Research Summaries for Normal Birth

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ABSTRACT

In this column, the author summarizes four research studies that further support the benefits of normal birth. The topics of the studies address the positive influence of vaginal birth and breastfeeding on newborns' immune systems; perineal management techniques that may reduce genital tract trauma at birth; predictive factors of the cesarean-surgery rate among low-risk, nulliparous women; and the important role of breastfeeding in alleviating pain among newborns undergoing painful procedures.

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HOME BIRTH AND BREASTFEEDING MAY SET THE STAGE FOR HEALTHY IMMUNE SYSTEMS IN INFANTS

- Penders, J., Thijs, C., Vink, C., Stelma, F. F., Snijders, B., & Kummeling, I., et al. (2006). Factors influencing the composition of the intestinal microbiota in early infancy. *Pediatrics*, 118(2), 511–521.

Summary

In this prospective cohort study, researchers examined the influence of several factors on the microbial environment of infants' gastrointestinal tracts. Fecal samples from 1,032 infants between 3 and 6 weeks of age were collected by the parents. The presence and quantity of various "beneficial" (e.g., bifidobacteria and lactobacilli) and "harmful" (e.g., *C. difficile*, *E. coli*, and *B. fragilis*) species of microbes were determined by polymerase chain-reaction as-

says. Information about demographic and medical factors, maternal diet, infant feeding practices, and lifestyle factors were collected through a series of questionnaires conducted prenatally and after birth. The study took place in the Netherlands, where home birth and exclusive breastfeeding are common. In this study, 47.5% of the infants were born vaginally at home ($n = 480$), and 70% were exclusively breastfed during the first month of life ($n = 700$). The cesarean-section rate was 10.7% ($n = 108$).

After adjusting for confounding factors, infants born by cesarean section had a significantly higher rate of colonization with *C. difficile* and lower rates of colonization with bifidobacteria and *B. fragilis* than those born vaginally at home. Each day of hospitalization after birth was associated with a 13% increase in the rate of colonization with *C. difficile*. Exclusively breastfed infants were significantly less likely than formula-fed babies to be colonized with *E. coli*, *C. difficile*, *B. fragilis*, and lactobacilli. Antibiotic use in the first month of life was associated

with a lower rate of bifidobacteria and *B. fragilis* colonization, while use of antifungal medications was associated with lower bifidobacteria counts. Infants with older siblings had higher levels of bifidobacteria. Term infants born at home and breastfed exclusively had the highest numbers of bifidobacteria and the lowest numbers of *C. difficile* and *E. coli* compared with any other group of infants.

Significance for Normal Birth

The newborn's gut, sterile at birth, rapidly becomes colonized with millions of microbes. The number and type of gut floras have been shown to influence immune system development, the risk of allergies and asthma, and metabolic functions such as the production of vitamin K.

In normal vaginal birth, newborns encounter their mothers' microbes during the critical first hours. Some of these microbes are beneficial and promote healthy gastrointestinal development. Other microbes are pathologic (may cause disease), but maternal antibodies, passed to the baby via breastfeeding, help ensure that the baby tolerates their presence. When a baby is born by cesarean surgery and/or subjected to prolonged hospitalization, unfamiliar hospital-borne pathogens such as *C. difficile* dominate the microbial environment of the newborn's gut. Minimizing the baby's contact with these harmful organisms by avoiding hospitalization for normal birth while maximizing newborns' exposure to antibodies and beneficial microbes by promoting exclusive breastfeeding may decrease the likelihood of newborn infection and optimize the baby's developing immune system for lifelong health benefits.

PHYSIOLOGIC PUSHING, BIRTH OF THE HEAD BETWEEN CONTRACTIONS REDUCE GENITAL TRACT TRAUMA AT BIRTH

- Albers, L. A., Sedler, K. D., Bedrick, E. J., Teaf, D., & Peralta, P. (2006). Factors related to genital tract trauma in normal spontaneous vaginal births. *Birth*, 33(2), 94–100.

Summary

This secondary analysis of a randomized, controlled trial of perineal management techniques evaluates the maternal and clinical factors associated with genital tract trauma during vaginal birth. The researchers analyzed data from 1,176 midwife-attended, spontaneous vaginal births where episiot-

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omy was not performed. Independent predictors of genital tract trauma were identified through logistic regression and data for primiparous (those giving birth vaginally for the first time) and multiparous (those with prior vaginal births) women were analyzed separately.

Greater maternal education, directed pushing while the woman holds her breath, and higher infant birth weight increased the risk of trauma requiring suturing in primiparous women; however, birthing the infant's head between contractions reduced the risk of trauma requiring suturing. In multiparous women, prior sutured trauma and higher infant birth weight increased the likelihood of trauma requiring suturing, and birthing the infant's head between contractions was protective.

Significance for Normal Birth

This study provides strong evidence that two modifiable factors may reduce trauma to the mother's genital tract at birth: physiologic pushing (when the woman follows her own urge to push without direction from maternity-care providers) and birthing the baby's head between contractions.

The authors note "a calm and unrushed approach to vaginal birth improved the health of new mothers by lowering overall trauma rates and reducing the need for suturing" (p. 99). In normal birth, the woman follows her own body's cues to give birth. Attendance by caregivers who are confident in normal birth, such as the midwives who conducted this trial, supports the natural unfolding of the birth process and, thus, reduces maternal injury.

QUALITY-IMPROVEMENT STUDY FINDS INDUCTION, EARLY LABOR ADMISSION PREDICTIVE OF CESAREAN SURGERY IN LOW-RISK MOTHERS

- Main, E. K., Moore, D., Barrell, B., Schimmel, L. D., Altman, R. J., & Abrahams, C., et al. (2006). Is there a useful cesarean birth measure?

