

Getting Through Birth in One Piece

PROTECTING THE PERINEUM

ABSTRACT

Purpose: To identify factors related to perineal trauma in childbirth, replicating the work of Albers et al. (1996).

Study Design and Method: A retrospective descriptive analysis of pregnancy and birth data recorded into the Nurse Midwifery Clinical Data Set for women ($N = 510$) with a singleton pregnancy and largely uncomplicated prenatal course. Prenatal care occurred at four prenatal clinics with births at a tertiary care facility during 1996–1997, with care provided by nurse midwifery faculty. Multivariate statistics detailed clinical characteristics associated with perineal trauma.

Results: Episiotomy was related to parity, marital status, infant weight, fetal bradycardia, prolonged second stage labor, and lack of perineal care measures. Factors related to laceration were age, insurance status, and marital status. For all women, laceration was more likely when in lithotomy position for birth ($p = .002$) or when prolonged second stage labor occurred ($p = .001$). Factors that were protective against perineal trauma included massage, warm compress use, manual support, and birthing in the lateral position. Albers et al. (1996) found that ethnicity and education were related to episiotomy and that warm compresses were protective. In this study, use of oils/lubricants increased lacerations, as did lithotomy positioning. Laceration rates were similar in both studies. Episiotomy use was lower in this study.

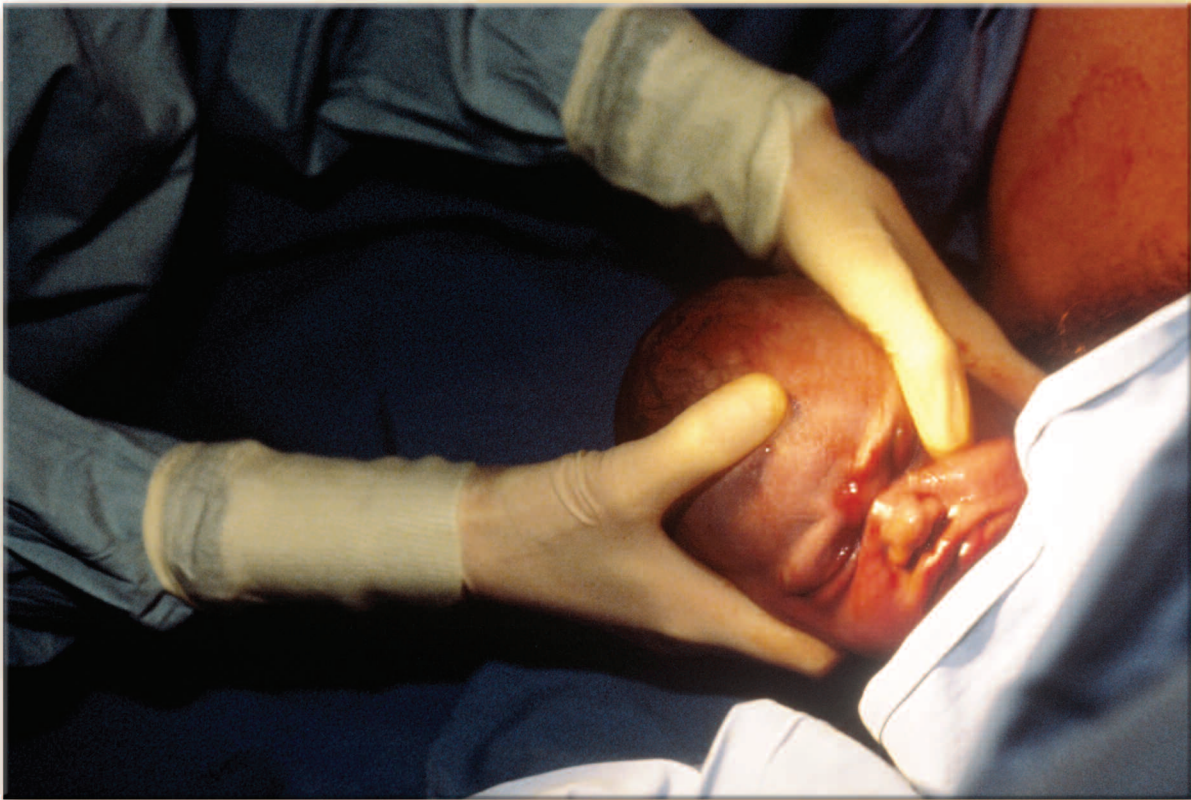
Clinical Implications: Side-lying position for birth and perineal support and compress use are important interventions for decreasing perineal trauma. Strategies to promote perineal integrity need to be implemented by nurses who provide prenatal education and care for the laboring woman.

