Use of Routine Interventions in Vaginal Labor and Birth: Findings from the Maternity Experiences Survey

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ABSTRACT: Background: *Intervention rates in maternity practices vary considerably across Canadian provinces and territories. The objective of this study was to describe the use of routine interventions and practices in labor and birth as reported by women in the Maternity Experiences Survey of the Canadian Perinatal Surveillance System. Rates of interventions and practices are considered in the light of current evidence and both Canadian and international recommendations.* **Methods:** *A sample of 8,244 estimated eligible women was identified from a randomly selected sample of recently born infants drawn from the May 2006 Canadian Census and stratified primarily by province and territory. Birth mothers living with their infants at the time of interview were invited to participate in a computer-assisted telephone interview conducted by Statistics Canada on behalf of the Public Health Agency of Canada. Interviews averaged 45 minutes long and were completed when infants were between 5 and 10 months old (9–14 mo in the territories). Completed responses were obtained from 6,421 women (78%).* **Results:** *Women frequently reported electronic fetal monitoring, a health care practitioner starting or speeding up their labor (or trying to do so), epidural anesthesia, episiotomy, and a supine position for birth. Some women also reported pubic or perineal shaves, enemas, and pushing on the top of their abdomen.* **Conclusions:** *Several practices and interventions were commonly reported in labor and birth in Canada, although evidence and Canadian and international guidelines recommend against their routine use. Practices not recommended for use at all, such as shaving, were also reported. (BIRTH 36:1 March 2009)*

Key words: *interventions, labor, birth, maternity experiences*

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Intervention rates in maternity practices vary considerably across Canadian provinces and territories. This paper compares the use of interventions and practices in labor and birth as reported by a random sample of Canadian women who participated in the Maternity Experiences Survey with guidelines for care recommended by the Cochrane systematic reviews of evidence-based practice and Canadian and international guidelines for practice.

The Cochrane Collaboration is the largest organization in the world engaged in the production and maintenance of systematic reviews. It is the most comprehensive, single source of reliable evidence about the effects of health care (1). In Canada, the Society of Obstetricians and Gynaecologists' national clinical practice guidelines, based on the foremost scientific knowledge in obstetrics and gynecology, advance these practices and promote informed choices for women (2). From time to time, the federal government convenes a group of key stakeholders and produces national guidelines, which are widely circulated to all professionals and hospitals providing maternity services (3). Internationally, the World Health Organization undertakes an international process of review and prepares programs and documents such as the Integrated Management of Pregnancy and Childbirth program (4), based on similar standards.

We examined the rates of use of electronic fetal monitoring, attempts to start or induce labor or to speed it up, epidural anesthesia, episiotomy, shaving, enemas, pushing on the top of the abdomen, forceps and vacuum use, and position adopted for birth as reported by women surveyed in the Maternity Experiences Survey who had vaginal or attempted vaginal births in relation to these guidelines.

Table 1 summarizes the evidence emerging from a systematic review of randomized controlled trials of these interventions and recommendations about their use by the existing Society of Obstetricians and Gynaecologists of Canada, Health Canada, and World Health Organization–Regional Office for Europe.

Methods

Sample

For the Maternity Experiences Survey, a sample of 8,542 women was identified from a randomly selected sample of recently born infants drawn from the May 2006 Canadian Census and stratified primarily by province or territory, maternal age, rural or urban residential area, and the presence of other children in the home. Women giving birth between February 15, and May 15, 2006, in the provinces and between November 1, 2005, and February 1, 2006, in the territories were eligible for inclusion. Mothers who were at least 15 years, gave birth in Canada to a singleton baby, and were living with their infants at the time of the interview were asked to participate in an approximately 45-minute, computer-assisted telephone interview conducted by Statistics Canada on behalf of the Public Health Agency of Canada, when their infants were between 5 and 10 months old (9–14 mo in the territories).

Of the 8,542 women initially identified, an estimated 8,244 were eligible for the survey. Completed responses were obtained from 6,421 women (78%). When contact was successfully established with women (85% of the sample), almost all were willing to participate with only 1 percent refusing. Full details of the sampling frame used and a flow chart depicting the number of women included or excluded in the sample, with reasons for exclusion, are provided in Dzakpasu et al (21).

The interviews were conducted in English, French, and 13 additional languages. A few women were interviewed in person at home. Approximately 70 experienced female interviewers, some in a supervisory capacity, administered the survey. A detailed report on the survey methodology and information on data quality and data weighting are reported elsewhere (21).

The research protocol was reviewed by Health Canada's Science Advisory Board and Research Ethics Board and the Federal Privacy Commissioner. Approval was received from Statistics Canada's Policy Committee before implementation.

