous labor + planned ERCB (OR 2.546 [95% CI 1.226–5.287],  $p\leq 0.05$ ) compared with the VBAC group. Six (0.3%) neonates were transferred to a NICU ( $n=2031$ ). There were zero (0%) neonates admitted to the NICU in the VBAC group, two (1.1%) in the pVBAC + EMCB group, three (1.3%) in the pVBAC + EMCB group, and one (0.1%) in the pERCB group (Table 5). There were 85 (4.2%) neonates who required resuscitation after birth ( $n=2031$ ; Table 5). There was no difference between groups for NICU admission ( $p=0.07$ ), resuscitation required ( $p=0.05$ ), Apgar <7 at 5 min ( $p=0.76$ ), or neonatal death ( $p=1.000$ ); however, the numbers were very small.

## 4 | DISCUSSION

The purpose of this study was to investigate rates of adverse maternal and neonatal outcomes for planned VBAC at a private hospital in Sydney, Australia. Despite VBAC policies and guidelines recommending attempting a vaginal birth, ERCB rates remain high (73% in our study).<sup>19</sup> The results of our study demonstrate that VBAC rates ( $n=148$ , 7.3%) at the private hospital are substantially below the state (NSW) average (17.0%–13.9%) from 2010 to 2020, which also has an impact on clinicians acquiring relevant experience and skills in managing VBAC.<sup>6</sup> While the numbers are low, limited changes have been made to increase these numbers, despite the low risk of adverse outcomes, and guideline recommendations.

At this private hospital, women with a planned ERCB were seven times less likely to experience a PPH compared with women in the VBAC group. Of these, six (0.3%) women had a blood transfusion after a PPH; one

TABLE 3 Maternal and neonatal demographics.

Demographic factors	VBAC, n = 148 (100%)	pVBAC + EMCB, n = 174 (100%)	lab + ERCB, n = 235 (100%)	pERCB, n = 1482 (100%)	Range	Total, n = 2039 (100%)	Number missing, n = 2039 (100%)
Age (mean)	33.1	33.3	34.1	33.5	21–47	2039 (100%)	0
Gravida (mean)	2.3	2.5	2.6	2.5	2–9	2039 (100%)	0
Interbirth years (mean)	3.2	3.4	3.4	3.3	0–19	2008 (98.5%)	31 (1.5%)
Region/Country of birth (number)	—	—	—	—	—	2013 (98.7%)	26 (1.3%)
Australia	103 (8.1%)	119 (9.3%)	127 (10.0%)	924 (72.6%)	—	1273 (62.4%)	—
Asia	22 (4.8%)	38 (8.2%)	73 (15.8%)	330 (71.3%)	—	463 (22.7%)	—
Middle East	5 (7.5%)	4 (6.0%)	8 (11.9%)	50 (74.6%)	—	67 (3.3%)	—
Africa	3 (6.3%)	2 (4.1%)	6 (12.5%)	37 (77.1%)	—	48 (2.4%)	—
Europe	2 (4.3%)	4 (8.5%)	8 (17.0%)	33 (70.2%)	—	47 (2.3%)	—
United Kingdom	2 (5.9%)	3 (8.8%)	1 (2.9%)	28 (82.4%)	—	34 (1.7%)	—
New Zealand	3 (11.1%)	2 (7.4%)	4 (14.8%)	18 (66.7%)	—	27 (1.3%)	—
Other	4 (7.4%)	2 (3.7%)	6 (11.1%)	42 (77.8%)	—	54 (2.6%)	—
ATSI status	—	—	—	—	—	2000 (98.1%)	39 (1.9%)
ATSI	0 (0%)	2 (1.54%)	1 (7.7%)	10 (77.0%)	—	13 (0.6%)	—
Non-ATSI	141 (7.1%)	169 (8.5%)	232 (11.7%)	1445 (72.7%)	—	1987 (97.4%)	—
BMI group	—	—	—	—	—	1522 (74.6%)	517 (25.4%)
<18.5	1 (4.5%)	1 (4.5%)	2 (9.1%)	18 (81.8%)	—	22 (1.1%)	—
18.5–24.9	48 (8.3%)	45 (7.8%)	74 (12.8%)	411 (71.1%)	—	578 (28.3%)	—
25.0–29.9	25 (4.7%)	51 (9.6%)	74 (13.9%)	381 (71.8%)	—	531 (26.0%)	—
>30.0	15 (3.8%)	32 (8.2%)	33 (8.4%)	311 (79.5%)	—	391 (19.2%)	—
Onset of labor	—	—	—	—	—	1749 (85.8%)	290 (14.2%)
Spontaneous	109 (50.5%)	52 (24.1%)	55 (25.5%)	0 (0%)	—	216 (10.6%)	—
Induction	38 (74.5%)	13 (25.5%)	0 (0%)	0 (0%)	—	51 (2.5%)	—
No labor	0 (0%)	0 (0%)	0 (0%)	1482 (100%)	—	1482 (72.7%)	—
CB priority category	—	—	—	—	—	2039 (100%)	0 (0%)
Category 1	0 (0%)	11 (84.6%)	2 (15.4%)	0 (0%)	—	13 (0.6%)	—
Category 2	0 (0%)	102 (57.6%)	75 (42.4%)	0 (0%)	—	177 (8.7%)	—
Category 3	0 (0%)	61 (27.9%)	158 (72.1%)	0 (0%)	—	219 (10.7%)	—
Category 4	0 (0%)	0 (0%)	0 (0%)	1482 (100%)	—	1482 (72.7%)	—