Key Words: Delivery, obstetric; Episiotomy; Perineal trauma; Genital trauma; Perineal laceration.

Marie Hastings-Tolsma, PhD, CNM,
Deborah Vincent, PhD, RN, FAANP,
Cathy Emeis, MS, CNM, and
Teresa Francisco, MS, RN

Perineal trauma or genital tract injury occurs in more than 65% of all vaginal births (Kozak, DeFrances, & Hall, 2006) and is generally the result of either spontaneous laceration or episiotomy. In the United States, lacerations occur in approximately 43% of all vaginal births and episiotomy occurs in approximately 23% of vaginal births (Kozak et al., 2006). Episiotomy rates in other countries range from 44% to 84% of vaginal births (Viswanathan et al., 2005). Perineal trauma from birth is strongly associated with perineal pain (Albers, Sedler, Bedrick, Teaf, & Peralta, 2006) and emotional discomfort (Glazener et al., 1995), and both may linger for weeks, causing some women significant distress.

Attention has been directed toward decreasing routine episiotomy use, with notable success. In the United States, downward trending in episiotomy rates have been seen, although there is wide variation among providers, depending on training, preference, and local practice. Episiotomy rates among providers have been noted to range from less than 10% to more than 75% (Viswanathan et al., 2005). Aside from efforts to decrease the incidence of episiotomy, however, little has changed regarding obstetric management to reduce the likelihood of perineal trauma other than rising elective cesarean rates, some for “perineal preservation” (Bailit, Love, & Mercer, 2004). In fact, as episiotomy rates have decreased, there have been increasing numbers of spontaneous first- and second-degree lacerations. Weeks and Kozak (2001) found that combined first- and second-degree lacerations



tion rates increased from 43% to 82% between 1980 and 1998. More recent data also support this trend (Kozak et al., 2006).

Perineal Laceration: Rates and Interventions

Women who are younger or have higher parity seem to have more lacerations, but nulliparous women are more likely to experience serious lacerations (Riskin-Mashiah, O'Brian Smith, & Wilkins, 2002). Older women have been shown to have more first- or second-degree lacerations when trauma does occur, probably due to parity and higher birth weights, both of which increase with age (Vincent, Hastings-Tolsma, & Park, 2004). Fourth-degree lacerations (which involve anal sphincter tears) are less frequent in women who have had a prior birth (Riskin-Mashiah et al., 2002).

The literature on perineal laceration demonstrates that some interventions increase the chance of laceration, some decrease the chance, and some have insufficient evidence. Some interventions increase the likelihood of perineal laceration, including squatting position in primiparas (Shorten, Donsante, & Shorten, 2002), disruption of spontaneous bearing-down efforts (Sampselle & Hines, 1999), epidural use (Carroll, Engelken, Mosier, & Nazir, 2003), pudendal anesthesia, and oxytocin use (Riskin-Mashiah et al., 2002). Some interventions seem to decrease the chances of perineal lacerations, including lateral position (Albers et al., 1996),

upright and hands and knees (Soong & Barnes, 2005); delivery of the fetal head between contractions (Albers et al., 2006); and prenatal perineal massage, particularly in nulliparous women (Beckmann & Garrett, 2006). Some interventions lack sufficient evidence to determine whether they protect the perineum from lacerations, including water immersion (Eckert, Turnbull, & MacLennan, 2001) and a longer second stage to allow for perineal stretching (Sampselle & Hines, 1999).