Questionnaire

The Maternity Experiences Survey questionnaire was developed over several years and was based on available literature and similar surveys conducted elsewhere (22–28). National and international perinatal health experts and members of the Maternity Experiences Study Group were consulted extensively for input. The questionnaire included 309 questions referring to topics such as preconception, pregnancy, birth and postpartum care, infant feeding, maternal and infant health, smoking, alcohol and drug use, physical and sexual abuse, stressful life events, postpartum depression, social support, satisfaction with care and caregivers, and work activity. The full questionnaire is available online (29). Only items pertaining to commonly reported interventions and procedures in labor and birth are reported here.

Table 1. Comparison of Guidelines and Evidence with Respect to Interventions

Intervention	*Cochrane Review*	*Society of Obstetricians and Gynaecologists of Canada*	*Health Canada*	*World Health Organization Regional Office for Europe*
EFM on admission/ continuous	Except for a reduction in neonatal seizures meta-analysis (5) of randomized control trials evaluating EFM vs intermittent auscultation has not found any benefit for the newborn in terms of mortality or substantive long-term morbidity such as cerebral palsy. An important concern is an increase in interventions such as cesarean section, operative vaginal birth, and the use of anesthesia. No evidence is available supporting use of the labor admission test for normal labor (6)	Continuous EFM is the least preferred method of fetal monitoring (7). Move away from routine EFM for normal, uncomplicated labor (7). Intermittent auscultation of the fetal heart is the method of choice (7)	Intermittent auscultation usually with doptone methods is preferred. Continuous EFM is the least preferred method of fetal monitoring (3)	Use a fetal stethoscope for monitoring the fetal heart in preference to all other methods (8)
Starting or speeding up labor	Labor induction has been associated with increased risk of operative vaginal deliveries, abnormal fetal heart rate patterns, uterine hyperstimulation, uterine rupture, and cesarean section (9). A systematic review by Gulmezoglu et al (10) found that a policy of induction at 41 completed weeks or beyond was associated with fewer perinatal deaths and no difference in the risk of cesarean section	Approaches to the management of slow progress in labor include: continuous professional support, upright postures in the first stage, cervical ripening before induction of labor, the use of low-dose epidurals and oxytocin and amniotomy	Induction is often associated with a cascade of problems and interventions. The decision to induce labor should only be made when the risk associated with continuing pregnancy is greater than the risk associated with induction (7)	An induction of labor can be dangerous for a mother or baby, or both. An induction of labor *must* have an indication (11)
Epidural	A meta-analysis comparing epidural anesthesia with opiates indicated that epidural anesthesia offered better pain relief than nonepidural anesthesia, but women having epidurals were more likely to have instrumental vaginal births, a longer second stage, augmentation, very low blood pressure, fever, and difficulty voiding (12)	Although the safety of epidural anesthesia has been well documented, it is important to recognize the effect it has on slowing the progress of labor. Women requesting epidurals should be partners in a thorough discussion of the procedure, its risks and benefits, and the expected outcome (7)	Epidural anesthesia should not be used as a first-line approach to pain relief during vaginal birth but should be reserved for use when other measures prove ineffective (3)	Avoid the use of epidural anesthesia as a routine method of pain management (8)

Continued

Table 1. (*continued*)

Intervention	*Cochrane Review*	*Society of Obstetricians and Gynaecologists of Canada*	*Health Canada*	*World Health Organization Regional Office for Europe*
Episiotomy	A systematic review revealed no beneficial outcomes and a potential for harm from routine vs restricted use of episiotomy (13)	Episiotomy should be used only to expedite delivery in the case of fetal compromise or maternal distress and lack of progress (7)	The practice of routine episiotomy should be abandoned (3). Both routine mediolateral and median episiotomies are associated with increased maternal morbidity without demonstrable maternal or fetal benefit (3)	Do not routinely perform an episiotomy (8).
Shaving	A systematic review indicates that there is no evidence to support the claim that perineal shaving reduces the risk of infection in case of tears or episiotomies (14)	No evidence is available to support the routine use of shave preparations (7)	Shaving should be abandoned (3)	Abandon the use of shaving (8)
Enema	No evidence is available to indicate that enemas lead to reduction in length of labor or reduced infection rates (15)	No evidence to support the routine use of enemas is available (7)	Enemas should be abandoned (3)	Abandon the use of enemas (8)
Pushing on abdomen	—	—	—	Absence of augmentation including absence of external pressure on the fundus during labor is regarded as evidence of effective management of normal labor (16)
Forceps/vacuum	Vacuum extraction reduces maternal morbidity and use of forceps reduces cephalhematoma and retinal hemorrhages (17,18)			
Supine position for birth	Second-stage bearing down is more efficient in upright positions (19). The supine position is a form of care that is ineffective or harmful (20)	Clear evidence is available that adopting an upright or semisitting position for delivery is advantageous from fetal and maternal points of view (7). Strapping women's legs in restrictive stirrups in the supine position is to be avoided (7)	Upright positions are associated with less pain and less narcotic and epidural use but more labial lacerations and postpartum blood loss. Women should choose their most comfortable position for delivery (3)	An upright position of the women's choice is preferred (8). Avoid the use of a supine position and particularly the use of stirrups (8). An upright position is included in the Bologna Score (16) of appropriate management of normal labor

EFM = electronic fetal monitoring.

