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Promoting, Protecting, and Supporting Normal Birth: A Look at the Evidence

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ABSTRACT

Interfering with the normal physiological process of labor and birth in the absence of medical necessity increases the risk of complications for mother and baby. Six evidence-based care practices promote physiological birth: avoiding medically unnecessary induction of labor, allowing freedom of movement for the laboring woman, providing continuous labor support, avoiding routine interventions and restrictions, encouraging spontaneous pushing in nonsupine positions, and keeping mothers and babies together after birth without restrictions on breastfeeding. Nurses are in a unique position to provide these care practices and to help childbearing women make informed choices based on evidence.

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In the past quarter century, advances in medical technology have been accompanied by an increase in intervention-intensive labor and birth. As technology in birth has become the norm, the cesarean rate has skyrocketed, going from less than 7% in 1970 to 30.2% in 2005 (Hamilton, Martin, & Ventura, 2006). Nature's simple plan for birth has been replaced by a maternity care system that routinely interferes with the normal physiological process and in doing so introduces unnecessary risks for mother and baby. Women no longer have confidence in their ability to give birth without technologic intervention. Nurses' time is spent managing technology rather than providing comfort and support in labor. In this environment, it is easy to lose sight of the physiology and benefits of normal birth.

In this article, we go back to basics. We describe the physiology of normal natural birth and the ways in which maternity care practices affect this exquisitely orchestrated process. We provide evidence to support six practices that promote, protect, and support normal birth and discuss the ways in which nurses can provide care that reflects this evidence and optimizes a woman's chances of achieving a normal birth.
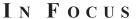
Physiology of Normal Birth

The physiological mechanisms of labor and childbirth are not completely understood. However, research on animal models and clinical observations in humans have yielded greater understanding of the endocrinology of parturition. Most of this research has focused on the initiation of labor because of the potential applications for preventing preterm birth and, to a lesser extent, optimizing the effectiveness and safety of labor induction methods. Physiological models for labor progress are much less robust than those for labor initiation and tend to focus on mechanical and anatomic elements (i.e., size of the pelvis and position of the fetus) rather than endocrinology. Less attention has been paid to models that emphasize the roles of maternal catecholamines and endogenous beta-endorphins. These suggest a delicate hormonal process that unfolds optimally when conditions minimize fear, pain, and stress.

Initiation of Labor

Normal term labor is the culmination of a sequence of interrelated hormonal shifts. These are mediated primarily by the fetus, with the placenta, the fetal membranes, and the maternal endocrine system playing less significant roles. In his review of the physiology of the initiation of term labor, Lockwood (2004) described four themes that have emerged in other reviews as well (Coad & Dunstall, 2001; Norwitz, Robinson, & Challis, 1999; Snegovskikh, Park, & Norwitz, 2006). First, maturation of the fetal hypothalamic-pituitary-adrenal (HPA) axis results in a cortisol surge, which prepares fetal vital organs for extrauterine life. Second, feed-forward (i.e., cascading) hormonal signals accelerate the pace of changes leading up to the start of labor. Third, hormone receptors in the myometrium become active. Finally, intrinsic factors within the uterine muscle affect contractions and progressive cervical dilation. Thus, spontaneous onset of term labor signifies the fetus' *readiness* to be born as well as the mother's physiological *receptiveness* to the process.

Labor Progress

Conventional obstetric theories of the physiology of normal labor progress emphasize the activity of oxytocin and, to a lesser extent, prostaglandins on local receptors within the myometrium (Cunningham et al., 2005). However, clinical observations suggesting that the woman's emotional state can also affect her labor have led to interest in the role of stress hormones. While there is a gradual physiological increase in maternal stress hormone levels throughout labor, excessive fear, anxiety, or pain and the associated increases in stress hormones can result in decreased frequency or intensity of contractions (Alehagen, Wijma, Lundberg, & Wijma, 2005; Coad & Dunstall, 2001). Similarly, labor progress may slow temporarily when a laboring woman arrives at the hospital as she gets familiar with her new surroundings. Researchers theorize that this is an adaptive mechanism to ensure that birth takes place in a safe environment, and related behavior has been observed in other mammals (Coad & Dunstall).

As labor progresses and maternal catecholamine levels rise, beta-endorphin levels rise concomitantly (Bacigalupo, Riese, Rosendahl, & Saling, 1990; Hoffman, Abboud, Haase, Hung, & Goebelsmann, 1984). Beta-endorphins have been called "nature's narcotic" because they act on the same receptors as exogenous narcotics. Thus, as labor progresses, there is a physiological mechanism to modulate the laboring woman's experience of pain.