Episiotomy: Risks, Complications, and Protective Factors

The literature is replete with suggestions that episiotomy use be restricted, and rates have decreased from 64% in 1980 to 23% in 2004 (Kozak et al., 2006). The women who seem most at risk for having an episiotomy are nulliparous women (Riskin-Mashiah et al., 2002), women who experience a prolonged second stage labor (Christianson, Bovbjerg, McDavitt, & Hullfish, 2003), and women with terminal fetal bradycardia (found to be the strongest predictor of episiotomy use) (Albers et al., 1996). Other factors found to be related to episiotomy use are fetal malposition at full dilatation (Senécal, Xiong, & Fraser, 2005), macrosomia, epidural use, induced/augmented labor (Bodner-Adler et al., 2001), severe lacerations, sphincter trauma, infection, greater blood loss, pain, decreased perineal muscle function, and long-term debilitation (Viswanathan et al., 2005).

When episiotomy is performed, lacerations can still occur, but some factors decrease the likelihood of severe laceration. The use of a large episiotomy angle (Eogan, Daly, O'Connell, & O'Herlihy, 2006) seems to decrease the likelihood of a severe laceration, as does a mediolateral episiotomy when forceps are required (Viswanathan et al., 2005). Some episiotomies, such as midline episiotomies, are more likely to lead to third-degree perineal tears when forceps are used (Riskin-Mashiah et al., 2002). Finally, performing an episiotomy when a tear appears imminent was thought to be of value, but now the literature documents that avoiding episiotomy in these circumstances increases intact perineum without adverse effects (Dannecker et al., 2004).

IN THIS SAMPLE OF 510 LOW-RISK
WOMEN, THE OVERALL SPONTANEOUS
LACERATION RATE WAS 49.2%. SOME TYPE
OF LACERATION OCCURRED IN 55.7% OF
ALL SPONTANEOUS VAGINAL BIRTHS.

Caregiver characteristics also affect episiotomy rates. Obstetricians (particularly those in private practice) have been found to be more likely than nurse midwives to perform episiotomy (Shorten et al., 2002). In fact, private practice physicians use episiotomy more often than other physicians (Howden, Weber, & Meyn, 2004). Third- and fourth-degree extensions have been found to be more common among clinicians who perform more episiotomies, dispelling the notion that experienced providers can avoid complications of the procedure (Low, Seng, Murtland, & Oakley, 2000). Nurse midwives are unlikely to perform an episiotomy without clear indication (Albers et al., 1996). Other caregivers whose presence seems to reduce the likelihood of operative birth and epidural use (both known to increase the risk of episiotomy) are doulas and nurses who give continuous nursing support (Hodnett, 2002).

Evidence for care effective in promoting perineal integrity is needed (Low et al., 2000). The purpose of this study, therefore, was to identify factors related to perineal trauma in childbirth in a healthy population, conducting a virtual replication of the work by Albers et al. (1996). Replication of research is an essential step in validating the efficacy of nurse midwifery interventions. Albers et al. studied patient characteristics and clinical care measures related to perineal trauma at birth in three cohort nurse midwifery services. They found that episiotomy and laceration were related to fetal bradycardia, prolonged second stage, ethnic status, and maternal education. They also found that warm compresses, lateral birth positioning, and flexion/counterpressure to slow birth were protective for the perineum. In their study, the use of oils or lubricants and the lithotomy position increased lacerations.

The aims of this study were to (a) describe the characteristics of women who sustained perineal trauma (defined as genital tract injury resulting from episiotomy and/or spontaneous laceration) during childbirth by parity, (b) detail the clinical care measures that increase the likelihood of an intact perineum after childbirth, and (c) compare findings with the work of Albers et al. (1996), who reported factors related to perineal trauma in childbirth in a similar population.

Study Design and Methods

This was a retrospective record review of nurse midwifery patients where data regarding their prenatal and intrapartum course had been entered into the Nurse Midwifery Clinical Data Set (NMCDS) during 1996–1997, the latest period for which data were recorded in the NMCDS and available to researchers. The practice was in a university setting and averaged 70 births per month.

Sample Characteristics

The sample consisted of 510 healthy women at term (37–42 weeks' gestation) with a vertex singleton pregnancy and essentially uncomplicated prenatal course. Hispanics comprised 41.6% of the sample and non-Hispanic Whites comprised 38.5%. Most of the women in the sample were unmarried (56.5%), multiparous (66.8%), and insured by Medicaid (62.5%) and had 12 or more years of school (74.5%). The mean age was 23.9 years ($SD = 5.5$; range, 14–43 years). Parity ranged from 1 to 11 ($M = 1.9$). The mean number of prenatal visits was 10.3 (range, 1–26). Most (60%) of the sample had some type of medical problem, ranging from vaginitis to hepatitis.