Two modifiable factors may reduce trauma to the mother's genital tract at birth: physiologic pushing and birthing the baby's head between contractions.

For a detailed discussion of the role of newborn gut flora in infants' health, visit the following link on the Web site of the Massachusetts Breastfeeding Coalition: www.massbfc.org/formula/

Assessment of the nulliparous term singleton vertex cesarean birth rate as a tool for obstetric quality improvement. *American Journal of Obstetrics & Gynecology*, 194, 1644–1652.

Summary

This prospective, quality-improvement study provides data on the association between elective obstetric practices and the cesarean-surgery rate in “nulliparous, term, singleton, vertex” (NTSV) births (those with one baby born in the head-down position after 37 weeks to a mother who has not previously given birth). The American College of Obstetricians and Gynecologists and the U.S. Department of Health and Human Services have identified the NTSV cesarean rate as an appropriate proxy for the cesarean rate in low-risk mothers. The study took place in 20 birthing units in a large hospital system that serves a diverse population of childbearing women.

Researchers analyzed 41,416 NTSV births taking place between 2001 and 2003. Data on the frequency of induction of labor prior to 41 weeks, admission in early labor (less than 3 cm dilation), and 5-minute Apgar scores <7 were collected, and age-adjusted cesarean rates were calculated for each of the 20 participating hospitals. The unadjusted NTSV cesarean rate ranged from 10.5 to 30.2% across the 20 hospitals, with age-adjusted rates demonstrating a similar distribution (exact values not provided). The researchers calculated that 32% of this variation in NTSV cesarean rates was accounted for by differences in the rate of labor induction, and 38% of the variation was accounted for by differences in the frequency of early labor admission. Together, rates of induction and early labor admission accounted for 53% of the variation in NTSV cesarean rates. More than 60% of low-risk nulliparas were either induced or admitted in early labor in every hospital that had a NTSV cesarean rate >25%. Statistical tests of the correlation between NTSV cesarean rates and low Apgar scores failed to reveal an optimal NTSV cesarean rate but demonstrated that lowering the rate to 19% did not compromise newborn outcomes. Some of the hospitals with NTSV cesarean rates below 19% had excellent newborn outcomes, while others in this category showed the possibility of increased risk to newborns. Due to this wide variation, the researchers call for further research into the conditions that support both low NTSV cesarean rates and favorable newborn outcomes.

Significance for Normal Birth

Low-risk nulliparous women are 4–10 times more likely to undergo cesarean surgery than their multiparous counterparts, and this population contributes significantly to the overall increasing cesarean rate. This study suggests that induction of labor and admission in early labor are strong determinants of the rate of cesarean surgery among low-risk women giving birth for the first time. This is of particular concern because, in today’s climate, almost all women who give birth to their first child by cesarean will go on having surgical births for all their future children. Although the study did not differentiate among elective or medically necessary inductions, the authors acknowledge that many inductions in low-risk nulliparas are purely elective or performed for “soft” indications (i.e., those without evidence-based medical rationale). The study suggests that the wide variation in NTSV cesarean rates across hospitals has less to do with intrinsic differences in the populations of women served than with the hospitals’ obstetric practices. Expectant families should be counseled that avoiding unnecessary inductions and laboring at home until an active labor pattern is established are two of the most important means of avoiding cesarean surgery. Choosing the birth setting carefully, with attention given to rates of elective and routine obstetric practices, may also help avert surgical births.

COCHRANE SYSTEMATIC REVIEW CONFIRMS EFFECTIVENESS OF BREASTFEEDING FOR REDUCING PROCEDURAL PAIN IN NEWBORNS

- Shah, P. S., Aliwalas, L. L., & Shah, V. (2006). Breastfeeding or breastmilk for procedural pain in neonates. *The Cochrane Library*, Issue 3.

Summary

This systematic review by the Cochrane Collaboration evaluated the effectiveness of breastfeeding or supplemental breast milk on pain in newborns undergoing painful procedures. The researchers extracted data from 11 randomized or quasirandomized controlled trials that met predetermined eligibility criteria for inclusion in the review. All of the studies compared the effect of breastfeeding or supplemental breast milk versus a control intervention on pain in newborns during a single procedure (heel lance or venipuncture). Pain was

determined by physiologic (heart rate, respiratory rate, etc.) and/or behavioral (cry, facial actions) indicators. In some cases, validated composite pain scores were used. Both term (≥ 37 weeks) and pre-term (< 37 weeks) babies were included in the review.

For all indicators studied, breastfed infants demonstrated less pain or no significant difference compared with infants who were swaddled, provided a pacifier, positioned in the mother's arms, or given glucose. Babies who were provided supplemental breast milk also demonstrated better or equivalent pain tolerance compared with babies who received other interventions, with one exception: Babies given glucose/sucrose had significantly lower increases in heart rate and duration of crying than did babies fed supplemental breast milk.

Significance for Normal Birth

A well-designed systematic review represents the gold standard of evidence. In this case, strong evidence emphasizes the role of breastfeeding in alleviating pain in newborns undergoing venipuncture or heel-stick procedures. Whether the mechanism of pain relief is the comfort of being close to the mother, the sweetness of her milk, the hormonal

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composition of breast milk, or a combination of these factors remains to be determined. Although many different interventions were compared with breastfeeding in the 11 studies included in this review, breastfeeding was consistently beneficial. The evidence is compelling enough to command a change in the practices of all birth settings where infants are denied breastfeeding during painful procedures. Nonseparation of mothers and infants and unlimited opportunities to breastfeed in the newborn period are the culmination of normal birth and optimize mother-infant bonding and the breastfeeding relationship. When painful procedures are necessary, these care practices also optimize pain relief, potentially decreasing trauma to the newborn and reducing anxiety in the mother.

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