Table 2. Practices or Interventions, or Both, in Labor and Birth*

Intervention	*%*
Method of delivery	
Vaginal	73.7
Spontaneous vaginal	61.1
Cesarean section	26.3
Mothers having vaginal or attempted vaginal births	83.6
Labor	
Any EFM	90.8
EFM on admission only	5.2
Intermittent EFM	21.1
Continuous EFM	62.9
Unspecified method of EFM	1.6
Induction	44.8
Augmentation	37.3
Enema	5.4
Pubic/perineal shaving	19.1
Pushing on abdomen	15.0
Epidural	57.3
Birth	
Instrumental delivery	
Forceps only	4.3
Vacuum only	8.6
Forceps and vacuum	1.4
Perineum	
Episiotomy	20.7
Sutures	64.1
Birth position	
Supine	47.9
Propped up or sitting	45.8
Side lying	3.3
Other	3.0
Legs in stirrups	57.0
Experienced any intervention†	86.6

**Questions about interventions experienced in labor and birth were asked of women having a vaginal or attempted vaginal birth only, which included 73.7% of women with vaginal births and 9.9% of women having cesarean sections after an attempted vaginal delivery (total 83.6%). The questions were not asked of women having planned cesarean sections (13.4%) or unplanned cesarean sections without attempted vaginal birth (2.9%).*

†Includes induction, augmentation, continuous EFM, enema, shaving, pushing on the abdomen, episiotomy, and forceps or vacuum extraction. EFM = electronic fetal monitoring.

To avoid misunderstanding with respect to what we asked mothers, we report the exact wording used in the interview to assess each of the interventions explored. Questions asked included the following: "During labor, were you attached to a machine, called an electronic fetal monitor, that recorded your baby's heartbeat?" and if yes, "Was the electronic fetal monitor used: on arrival or admission but not again, on and off (intermittently) during labor, continuously during labor?"; "Did your health care provider try to start or induce your labor by the use of medications or some other technique?"; "After your labor started, did your health care provider try to speed it up by the use of medication or some other technique?"; "Did you use an epidural or spinal anesthesia?"; "Just before the birth of your baby, did you have an episiotomy, that is, a cut to enlarge your vagina?"; "After the birth, did you have stitches near the opening of your vagina to repair a cut or tear?"; "Before or during labor, in preparation for birth, did you have your pubic hair or the hair around your vagina shaved?"; "Before or during labor, in preparation for birth, did you have an enema to help you move your bowels?"; "During the birth of your baby did anyone push on the top of your abdomen to help push the baby down?"; "Were forceps used?"; "Was a vacuum used?"; "Which of the following best describes your position when the baby was born: lying on your side, propped up or sitting, lying flat on your back, some other position?"; "Were your legs in stirrups?." We have retained the wording used in the interviews when reporting our findings (such as 'pushing on top of the abdomen to help push the baby down') rather than the less cumbersome and clinically accurate 'fundal pressure' to avoid potential misinterpretation.

Statistical Analyses

Because the Maternity Experiences Survey sample was not a simple random sample, weighted estimates of prevalence and of variances were required to take into consideration the sample design and rates of nonresponse (30). Reported percentages, therefore, are based on 6,421 respondents weighted to represent an estimated 76,508 women giving birth during the survey target period (21). Sociodemographic characteristics of the participating sample, however, are not weighted. Characteristics of women participating in the survey compared with all women included in the sampling frame are provided in Dzakpasu et al (21). Missing values were excluded from the analysis.

Initial analyses of the data by province or territory, maternal age and education, parity, type of delivery, and household income above or below the low income cutoff—a composite variable based on household income, household size, and rural or urban status—were performed. Analyses were carried out using SAS version 8.2 (31).

Results

Participants (Unweighted Results)

The mean age of mothers at the time of the interview was 29.3 years, with 92.6 percent between 20 and 39 years. Slightly fewer than one-half of the women (45.0%) were primiparous. Approximately three-quarters (73.7%) gave birth vaginally and 26.3 percent

Table 3. Interventions in Labor and Birth by Province and Territory (%)