Nearly 90% of subjects had a spontaneous vaginal birth; 5.8% had a cesarean birth; and 5.2% had assisted vaginal births. Most patients (66.1%) birthed in a semi-Fowlers position. About half (49%) of the subjects had a spontaneous laceration, although 19.1% of them did not require suturing. Slightly more than 8% had an episiotomy. Approximately 43% had intact perineum, which included minor abrasions and lacerations that did not require suturing.

The study was approved by the Institutional Review Board at the University of Colorado at Denver & Health Sciences Center (Protocol 04-0259).

Data Collection and Analysis

The NMCDS record, a valid measure with approximately 75 items, describes nurse midwifery care interventions and outcomes (Greener, 1991). The record was completed by the nurse midwife birth attendant for patients receiving prenatal care at one of four clinics. Births occurred at a university tertiary care facility. Nurse midwifery faculty were all experienced clinicians who held a minimum of a master's degree. There were 510 usable records.

Descriptive statistics summarized demographic variables. Use of chi-square determined variables that differed between nulliparous and multiparous women with and without laceration or episiotomy. A logistic regression model was performed to examine determinants of episiotomy or laceration

TABLE 1.Differences Between Nulliparous ($n = 169$) and Multiparous ($n = 341$) Women and Perineal Trauma

Variable	Laceration		Variable	Episiotomy	
	Nulliparous ($n = 111$)	Multiparous ($n = 143$)		Nulliparous ($n = 23$)	Multiparous ($n = 16$)
Marital status: Married n (%) χ^2	39 (35.1) 4.658*	81 (56.6) 4.658*	Marital Status: Married n (%) χ^2	14 (60.8) 9.53**	8 (50.0) 0.142
Prolonged second stage n (%) χ^2	14 (12.6) 3.72	13 (9.0) 5.311*	Prolonged second stage n (%) χ^2	7 (30.4) 12.19***	3 (18.7) 6.544**
Insured n (%) χ^2	100 (90.0) 6.406**	138 (96.5) 1.95	Fetal bradycardia n (%) χ^2	4 (17.3) 13.61***	5 (31.2) 82.98***
Birth position other than lateral n (%) χ^2	11 (9.9) 4.226*	27 (18.8) 0.096	No perineal massage n (%) χ^2	2 (8.6) 11.62***	3 (18.7) 22.56***
No perineal compresses n (%) χ^2	7 (6.3) 2.961*	5 (3.4) 1.044*	Fetal weight ≥ 9 lb n (%) χ^2	4 (17.3) 19.02***	2 (12.5) 0.273
No manual support n (%) χ^2	69 (62.1) 6.365*	95 (66.4) 0.261			
Age ≥ 30 years n (%) χ^2	5 (4.5) 3.872*	34 (23.7) 0.817			

* $p < .05$. ** $p < .01$. *** $p < .001$.

for both nulli- and multiparous women. Level of significance was .05, and power of 0.80 was based on an estimated effect size of 0.25. SPSS 11.5 was used to analyze data.

Results

Aim 1: Description of the Characteristics of Women Who Sustained Perineal Trauma During Childbirth by Parity Lacerations

The overall spontaneous laceration rate was 49.2%. When considering only women with a spontaneous vaginal birth, some type of laceration occurred in 55.7%, although only 36.6% required suturing. For lacerations that required suturing, a severe laceration (third or fourth degree) was sus-

tained by approximately 15% of women; 21.5% had a first- or second-degree laceration; 8.6% had an episiotomy. Women with minor abrasions and superficial lacerations that were not sutured were considered to be intact; thus approximately 55% had intact perineia.

Parity was protective against all types of laceration, with multiparous women less likely to tear than nulliparous women ($\chi^2 = 41.40$, $p = .000$) and when a tear did occur, it was less serious. There was no association between laceration and birth weight. Table 1 details the differences between nulliparous and multiparous women along with factors significant for perineal trauma. Laceration for both groups of women was more likely if the women were married. Multiparous women were also more likely to sustain a

laceration when there was a prolonged second stage. For nulliparous women, a laceration was more likely if a woman was 30 years or older and insured.