As birth becomes imminent, maternal catecholamines appear to have the opposite function. A surge in stress hormones toward the end of labor and in second stage may aid in expulsion of the fetus (referred to as the "fetal ejection reflex") (Odent, 1992). Together with fetal compression that occurs during descent, this maternal catecholamine surge also stimulates fetal breathing, increases fluid absorption in the lungs, stimulates surfactant release, and mobilizes glucose and fatty acids required for extrauterine life (Coad & Dunstall, 2001).

Despite the evidence of hormonal regulation of labor progress, "dysfunctional" labor has classically been described as a mechanical abnormality of one or more of the "three Ps": The *powers* (i.e., adequacy of contractions or maternal expulsive efforts), the *passenger* (i.e., size and position of the fetal presenting part), and the *pelvis* (i.e., size, shape and mobility of the bony pelvis, and elasticity of the soft tissues of the genital tract) (Cunningham et al., 2005).

Because this model fails to adequately address factors that modulate stress hormones, Simkin and Ancheta (2000) added two additional "Ps," *pain* (and the woman's ability to cope with it) and *psyche* (including anxiety and the emotional state of the woman). They also stressed the importance of extrinsic factors that affect the woman's stress levels and ability to cope and therefore may affect labor progress: the environment, ethno-cultural factors, hospital or caregiver policies, and psychoemotional care.

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The Early Postpartum Period and Newborn Transition

A surge of oxytocin that occurs within a few minutes of birth encourages uterine involution and minimizes postpartum bleeding (Cunningham et al., 2005). It also increases the skin temperature of the breasts to maintain the newborn's warmth, reduces maternal anxiety, and readies the mother-baby dyad for breastfeeding (Uvnas-Moberg, 1998). Early and frequent skin-to-skin contact after birth increases maternal and infant oxytocin levels and is associated with improved breastfeeding success. Observational and experimental studies have demonstrated that newborns will self-attach to the breast under these conditions after a normal birth (Moore, Anderson, & Bergman, 2007).

A state of euphoria immediately following birth has been described but poorly studied (Heron, Craddock, & Jones, 2005). This elevated mood and an associated state of heightened alertness are probably brought on by surges in beta-endorphins, catecholamines, oxytocin, or a combination of these hormones at the moment of birth. Eye-to-eye and skin-to-skin contact in the immediate postpartum period may promote optimal bonding between the mother and her baby under the influence of the cocktail of postpartum hormones.

Care Practices That Promote Normal Physiological Birth

Nature's carefully orchestrated plan for labor and birth is easily disrupted. Because of this, it is critical to understand how to optimally promote, protect, and support the normal physiological process. The *World Health Organization* identifies four care practices that promote, protect, and support normal birth (Chalmers & Porter, 2001; World Health Organization Department of Reproductive Health and Research, 1999). Lamaze International has identified two more. Together, these six maternity care practices are supported by research, including systematic reviews from the *Cochrane Library* (2006) and the Coalition for Improving Maternity Services (2007). Five care practices promote the normal physiological process: allowing labor to start on its own, freedom of movement during labor, continuous labor support, spontaneous pushing in nonsupine positions, and no

separation of mother and baby. The sixth care practice, no routine intervention, avoids unnecessary disruption of the normal physiological process.

Care Practice No. 1: Labor Begins on Its Own

Evidence of the benefits of allowing labor to begin on its own can most readily be derived from studies comparing spontaneous labor with labor that is induced electively, that is, for convenience or other nonmedical reasons. By looking at elective induction, we eliminate the confounding effect of medical complications that may give rise both to the need for induction and to poor outcomes. A recent systematic review comparing outcomes of elective induction with those of spontaneous labor found that elective induction increases the need for analgesia, epidural anesthesia, and neonatal resuscitation, results in more cesarean surgeries, and may increase the likelihood of instrumental vaginal delivery, intrapartum fever, shoulder dystocia, low birthweight, and admission to the neonatal intensive care unit (Goer, Leslie, & Romano, 2007).

Labor Induction for "Soft" Indications: While purely elective induction is becoming more common, the increase in induction of labor for medical reasons that are not supported by evidence has contributed significantly to the growth in the overall induction rate, which stood at 34% of all singleton live births in 2005 (Declercq, Sakala, Corry, & Applebaum, 2006). Specifically, as this article will demonstrate, induction for suspected macrosomia and routine induction at 41 weeks of gestation are increasingly common despite their association with cesarean surgery and a lack of definitive evidence that inducing labor under these circumstances improves neonatal outcomes.

A 2002 systematic review of 11 studies involving 3,571 nondiabetic participants concluded that "compared with a policy of labor induction for suspected fetal macrosomia at term, expectant management leads to a reduced proportion of cesarean deliveries without compromising perinatal outcomes" (Sanchez-Ramos, Bernstein, & Kaunitz, 2002, p. 997).