Province of Residence	*Epidural*	*Episiotomy*	*Stitches*	*Induction*	*Augmentation*	*Forceps Only*	*Vacuum Only*	*Shaving*	*Enema*	*Pushing*	*Any Electronic Fetal Monitoring*	*Continuous Electronic Fetal Monitoring*	*Admission Electronic Fetal Monitoring*	*Supine Position*	*Stirrups*†*
Canada	57.3	20.7	64.1	44.8	37.3	4.3	8.6	19.1	5.4	15.0	90.8	62.9	5.2	47.9	57.0
Newfoundland and Labrador	46.1	20.4	61.8	43.8	40.1	3.9†	0.4†	20.8	3.6†	13.9	92.7	52.7	5.4†	36.6	69.2
Prince Edward County	29.7	12.8	65.2	52.5	37.5	0.0	3.6†	13.2	4.4†	12.5	98.6	64.3	4.3†	24.2	70.4
Nova Scotia	58.4	19.4	67.9	46.9	34.9	4.9†	7.5†	14.3	1.9‡	18.0	95.1	64.7	4.6†	35.6	37.7
New Brunswick	49.7	19.3	71.5	47.0	39.7	5.4†	8.1†	20.9	6.7†	15.6	94.7	58.6	4.8†	45.1	60.2
Quebec	66.7	24.1	71.3	46.5	40.6	4.2	9.9	12.1	6.2	13.5	92.9	66.9	4.7	57.2	73.4
Ontario	60.7	23.2	63.4	46.4	37.7	4.3	8.4	24.3	4.5	16.4	90.1	67.2	5.0	48.2	51.6
Manitoba	50.3	18.4	59.3	39.1	34.6	2.8†	4.3†	18.6	10.5†	13.7	88.7	58.1	4.6†	42.3	54.2
Saskatchewan	56.8	18.6	59.8	43.6	33.4	2.4‡	10.7	16.5	13.0	14.8	92.6	56.8	9.5†	34.6	62.9
Alberta	54.1	12.9	59.7	44.1	36.0	4.9†	8.6	16.5	3.4†	14.4	93.6	59.6	6.1	40.8	50.9
British Columbia	36.3	16.3	57.8	38.3	32.9	4.9†	7.3	21.9	5.5†	14.0	84.0	49.2	4.6†	44.3	44.4
Yukon	24.2	5.7†	58.1	32.1	24.7	1.8‡	1.8‡	15.4	7.8†	7.1†	88.3	29.3	13.8†	21.1	39.2
Northwest Territory	28.5	10.0†	46.0	33.9	31.0	2.8‡	2.7‡	5.2†	2.7‡	20.4	89.8	38.1	13.0	32.5	49.1
Nunavut	13.0†	5.4†	23.2	21.6	6.1†	1.4‡	2.7‡	2.3‡	2.6‡	4.0‡	74.8	29.3	17.2†	63.3	54.6

**Denominator only includes women who gave birth vaginally and were not lying on their side at the time of birth.*
†Coefficient of variation between 16.6% and 33.3%.
‡Coefficient of variation > 33.3%.

Table 4. Rates of Interventions by Maternal Age, Parity, Maternal Education, and Low-Income Cutoff (%)

Characteristic	*Epidural*	*Episiotomy*	*Stitches*	*Induction*	*Augmentation*	*Forceps Only*	*Vacuum Only*	*Shaving*	*Enema*	*Pushing*	*Any Electronic Fetal Monitoring*	*Continuous Electronic Fetal Monitoring*	*Admission Electronic Fetal Monitoring*	*Supine Position*	*Stirrups**
Canada	57.3	20.7	64.1	44.8	37.3	4.3	8.6	19.1	5.4	15.0	90.8	62.9	5.2	47.9	57.0
Maternal age (yr)															
15–19	64.9	14.4	63.2	48.5	36.2	4.5†	10.9†	26.0	9.9†	16.9	93.6	62.2	6.4†	43.8	58.9
20–24	55.4	17.4	59.5	42.7	35.0	3.4†	6.6	25.0	5.4	18.6	91.4	59.8	5.5	47.5	56.9
25–29	59.4	21.7	64.3	46.5	38.5	3.7	9.0	19.7	5.1	14.1	91.7	64.0	4.5	47.8	60.6
30–34	57.3	20.7	65.6	43.6	39.2	5.6	8.8	16.5	4.9	14.6	90.6	63.5	5.1	48.8	54.7
35–39	52.4	23.3	64.8	45.6	33.4	3.9†	8.5	15.4	5.4	13.7	88.1	61.6	6.5	47.0	54.9
40+	52.8	19.5†	63.5	45.6	36.8	3.1‡	8.6†	20.4†	8.1†	14.7†	86.5	65.4	4.2‡	45.4	43.4
Parity															
Primipara	71.6	27.1	70.6	50.7	44.7	6.5	13.2	22.4	6.3	16.6	94.0	68.0	3.8	49.3	59.5
Multipara	44.3	15.0	58.2	39.4	30.8	2.3	4.2	16.0	4.5	13.4	87.9	58.3	6.6	46.6	55.2
Maternal education															
Less than high school	51.9	14.2	51.7	44.7	34.0	3.2†	4.5†	23.5	8.5†	16.6	92.1	66.7	5.7‡	50.0	57.5
High school graduate	52.7	17.7	59.6	44.0	36.2	3.5†	7.4	24.6	6.6	15.9	91.3	62.4	6.0	45.8	55.8
Postsecondary diploma	58.7	22.4	64.1	46.8	38.2	4.6	9.4	19.2	4.4	17.2	92.5	63.8	5.9	47.0	60.0
University graduate	59.6	21.9	69.1	43.3	37.7	4.7	8.9	14.6	4.9	11.6	88.4	61.4	4.1	48.9	54.4
LICO															
At/below LICO	50.7	19.7	59.6	46.0	32.7	3.6†	6.7	25.8	6.9	18.5	90.8	62.8	5.3	52.6	57.9
Above LICO	59.4	20.8	65.5	44.7	38.8	4.4	9.0	17.1	4.4	14.1	90.7	62.9	5.3	45.4	56.3