Episiotomy

In nulliparous women, episiotomy was significantly related to marital status and infant weight of ≥ 9 pounds. In both nulliparous and multiparous women, fetal bradycardia and a prolonged second stage increased episiotomy risk.

Aim 2: Detail the Clinical Care Measures That Increase the Likelihood of an Intact Perineum After Childbirth

For all women, laceration was more likely when in lithotomy position for birth ($\chi^2 = 9.656, p = .002$) or when prolonged second stage occurred ($\chi^2 = 11.597, p = .001$). Use of parenteral narcotics decreased the risk of laceration ($\chi^2 = 3.940, p = 0.02$). Nulliparous women who used lateral positioning, warm compresses, and manual support techniques (support of the perineum to encourage a gentler, unhurried birth) were less likely to experience a tear (all of these interventions were used in second stage labor for varying amounts of time). Of these factors, only failure to use compresses was of significance for multiparous women. Episiotomy was less likely when prenatal perineal care measures (e.g., massage) had been used.

Regression analysis failed to identify factors that could predict episiotomy in nulliparous women, explaining only 35% of the variance. The strongest risk factor for episiotomy in multiparous women was lack of perineal massage (242-fold risk). Other factors were not associated with episiotomy risk ($R^2 = .34$). Factors that could predict laceration in nulliparous women included birth in other than a lateral position (near 4-fold risk), lack of perineal support (3-fold risk), and being uninsured (12-fold risk) ($R^2 = .25$). For multiparous women, prolonged second stage labor was the only significant predictor of laceration. Little of the variance could be explained by the model ($R^2 = .04$).

Aim 3: Compare Findings With the Work of Albers et al. (1996), Who Reported Factors Related to Perineal Trauma in Childbirth in a Similar Population

Study findings were compared with the study by Albers et al. (1996), which examined NMCDS records from 3,049 women who received nurse midwifery care, and were found to be largely consistent with their findings. Their sample was composed of a young, mostly married, largely non-White population. More than 70% of women in the study by Albers et al. (1996) had completed ≥ 12 years of school. Thus, the sample in this study and the study by Albers et al. (1996) were similar. The samples were also similar in regard to prenatal risk factors and cesarean and spontaneous vaginal birth rates. Nearly one half (43.4%) of Albers et al.'s sample sustained a perineal laceration, and 11.2% had an episiotomy, which was higher than the current study. Factors found to be protective for perineal trauma in both studies were multiparity; perineal care measures, such as warm compresses; and a side-lying position for birth. Albers et al.

TABLE 2.
Comparison of Findings Between Albers et al. (1996) and Current Study

Albers et al., 1996 (N = 3,049)	Current study (N = 510)
Episiotomy rate 11.2%	Episiotomy rate 8.6%
Spontaneous laceration rate 43.4%	Spontaneous laceration rate 49.2%
Intact perinea (no suturing) 50.1%	Intact perinea (no suturing) 43.2%
Side-lying position and warm compresses protective of perineum	Side-lying position, manual support, warm compresses, massage protective of perineum
Perineal care measures related to less trauma	Factors related to midline episiotomy also related to laceration
Epidural related to perineal trauma in multiparous women	Episiotomy related to parity, marital status, infant weight, fetal bradycardia, prolonged second stage
Ethnicity related to episiotomy	Marital status related to laceration

found that non-Hispanic Whites had higher rates of perineal trauma. Because the literature documents a higher incidence of perineal trauma for Asian women (Riskin-Mashiah et al., 2002), likely because of a shortened perineal body, the question of ethnicity and perineal trauma was important to assess. In this study, ethnicity was not found to be a factor, a finding only partially explained by the low numbers of Asians. There was no association between laceration and birth weight, which was consistent with the work by Albers et al. (1996). Nurse midwifery management differences may explain this finding. Contrary to the research by Albers et al. (1996), this study did not find a significant association between epidural use and laceration. Because there were comparable epidural rates between the study by Albers et al. (27.5%) and this study (34%), the lack of association between epidural use and laceration make the finding likely due to management differences not accounted for by the NMCDS tool.