TABLE 4 Mode of birth.

Study groups	Classification	Number of births
Group 1 (VBAC)	Planned and had a VBAC	148 (7.3%)
Group 2 (pVBAC + EMCB)	Planned VBAC and had an emergency CB	174 (8.5%)
Group 3 (lab + planned ERCB)	Women who experienced labor before their planned elective CB and proceeded with their elective CB	235 (11.5%)
Group 4 (ERCB)	Planned Elective repeat CB	1482 (72.7%)
Total		2039 (100%)

(0.7%) post-VBAC, two (1.7%) post-pVBAC + EMCB and three (0.1%) post-ERCB. The overall rate for blood transfusion after a PPH in this study is 0.3%, which is lower than the rate in NSW in the last 10 years (vaginal birth 0.9%–1.5% and cesarean 0.82%–1.72%) and is consistent with rates reported for private hospitals (vaginal birth 0.4%–1.4% and cesarean 0.4%–0.8%) elsewhere.<sup>6</sup> In addition, research indicates that clinicians often inaccurately measure intrapartum and postpartum blood loss.<sup>23</sup> A 2015 systematic review found that midwives and obstetricians visually underestimate blood loss by 40%–49%.<sup>24</sup> A 2022 American study concluded that blood loss is a difficult outcome to assess as it can often be mistaken as amniotic fluid and vice versa, resulting in a highly inaccurate over or under estimation of maternal blood loss in a CB.<sup>23</sup>

In this study, there was only one (<0.1%) case of uterine rupture, occurring in the pVBAC + EMCB group. This is similar to rates in a recent study from China (<0.1%), but lower than in other reported literature, including an Australian study that reported a rate of 0.3%, and an American study reporting a rate of 0.3% overall, which also reported an increased risk for planning a VBAC (0.5%) compared with ERCB (0.03%).<sup>12,21,25</sup> A multi-country European population study found that there was a very low overall prevalence of uterine rupture (22 per 10,000) (0.22%) in women with a previous CB.<sup>20</sup> Countries with high rates of attempted VBAC have higher rates of uterine rupture; however, our low rate of attempted VBAC ( $n = 322$ , 15.8%) means that we are unable to reliably compare the data with the published research.<sup>20</sup> Rates for hysterectomy were low (0.1%), with two occurring in the pERCB group and none in the VBAC group.

Women's wishes about future mode of birth, and fully informed consent, need to be paramount when approaching a shared decision-making model. The literature indicates many factors that may influence why women wish to have a VBAC, including activation of normal hormonal and physiological pathways, securing skin-to-skin time with their newborn, a desire to be mobile sooner, and avoiding healing after abdominal surgery.<sup>13,26</sup> Studies have found that advanced cervical ripening, effacement,

spontaneous onset of labor, spontaneous rupture of membranes, low station of fetal head, gravidity, parity, and prior vaginal birth were all factors positively associated with having a completed VBAC, but these factors were unable to be examined in this study.<sup>21,27–29</sup> The decision to attempt a VBAC is also influenced by previous birth experiences, previous traumatic birth experiences, concerns about CB, clinical evaluation, information from clinicians, and health insurance considerations.<sup>13,30,31</sup> A 2020 Iranian study found that barriers to VBAC can be classified into “psychological and operations barriers,” with five subcategories: “sense of danger, financial dissatisfaction, negative attitude, barriers to decision making and clinician attitude.”<sup>32</sup> In the private sector, clinicians need to encourage women to have a VBAC if there are no contraindications and support her with whatever planned mode of birth she decides.