**Denominator only includes women who gave birth vaginally and were not lying on their side at the time of birth.*
†Coefficient of variation between 16.6% and 33.3%.
‡Coefficient of variation > 33.3%.
LICO = low-income cutoff.

by cesarean section. Obstetricians and gynecologists were the most frequently reported prenatal and birth health care practitioners (67.7%), with family doctors attending 16.5 percent, nurse or nurse practitioners 4.9 percent, and midwives 3.7 percent of births. Most women were Canadian born, married or in common-law relationships, and had at least some postsecondary education. Additional sociodemographic and maternity characteristics are reported elsewhere (21,32).

Interviews were conducted when babies were, on average, 7.3 months and most (84.6%) were between 6 and 9 months old at the time of the interview. The mean gestational age of babies was 39.0 weeks, with 92.3 percent being born between 37 and 41 completed weeks' gestation. The babies' mean birthweight was 3,438 g, with 81.8 percent being between 2,500 and 3,999 g, and 51.8 percent were male. Responses of women giving birth vaginally or after an attempted vaginal birth are reported here.

Interventions in Labor and Birth (Weighted Results)

Table 2 shows the overall frequency of selected interventions and procedures reported by women. Questions about interventions in labor and birth were asked of all women who had a vaginal birth (73.7%, 95% CI: 72.5–74.8) and of 9.9 percent (95% CI: 9.2–10.7) of women who had a cesarean section after an attempted vaginal birth. The questions were not asked of women who had planned cesarean sections or unplanned cesarean sections without attempted vaginal birth (13.5%, 95% CI: 12.6–14.3 and 2.9%, 95% CI: 2.5–3.3, respectively).

Most women (86.6%, 95% CI: 85.7–87.5) giving birth or attempting to give birth vaginally reported at least one of the following interventions: health care practitioner tried to start or induce labor or speed it up with medication or some other technique, continuous electronic fetal monitoring, enema, shaving, pushing on the top of the abdomen by a health care practitioner, episiotomy, forceps, or vacuum extraction.

Tables 3 and 4 report the rates of interventions in labor and birth by province and territory of Canada (Table 3), maternal age, parity, education, and low-income cutoff (Table 4).

Interventions

Electronic Fetal Monitoring

Nearly 91 percent (90.8%, 95% CI: 90.0–91.6) of women reported electronic fetal monitoring at some time during labor (Table 2), with rates varying from 74.8 to 98.6 percent (95% CI: 67.9–81.7 and 95% CI: 97.5–99.7, respectively) across the country (Table 3). The use of electronic fetal monitoring decreased progressively with increasing maternal age, from 93.6 percent at 15 to 19 years to 88.0 percent or less beyond 35 years (93.6%, 95% CI: 90.5–96.7 for women between 15 and 19 yr; 88.1%, 95% CI: 85.5–90.6 for women 35–39 yr; and 86.5%, 95% CI: 80.7–92.4 for women older than 40 yr). Electronic fetal monitoring was more likely to be used by primiparas than by multiparas (94.0%, 95% CI: 93.0–94.9 vs 87.9%, 95% CI: 86.6–89.2) (Table 4).

A continuous approach was adopted for 62.9 percent (95% CI: 61.5–64.2) of women, with regional variations ranging from 29.3 to 67.2 percent (Table 3). Intermittent use was reported by 21.1 percent and use on admission, but not subsequently, by 5.2 percent (95% CI: 19.9–22.3 and 95% CI: 4.6–5.8, respectively). Wide regional variations in the use of both admission and intermittent electronic fetal monitoring were also reported (Table 3).

Starting or Speeding Up Labor

Many women reported that their health care practitioner tried to start or induce their labor or tried to speed it up (44.8%, 95% CI: 43.4–46.1 and 37.3%, 95% CI: 36.0–38.6, respectively) (Table 3). Reported rates of trying to start or induce labor varied among Canadian provinces and territories and ranged from 21.6 to 52.5 percent (95% CI: 15.6–27.6 and 95% CI: 47.7–57.2, respectively) (Table 3).

Of the 9.9 percent of respondents who had a cesarean birth after attempting a vaginal birth, 65 percent (95% CI: 61.0–69.0) reported that efforts to start or induce their labor were made by their practitioner. Primiparas were more likely to report attempts to start or induce their labor than multiparas (50.7%, 95% CI: 48.7–52.7 vs 39.4%, 95% CI: 37.5–41.4) (Table 4).