Limitations

This study had several limitations. There was no randomization of subjects. Neither was there a review of patient charts to ensure accuracy of data, although electronic entries were compared with the paper record for each patient entry. The NMCDS tool, with numerous questions and subquestions, may lack sensitivity in detecting quality differences specific to nurse midwifery care (Vincent et al., 2004). Comparison of findings with studies using current

Clinical Implications for Preventing Perineal Trauma in Low-Risk Pregnant Women

- Prenatal education should include information about side-lying labor positions known to promote an intact perineum.
- Nurses should promote a side-lying position in second stage labor to help decrease the likelihood of laceration or episiotomy, especially for nulliparous women.
- Manual support, flexion/counterpressure, and perineal massage during second stage labor are protective of the perineum and should be considered.
- Special care should be taken to protect the perineum when the following risk factors are present:
 - Nulliparity
 - Married status
 - Age ≥ 30 years
 - Insured status
 - Suspected macrosomia
 - Fetal bradycardia
 - Prolonged second stage labor
 - Use of analgesia/anesthesia other than parenteral narcotics

databases, therefore, would be useful. No data were available regarding patient outcomes when transferred to physician care, a flaw in the data tracking used in this study. Finally, results must be interpreted with caution because data from the late 1990s were examined, and interim practice changes may make the findings of marginal significance. It should be noted, however, that there are limited current data regarding perineal outcomes and nurse midwifery management.

Clinical Implications

What can this study of birth outcomes teach clinical nurses? First, it is clear that lacerations are common: nearly one half of women in the study had a laceration. Episiotomies, on the other hand, are less frequent; less than 10% of the women studied had an episiotomy. Although the demographic statistics concerning lacerations and episiotomies are of interest (see Table 2), there is little that clinical nurses can do about demographic characteristics except to note them and provide care for women accordingly. This study found that nulliparous women were more likely to have a laceration if they were older, insured, and used compresses and manual support techniques. Multiparous women were less likely to experience a tear than nulliparous women, and even when a tear occurred, the tear was less severe. Nurses know anecdotally and from the literature that laceration is more likely with prolonged second stage labor, which was confirmed in this study.

Information that might be new to nurses includes the

findings that birth in a side-lying position, use of parenteral narcotics in labor, and application of warm moist compresses during second stage labor made tears less likely for all women. Both this study and the work by Albers et al. (1996) found that lateral positioning for birth was protective of the perineum, adding to the literature that has documented that birth position affects perineal outcome (Shorten et al., 2002). This finding suggests that nurses who work with pregnant or laboring women should become more cognizant of the importance of side-lying position for birth and that knowledge about differences in birth positions should be shared with pregnant women. A full side-lying position during second stage labor would promote intact perineum.

Regarding compresses, this study found that warm moist compresses applied during second stage labor were protective of the perineum. This finding is consistent with the work of Albers et al. (1996) but contradictory to other research findings (Albers, Sedler, Bedrick, Teaf, & Peralta, 2005). The NMCDS tool did not capture length of time compresses were used nor when they were applied, and such detail is needed when further studies are done. Nevertheless, nurses who care for laboring women can use the results of this current study to learn more about the use of warm compresses for the perineum and possibly use them as a protective measure against perineal trauma during childbirth.

Two important findings with clinical implications for nurses were that episiotomy was less likely where prenatal perineal care measures (i.e., perineal massage) had been used and that failure to do perineal massage was the strongest predictor of episiotomy in multiparous women. Clearly nurses need to understand this association better and add this teaching to the prenatal education they give pregnant women. It is unclear how many nurses teach pregnant women about prenatal perineal care measures. A study of this would make an interesting contribution to the nursing literature.

BIRTH IN A SIDE-LYING POSITION, USE
OF PARENTERAL NARCOTICS IN LABOR,
AND COMPRESS USE MADE LACERATIONS
LESS LIKELY FOR ALL WOMEN.