At the private hospital in this study, VBAC numbers were exceptionally low compared with the state average and within other private hospitals. We need to further examine the clinical practices at this hospital to improve and increase VBAC rates while decreasing the incidence of adverse outcomes. The current model of care at the research hospital is private obstetrician-led care; however, it is important to consider the role midwives play when choosing VBAC as a mode of birth, as midwifery-led continuity of care models positively influence VBAC rates with higher rates of women with completed VBAC.<sup>33</sup> In the current model of care at private hospitals, there is little to no continuity of care from midwives. Midwives provide most of the intrapartum care during labor and by having combined midwifery continuity of care options in the private sector, women may feel more in control and confident about their labor and birth, leading to higher rates of completed VBACs.<sup>13,33,34</sup> All women should be aware of all birthing options, including the benefits of VBAC in normal and low-risk pregnancies.<sup>30</sup> Person-centered, shared, decision-making enables women to make an informed decision about their chosen mode of birth.<sup>30,35</sup> Services need to be provided at this private hospital so that VBAC is a viable option for women, and they can be reassured by the safety data that they will receive excellent medical

TABLE 5 Counts and percentages of maternal and neonatal adverse outcomes by group.

Type of adverse outcome	VBAC, n = 148 (100%)	Repeat EmCB, n = 174 (100%)	Labor + planned ERCB, n = 235 (100%)	ERCB, n = 1482 (100%)	Total number of participants	Number of missing data	p-Value
Uterine rupture	0 (0%)	1 (0.5%) (OR >100 [CI <0.001])	0 (0%) (OR 1.000 [CI <0.001])	0 (0%) (OR 1.000 [CI <0.001])	2039	0	0.158
Postpartum hemorrhage (PPH)	8 (5.4%)	3 (1.7%) (OR 0.329 [CI 0.085–1.268])	0 (0%) (OR <0.001 [CI <0.001])	12 (0.8%) (OR 0.149 [CI 0.060–0.373])	1702	337	<0.001
Blood transfusion	1 (0.7%)	3 (1.7%) (OR 2.579 [CI 0.265–25.060])	0 (0%) (OR <0.001 [CI <0.001])	2 (0.1%) (OR 0.199 [CI 0.018–2.204])	2039	0	0.013
Hysterectomy	0 (0%)	0 (0%) (OR 1.000 [CI <0.001])	0 (0%) (OR 1.000 [CI <0.001])	2 (0.1%) (OR <1.000 [CI <0.001])	2039	0	1.000
Maternal death	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2039	0	N/A
Apgar score <7	1 (0.7%)	0 (0%) (OR <0.001 [CI <0.001])	0 (0%) (OR <0.001 [CI <0.001])	3 (0.2%) (OR 0.288 [CI 0.030–2.789])	2032	7	0.407
Resuscitation	7 (4.7%)	17 (9.8%) (OR 2.102 [CI 0.846–5.220])	17 (7.2%) (OR 1.504 [CI 0.608–3.721])	44 (3.0%) (OR 0.591 [CI 0.261–1.337])	2031	8	0.000
Special care nursery (SCN)	10 (6.8%)	45 (25.9%) (OR 4.641 [CI 2.243–9.601])	38 (16.2%) (OR 2.546 [CI 1.226–5.287])	119 (8.0%) (OR 1.153 [CI 0.590–2.253])	2031	8	0.000
Neonatal intensive care Unit (NICU)	0 (0%)	2 (1.1%) (OR >100 [CI <0.001])	3 (1.3%) (OR >100 [CI <0.001])	1 (0.1%) (OR >100 [CI <0.001])	2031	8	0.004
Neonatal death	1 (0.7%)	0 (0%) (OR <0.001 [CI <0.001])	0 (0%) (OR <0.001 [CI <0.001])	0 (0%) (OR <0.001 [CI <0.001])	2032	7	0.070
Combined adverse outcomes	25 (16.9%)	48 (27.6%) (OR 1.874 [CI 1.088–3.228])	49 (20.9%) (OR 1.296 [CI 0.761–2.208])	157 (10.6%) (OR 0.583 [CI 0.368–0.924])	2039	0	0.000

care if any adverse outcome were to occur. Private hospitals also need to record a woman's planned or preferred mode of birth. While it may be recorded in the private obstetrician's notes, it is not always recorded in the hospital's electronic medical records. Improved patient data recording, indicating requirements for supportive services, may result in increased funding for antenatal VBAC support such as VBAC education classes, and proper planning for service provision and adequate clinician training.