Reported rates of attempts to speed up labor varied among Canadian provinces and territories and ranged from 16.1 to 40.6 percent (95% CI: 10.6–21.5 and 95% CI: 37.7–43.5, respectively) (Table 3). Of the respondents who had a cesarean section after attempting a vaginal birth, 56.7 percent (95% CI: 52.6–60.8) reported that their practitioner had tried to speed up their labor. Primiparas compared with multiparas were more likely to report that their practitioner tried to speed up their labor (44.7%, 95% CI: 42.8–46.7 vs 30.8%, 95% CI: 28.9–32.6). More women living in a household above the low-income cutoff reported that their practitioner tried to speed up their labor compared with women living in a household at or below the low-income cutoff (38.8%, 95% CI: 37.2–40.3 vs 32.7%, 95% CI: 29.7–35.8) (Table 4).

Epidural Anesthesia

More than half of all women who delivered or attempted to deliver vaginally had epidural or spinal analgesia (57.3%, 95% CI: 56.0–58.5) (Table 3). Reported epidural rates ranged widely across the country, from 13.0 to 66.7 percent (95% CI: 8.0–17.9 and 95% CI: 64.1–69.3, respectively) (Table 3). Of those who had epidurals, most respondents (81.1%, 95% CI: 79.7–82.6) found them to be "very helpful."

Women had epidural anesthesia more frequently if they eventually had a cesarean deliver (84.4%, 95% CI: 81.5–87.3), were primiparous (71.6%, 95% CI: 69.7–73.5), had higher levels of education (postsecondary diploma: 58.7%, 95% CI: 56.6–60.8 and university graduate: 59.6%, 95% CI: 57.3–61.8), or lived in a household above the low-income cutoff (59.4%, 95% CI: 57.9–60.9) (Table 4).

Episiotomy

In all, 20.7 percent (95% CI: 19.6–21.8) of women who had a vaginal or attempted vaginal birth reported having had an episiotomy (Table 3). Interprovincial and territorial rates varied considerably ranging from 5.4 to 24.1 percent (95% CI: 2.1–8.7 and 95% CI: 21.6–26.6, respectively) (Table 3). The proportion of women who reported having had an episiotomy increased with maternal age, up to the 35-39-year age group (Table 4). Primiparas were more likely to have had an episiotomy than multiparas (27.1%, 95% CI: 25.3–28.8 vs 15.0%, 95% CI: 13.6–16.4). Those with postsecondary education (22.4%, 95% CI: 20.4–24.3) were more likely to have had an episiotomy than those with high school (17.7%, 95% CI: 15.3–20.0) or less than high school education (14.2%, 95% CI: 10.6–17.8) (Table 4).

In all, 64.1 percent (95% CI: 62.8–65.4) of women reported having stitches near their vagina with wide regional variations in rates ranging from 23.2 to 71.5 percent (95% CI: 16.8–29.6 and 95% CI: 66.4–76.5, respectively) (Table 3). Primiparas were more likely to have had stitches than multiparas (70.6%, 95% CI: 68.8–72.4 vs 58.2%, 95% CI: 56.3–60.2) as were university graduates compared with those with postsecondary or less education (69.1%, 95% CI: 66.9–71.3 vs 64.1%, 95% CI: 61.9–66.3) (Table 4). Women living in households above the low-income cutoff were more likely to have had stitches than those living in households at or below this cutoff (65.5%, 95% CI: 63.9–67.0 vs 59.6%, 95% CI: 56.5–62.7) (Table 4). Approximately one-third (35.9%, 95% CI: 34.5–37.2) of women did not report having either an episiotomy or perineal stitches.

Shaving, Enemas, and Pushing on the Abdomen

Shaving. Overall, 19.1 percent (95% CI: 17.9–20.2) of women reported having had a perineal shave, with wide regional variations ranging from 2.3 to 24.3 percent (95% CI: 0.2–4.4 and 95% CI: 22.1–26.5, respectively) (Table 3). Women who were younger (< 24 yr), delivered by cesarean section after attempting to deliver vaginally, were having their first baby, had lower levels of education, or were living in households with family incomes at or below the low-income cutoff (Table 4) were more likely to have had a perineal shave than other women.

Enemas. Overall, 5.4 percent (95% CI: 4.7–6.0) of women reported having an enema with regional variations in rates ranging from 1.9 to 13.0 percent (95% CI: 0.5–3.3 and 95% CI: 9.3–16.6, respectively) (Table 3). Younger women (15–19 yr) and women aged 40 years and older, women who delivered by cesarean section after attempting to deliver vaginally, women having their first baby, women with lower levels of education, and women with family income at or below the low-income cutoff (Table 4) were more likely to report having had an enema than other women.

Pushing on the Abdomen. In all, 15.0 percent (95% CI: 14.0–16.0) of women reported that someone pushed "on the top of their abdomen to help push the baby down" during vaginal or attempted vaginal delivery, with regional variations in rates ranging from 4.0 to 20.4 percent (95% CI: 1.1–6.8 and 95% CI: 15.2–25.6, respectively) (Table 3). Women who were older, multiparous, university graduates, and with family incomes above the low-income cutoff (Table 4) were less likely to report that someone pushed on the top of their abdomen.