Some maneuvers used by some midwives during second stage childbirth, such as perineal care measures of flexion/counterpressure, manual support, and massage, afforded perineal protection in this study. This information seems to contradict findings by McCandlish et al. (1998) and Mayerhofer et al. (2002), who examined midwives' hands "poised" versus "hands on" the perineum and found fewer perineal tears and a lower episiotomy rate in the

hands-poised group, which suggested that manual intervention may foster perineal ischemia and serve as a risk factor for perineal trauma (Mayerhofer et al., 2002). The literature demonstrates no decided advantage in the use of perineal care measures during birth, and one study of nulliparous women found no difference in frequency or severity of laceration whether hands were “on” or “off” the perineum (De Souza Caroci da Costa & Gonzalez Riesco, 2006). Albers et al. (2005) also found no advantage of perineal massage in preventing genital tract trauma. However, nurse midwives have long believed perineal care measures to be of value, and the current study supports that belief. These discrepancies warrant further study.

The women we care for should know more about strategies for preventing genital trauma during childbirth. Nurses and midwives should be prepared to offer prenatal education that includes a discussion of interventions helpful in maintaining perineal integrity, such as parenteral narcotic use, lateral positioning in second stage labor, manual support, and perineal massage. Particular attention should be paid to protecting the perineum where risk factors for trauma exist.

Prospective studies are needed to examine clinical care measures by nurses and nurse midwives that influence perineal outcomes in order to develop appropriate interventions that promote perineal integrity and add to our database of evidence-based practice. ♦

Acknowledgments

This study was supported by an intramural award from the University of Colorado at Denver & Health Sciences Center Graduate Office. Portions of this article were presented at the American College of Nurse Midwives 49th Annual Meeting in New Orleans, LA, May 28–June 3, 2004. The authors would also like to thank Patty McHardy, MS, CNM, and Abby Burton, MS, CNM, for their assistance with the study.

Marie Hastings-Tolsma is an Associate Professor, Nurse Midwifery, University of Colorado at Denver & Health Sciences Center. She can be reached via e-mail at marie.hastings-tolsma@uchsc.edu

Deborah Vincent is an Associate Professor, College of Nursing, University of Arizona, Tucson.

Cathy Emeis is an Instructor of Nursing, University of Colorado—Colorado Springs.

Teresa Francisco is the Director, Women and Children's Center, Vail Valley Medical Center, Vail, CO.

The authors have no conflict of interest.