Other educational resources and clinician support may assist in preparing women for VBAC. Antenatal education can increase the success of VBAC, by including evidence-based information such as the benefits of increased mobility during labor, which is known to increase successful VBAC rates.<sup>13,36</sup> However, we were unable to assess labor positions for this study. The current model of obstetric care in private hospitals should incorporate upright positions and increased mobility into their intrapartum care instead of strict bed rest, which is commonly seen during labor and contributes to over-medicalized intrapartum care.<sup>37</sup> In general, all healthcare professionals need to proactively encourage VBAC as a safe mode of birth for mothers with a previous CB, and work with all birthing people to support this choice by providing infrastructure, education and supportive services. Clinicians need to be trained in how to support and manage VBAC births to ensure the best outcome for the family.

Overall, this private hospital had a low number of adverse maternal and neonatal outcomes, with 279 (13.7%) of women and neonates having an adverse outcome. However, the population demographics in this study, which consists of participants from a higher socioeconomic background in a private hospital, means that this may not be generalized to the greater population.

## 4.1 | Limitations

The limitations of this study are mainly reflective of retrospective database studies, and in particular, errors of data recording and difficulty in extracting specific subcategories of data. First, low numbers of completed VBACs ( $n = 148$ ) meant that it was difficult to accurately compare adverse outcomes between groups and to the published literature. While this study looks at only one hospital's data over a 10-year period, it is a good example of VBAC numbers in the private sector. As there are lower numbers of VBAC in private hospitals compared with the public sector across Australia, it is important for clinicians and policymakers to critically review the practices and systemic issues that contribute toward this difference. Due to clinicians' privacy and logistical reasons, despite reaching out for clarification of certain outcomes (e.g., was the

uterine rupture a complete or partial uterine rupture, or what is the recorded planned mode of birth), we were unable to obtain data on clinicians' conversations about VBAC in private rooms.

Second, missing data from the electronic medical records were a major limitation in this study. Data for several variables could not be included, such as grading of uterine rupture, length of labor, labor and birth positions and support, type of resuscitation given, and reason for SCN admission. In addition, not all women who attempted VBAC had vaginal examinations recorded in the K2 medical record system, making accurate categorization into groups difficult. Data recording issues may have introduced bias into the sample. Ongoing data collection and refinement of the K2 system is required for high-quality research.

Missing data were recorded in 17% of all patient records for the main outcomes of which assumptions were not able to be made. This is most notable in estimating blood loss. Under the K2 Medical system, blood loss during labor is recorded as "delivery estimated blood loss" and "postpartum estimated blood loss." However, inconsistencies in data recording and missing data mean that combining the data into an estimated total blood loss enabled a more accurate calculation of blood loss. Despite this, many women had no blood loss recorded in either subcategory.

## 4.2 | Recommendations

It is evident that adverse maternal and neonatal outcomes were low at this private hospital, regardless of mode of birth. It is advised to continue offering VBAC to women who give birth in private hospitals, as per NSW Health VBAC Guidelines.<sup>19</sup> It is important that clinicians and women continue to advocate for VBAC and VBAC services, as well as training being provided within the health system, which may include options for combined midwifery and obstetric continuity of care models. Public health resources should be made available and distributed to target this population, who often have antenatal visits in private rooms rather than an antenatal clinic in a hospital. Targeted education and collaboration with obstetricians and childbirth education practitioners in the private hospital system needs to occur to highlight the psychological and physiological benefits of VBAC for women with a previous cesarean and assist with skill maintenance for clinicians.

## 4.3 | Future directions

There is limited research about VBAC in private hospital settings in Australia; as such, this research aims to raise



awareness of VBAC in private hospitals and to encourage further investigation into VBAC in other private hospitals. Private clinicians certainly have the biggest impact on women's decision about the mode of birth as they have close, one-to-one relationships with patients and are often able to steer a decision one way or the other. Further research should expand on these initial findings, and a comparison study of public and private hospital data in the same local health district is needed. Further exploration of the clinical practices at a private hospital and in private rooms can identify issues and biases that can be improved in the current private obstetrician model of care. Both clinicians and women should be advocates for VBAC and barriers to offering or choosing VBAC should be explored, as well as identifying any potential risks, and supporting women appropriately regardless of their birth preferences. The factors that influence whether a woman decides to plan a VBAC may vary between the public and private hospital systems. A qualitative analysis could assist in identifying these factors so that public health education on VBAC and its safety can be targeted appropriately.

#### 4.4 | Conclusions

Overall, there were favorable outcomes for women who had a VBAC at this private hospital in the last 10 years. Adverse outcomes in this study were less frequent when compared with NSW statistics and other published research. Therefore, it is critical that pregnant people with a previous CB be informed, advised, and encouraged to plan a vaginal birth, and for clinicians to manage any risks appropriately to further reduce adverse outcomes.

#### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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