Forceps and Vacuums

In total, 8.6 percent (95% CI: 7.8–9.3) of women had a vacuum-assisted delivery, 4 percent (4.3%, 95% CI: 3.7–4.9) of women had a forceps-assisted delivery, and 1.4 percent (95% CI: 1.1–1.7) were assisted by both forceps and vacuum during vaginal or attempted vaginal delivery. Both forceps and vacuum use varied across the country from 0 to 5.4 percent and from 1.8 to 10.7 percent, respectively (Table 3). Both interventions were used least often in multiparas, older women, women with lower education levels, and women living in households at or below the low-income cutoff (Table 4).

Position for Birth

The most frequent position for birth reported by women was lying flat on their back, followed by propped up or sitting (47.9%, 95% CI: 46.4–49.4 and 45.8%, 95% CI: 44.3–47.3, respectively) (Table 3). Only 3.3 percent of mothers gave birth in a side-lying position and 3.0 percent in other positions (95% CI: 2.8–3.9 and 95% CI: 2.5–3.5, respectively). The use of a supine position for birth varied substantially among Canadian provinces and territories ranging from 21.1 to 63.3 percent (95% CI: 15.7–26.5 and 95% CI: 56.0–70.6, respectively) (Table 3). More than one-half of the women with a vaginal birth who were not side lying (57.0%, 95% CI: 55.5–58.5) had their legs in stirrups when the baby was born. Mothers less than 30 years reported this practice more often than older mothers (Table 4).

Overall, both younger and older mothers were less likely to adopt a supine position for birth (Table 4) and more likely to be on their side, propped-up, or in other positions. Compared with multiparous mothers, those giving birth for the first time were more likely to adopt a supine position (49.3%, 95% CI: 47.0–51.6 vs 46.6%, 95% CI: 44.5–48.6) and have their legs in stirrups (59.5%, 95% CI: 57.3–61.8 vs 55.2%, 95% CI: 53.2–57.3) (Table 4). Women living in households above the low-income cutoff used a supine position for vaginal birth less often than women living in households at or below this cutoff (45.4%, 95% CI: 43.6–47.2, and 52.6, 95% CI: 49.2–56.1, respectively).

Discussion

Obstetric intervention rates varied considerably across Canadian provinces and territories suggesting variable practice patterns. Some factors that might influence this variability and that require further analysis include the types of health care practitioners in different regions, hospital size, availability of resources, maternal access to care, rural or urban residence, local cultural variations, and maternal demographic variables such as parity, age, and body mass index. Lack of knowledge among both women and caregivers, adherence to traditional ways of providing care, and fear of litigation may also influence practice.

Use of Specific Interventions

At the time of birth, several interventions were reported by women giving birth or attempting to give birth vaginally that are not supported for routine use by Cochrane evidence or by national or global practice guidelines (Table 1). Maternity Experiences Survey respondents reported continuing widespread use of electronic fetal monitoring and relatively little reliance on intermittent auscultation, despite available evidence for best practice (3,5,7,8,33) (Table 1). In the Maternity Experiences Survey, almost two-thirds of women having or attempting a vaginal birth reported receiving continuous electronic fetal monitoring, although, surprisingly, its use appeared to decrease with increasing maternal age.

Overall, 44.8 and 37.3 percent of Maternity Experiences Survey respondents reported that attempts to start or induce or speed up labor were made by their health care practitioner, respectively. These rates varied considerably by provinces and territories, parity, maternal age, education, and low-income cutoff. The total labor induction (start up) rate reported in the Maternity Experiences Survey (44.8%) is considerably higher than the 21.8 percent reported in the Perinatal Health Report, 2008 Edition (34). It is possible that perceptions of mothers differ from those of practitioners with respect to what procedures are designed to induce or augment labor. For example, "stripping of membranes" could be perceived by some mothers to be an induction. Furthermore, these rates are not mutually exclusive: women who reported that their labors had been augmented may also have reported that their labor had been started up or induced. Furthermore, Canadian guidelines (3) recommend that epidural anesthesia should not be used as a first-line approach to pain relief during vaginal birth, and the World Health Organization recommends that it be avoided as a routine method of pain management (8) (Table 1). Epidural or spinal anesthesia was used by 57.3 percent of women in the Maternity Experiences Survey, most of whom rated it as very helpful.

Systematic reviews indicate that there are no beneficial outcomes and a potential for harm from routine use of episiotomy as opposed to restricted use (13), and both Canadian (3,7) and World Health Organization (8) recommendations endorse restricted use (Table 1). In the Maternity Experiences Survey, 1 in 5 women reported having an episiotomy. Two of three women reported having perineal stitching. Women who were primiparous or living in the 10 provinces, or both, were more likely to have stitches, whereas those in the three territories were less likely to have either an episiotomy or stitches.