References

- Albers, L. L., Anderson, D., Cragin, L., Daniels, S. M., Hunter, C., Sedler, K. D., et al. (1996). Factors related to perineal trauma in childbirth. *Journal of Nurse-Midwifery*, 41, 269-276.
- Albers, L. L., Sedler, K. D., Bedrick, E. J., Teaf, D., & Peralta, P. (2005). Midwifery care measures in the second stage of labor and reduction of genital tract trauma at birth: A randomized trial. *Journal of Midwifery & Women's Health*, 50, 365-372.
- Albers, L. L., Sedler, K. D., Bedrick, E. J., Teaf, D., & Peralta, P. (2006). Factors related to genital tract trauma in normal spontaneous vaginal births. *Birth*, 33, 94-100.
- Baillit, J. L., Love, T. E., & Mercer, B. (2004). Rising cesarean rates: Are patients sicker? *American Journal of Obstetrics & Gynecology*, 191, 800-803.
- Beckmann, M., & Garrett, A. (2006). Antenatal perineal massage for reducing perineal trauma. *Cochrane Database Systematic Review*, 1, CD005123.
- Bodner-Adler, B., Bodner, K., Kaider, A., Wagenbichler, P., Leodolter, S., Husleins, P., et al. (2001). Risk factors for third-degree perineal tears in vaginal delivery with an analysis of episiotomy types. *The Journal of Reproductive Medicine*, 46, 752-756.
- Carroll, T. G., Engelken, M., Mosier, M. C., & Nazir, N. (2003). Epidural analgesia and severe perineal laceration in a community-based obstetric practice. *Journal of the American Board of Family Practice*, 16, 1-6.
- Christianson, L. M., Bovbjerg, V. E., McDavitt, E. C., & Hullfish, K. L. (2003). Risk factors for perineal injury during delivery. *American Journal of Obstetrics & Gynecology*, 189, 255-260.
- Dannecker, C., Hillemanns, P., Strauss, A., Hasbargen, U., Hepp, H., & Anthuber, C. (2004). Episiotomy and perineal tears presumed to be imminent: Randomized controlled trial. *Acta Obstetrica et Gynecologica Scandinavica*, 83, 364.
- De Souza Caroci da Costa, A., & Gonzalez Riesco, M. L. (2006). A comparison of “hands-off” versus “hands-on” techniques for decreasing perineal lacerations during birth. *Journal of Midwifery and Women's Health*, 51, 106-111.
- Eckert, K., Turnbull, D., & MacLennan, A. (2001). Immersion in water in the first stage of labor: A randomized controlled trial. *Birth*, 28, 84-93.
- Eogan, M., Daly, L., O'Connell, P. R., & O'Herlihy, C. (2006). Does the angle of episiotomy affect the incidence of anal sphincter injury? *British Journal of Obstetrics and Gynaecology*, 113, 190-194.
- Glazener, C. M., Abdalla, M., Stroud, P., Naji, S., Templeton, A., & Russell, I. T. (1995). Postnatal maternal morbidity: Extent, causes, prevention and treatment. *British Journal of Obstetrics and Gynaecology*, 102, 282-287.
- Greener, D. (1991). Development and validation of the nurse midwifery clinical data set. *Journal of Nurse-Midwifery*, 36, 174-183.
- Hodnett, E. D. (2002). Caregiver support for women during childbirth. *Cochrane Database Systematic Review*, 1, CD000199.
- Howden, N. L., Weber, A. M., & Meyn, L. A. (2004). Episiotomy use among residents and faculty compared with private practitioners. *Obstetrics & Gynecology*, 103, 114-118.
- Kozak, L. J., DeFrances, C. J., & Hall, M. J. (2006). National hospital discharge survey: 2004 annual summary with detailed diagnosis and procedure data. *National Center for Health Statistics. Vital Health Statistics*, 13, 162.
- Low, L. K., Seng, J. S., Murtland, T. L., & Oakley, D. (2000). Clinician-specific episiotomy rates: Impact on perineal outcomes. *Journal of Midwifery & Women's Health*, 45, 87-93.
- Mayerhofer, K., Bodner-Adler, B., Bodner, K., Rabl, M., Kaider, A., Wagenbichler, P., et al. (2002). Traditional care of the perineum during birth: A prospective, randomized, multicenter study of 1,076 women. *Journal of Reproductive Medicine*, 47, 477-482.
- McCandlish, R., Bowler, U., van Asten, H., Berridge, G., Winter, C., Sames, I., et al. (1998). A randomized controlled trial of care of the perineum during the second stage of normal labour. *British Journal of Obstetrics & Gynaecology*, 105, 1262-1272.
- Riskin-Mashiah, S. E., O'Brian Smith, E. O., & Wilkins, I. A. (2002). Risk factors for severe perineal tear: Can we do better? *American Journal of Perinatology*, 19, 225-234.
- Sampsel, C. M., & Hines, S. (1999). Spontaneous pushing during birth: Relationship to perineal outcomes. *Journal of Nurse-Midwifery*, 44, 36-39.
- Senécal, J., Xiong, X., & Fraser, W. D. (2005). Effect of fetal position on second-stage duration and labor outcome. *Obstetrics & Gynecology*, 105, 763-772.
- Shorten, A., Donsante, J., & Shorten, B. (2002). Birth position, accoucheur, and perineal outcomes: Informing women about choices for vaginal birth. *Birth*, 29, 18-27.
- Soong, B., & Barnes, M. (2005). Maternal position at midwife-attended birth and perineal trauma: Is there an association? *Birth*, 32, 164-169.
- Vincent, D., Hastings-Tolsma, M., & Park, J. H. (2004). Down the rabbit hole: Examining outcomes of nurse midwifery care. *Journal of Nursing Care Quality*, 19, 361-367.
- Viswanathan, M., Hartmann, K., Palmieri, R., Lux, L., Swinson, T., Lohr, K. N., et al. (2005). The use of episiotomy in obstetrical care: A systematic review. *Evidence Report/Technology Assessment*, 112, 1-8.
- Weeks, J. D., & Kozak, I. J. (2001). Trends in the use of episiotomy in the United States: 1980-1998. *Birth*, 28, 152-160.