Contrary to evidence-based practice, and both Canadian (7) and World Health Organization guidelines (8) (Table 1), almost half the Maternity Experiences Survey respondents reported being in a supine position at the time of birth and, excluding those who were in a side-lying position for birth, reported the common use of stirrups. Enkin et al (20) classify

a supine or lithotomy position for birth as "Forms of care likely to be ineffective or harmful," whereas a World Health Organization–Regional Office for Europe perinatal task force (16) included the use of a nonsupine position for delivery as 1 of 5 key indicators comprising the "Bologna Score" of effective management of normal birth. A recent Cochrane review (19), although concluding that second-stage bearing down is more efficient in upright positions, noted that most available research papers in this area are of variable quality.

On the other hand, the Cochrane review of vacuum and forceps use (17), endorsed by Health Canada (3), concluded that as options for assisted birth, vacuum extraction reduces maternal morbidity and use of forceps reduces cephalhematoma and retinal hemorrhages (Table 1). Forceps may be considered to be a more difficult skill to learn, especially when the baby's position is occipitoposterior and the baby needs turning, whereas vacuum extraction may be less difficult to learn and potentially less risky. In the Maternity Experiences Survey, respondents reported almost twice as many vacuum extractions as forceps deliveries.

Although most professional guidelines recommend restrictive rather than liberal use of interventions, the distinction between these criteria is unspecified. Interventions such as initial and continuous electronic fetal monitoring, episiotomy, epidural anesthesia, induction and augmentation of labor, and use of forceps and vacuum, although not routinely recommended may be required in certain circumstances. Lower intervention rates might form a benchmark standard for comparison; however, this suggestion needs further examination. Reported rates from various countries or settings may provide benchmarks for potential clinical standards, but for most interventions, these are not yet clearly defined. Strong recommendations against the use of routine perineal shaving or enemas during labor and potential harm associated with pushing on the top of abdomen during vaginal delivery to help push the baby down do exist, however (Table 1), since these are not recommended at all. In Canada, almost 1 woman in 5 reported having a perineal shave, 1 in 20 an enema, and 1 in 8 experiencing pushing on the top of her abdomen. Large variations occurred across provinces and territories in how frequently these procedures were reported. It should be noted, however, that some women may have shaved themselves or given themselves an enema. Although the question was clearly worded ("Did anyone push on the top of your abdomen to help push the baby down?"), women might also have reported abdominal palpation as pushing on the top of the abdomen.

In general, women in the three territories were least likely to experience most of the interventions examined (Table 3), but whether this finding was in accordance with existing policy or because fewer resources were available to them is unknown. As would be expected on clinical grounds, multiparas were less likely to experience the interventions assessed in the Maternity Experiences Survey, except for use of an admission electronic fetal monitor. Compared with older mothers, teenage mothers were more likely to have had epidurals, attempts to start or induce labor, vacuum extractions, pubic or perineal shaves, enemas, and admission electronic fetal monitoring assessments (Table 4) and less likely to have had episiotomies, continuous electronic fetal monitoring, and lie in supine positions for birth.

Women with lower education levels and those in households living below the low-income cutoff were less likely to have had epidurals, episiotomies, stitches, and attempts to speed up labor and forceps or vacuum, or both. Women with higher education levels and those living above the low-income cutoff were least likely to have had attempts to start or induce labor, shaves, enemas, pushing on their abdomens during delivery, or lie in a supine position for birth (Table 4).

No evidence is available to support the use of shaving, enemas, or pushing on the abdomen, and the finding that women with lower education and income levels are more likely to experience these practices is of some concern. Benchmark standards in these situations should be zero.

Limitations

The Maternity Experiences Survey has some limitations. Measuring women's experiences of their care is complex and little standardization of the approaches or questions to be used to facilitate measurement accuracy or consistency exist. Some aspects of clinical care, such as knowing whether a spinal or an epidural anesthetic was used, could not be specified since it was not certain that women would be knowledgeable about them. The timing of interviews varied from 5 to 14 months postpartum, which may have influenced both maternal recall and perception of some of the parameters. Some findings also raise issues that were not addressed, such as the reasons for the interventions women experienced or whether perineal stitching was for repair of episiotomy or extensive tears, or for minor lacerations that do not necessarily require routine repair (8). Mothers and practitioners may also describe some clinical actions differently, such as sweeping of the membranes as induction or augmentation.

Further multivariate analyses are needed, and planned, to explore whether the observations emerging

from this analysis of independent Maternity Experiences Survey variables are robust or influenced by more complex associations in the data.

Conclusions

Many beneficial practices are in place, from the perspective of Canadian women, but several evidence-based and family-centered practices are not yet being fully implemented. What factors contribute to this finding requires further research. The higher use of inappropriate interventions and practices among women of lower education and household income levels, in particular, is of considerable concern. The findings lend support to the need to provide further information to both mothers and practitioners about appropriate, evidence-based perinatal care.

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