The failure of labor induction to prevent shoulder dystocia and other poor outcomes from macrosomia is due in large part to the fact that prenatal diagnosis of macrosomia is notoriously unreliable. Ultrasound has a high negative predictive value (i.e., it can reliably rule out macrosomia) but its positive predictive value is only 30% to 44% (American College of Obstetricians and Gynecologists [ACOG], 2004b). This means that 70% or more of those with suspected fetal macrosomia on ultrasound might be subjected to the risks of induction despite carrying normal weight babies.

The American College of Obstetricians and Gynecologists defines a postterm pregnancy as one that has extended to or beyond 42 weeks of gestation (ACOG, 2004a). However, a survey of ACOG Fellows and Junior Fellows found that 43.1% considered 41 weeks gestation or greater to be postterm and 73% routinely induced patients at low risk at 41 weeks gestation (Cleary-Goldman et al., 2006). This is despite evidence that these inductions may be actually taking place at term: the only study to look at the normal length of gestation found that, among the study population of White women at low risk, the average length of pregnancy was 41 weeks 1 day in primiparous women and 40 weeks 3 days in multiparas (Mittendorf, Williams, Berkey, & Cotter, 1990).

There is strong evidence that perinatal mortality rates are elevated in pregnancies that extend beyond 42 weeks of gestation (ACOG, 2004a), and the largest systematic review comparing routine induction with expectant management appears on the surface to support a policy of routine induction at 41 weeks (Gülmezoglu, Crowther, & Middleton, 2006). However, the absolute difference in perinatal deaths was small and statistically not significant, with 6 deaths in 2,808 expectantly managed pregnancies versus 0 among 2,835 that were randomized to be induced at 41 weeks (RR 0.25, CI 0.05-1.18). No significant difference was found in the cesarean delivery rate, but this lack of observed effect also may be misleading. Many of the women randomized to expectant management in the included studies were eventually induced due to nonreassuring fetal testing or other indications or because they became eligible for induction under the study protocols (i.e., they reached 42 weeks, or in some cases, they developed a ripe cervix and were considered "inducible"). Some women allocated to the routine induction arms of the included trials went into spontaneous labor after randomization but before the induction was scheduled. This crossover of treatment conditions from one study group to the other can skew the results of studies so that a true difference may no longer be observed to be significant.

Crossover combined with high baseline cesarean rates in many settings made it more difficult to detect the added effect of routine induction at 41 weeks on cesarean delivery rates (Gülmezoglu et al., 2006). Furthermore, in the expectant management group, physicians who prescribed induction for nonreassuring fetal testing may also have had lower thresholds for recommending cesareans, despite the fact that these tests are unreliable indicators of fetal well-being (ACOG, 2004a).

The Effect of Normal Physiology on Induction Outcomes. More than one third of women in the United States are starting labor before their babies and bodies have initiated the process. Induction of labor sets the stage for medically managed labor and birth characterized

by intravenous lines, electronic fetal monitoring, and very often epidural analgesia. This makes the overuse of induction of labor perhaps the greatest risk to normal physiological birth. It is therefore ironic that normal physiology prevails as one of the most important modifiers of induction success.

Induction is safer and more effective when the woman's own body has begun the work of beginning labor on its own. A recent review of factors associated with successful labor induction found that greater cervical ripeness as measured by the modified Bishop's score or by decreased cervical length on transvaginal ultrasound is associated with a lower risk of cesarean, while the absence of fetal fibronectin (a biochemical marker of fetal membrane degradation) in the vagina at term was linked to increased cesarean rates when induction was attempted (Crane, 2006).

Care Practice No. 2: Freedom of Movement Throughout Labor

Left to their own devices, women will choose a variety of movements to cope with labor (Simkin & O'Hara, 2002). Standing, walking, rhythmic swaying, leaning forward, and assuming the hands and knees position are examples of spontaneous movements that women instinctively use in response to pain or other sensations during labor. Labor may progress more efficiently when the woman responds to her own body's cues, assuming upright positions or changing position frequently to find the best "fit" for the fetus through the pelvis. Provider preferences, restrictive hospital policies, and the routine use of intravenous lines and fetal monitors that restrict movement result in the majority of women spending most or all of their labors in bed, often in the supine position (Declercq et al., 2006).

The Benefits of Freedom of Movement. A systematic review of the effects of freedom of movement in labor found that policies encouraging nonsupine positioning or movement, or both, in labor may result in shorter labors, increased uterine contractility, greater comfort, and reduced need for pharmacologic pain relief (Simkin & O'Hara, 2002). A prospective cohort study of nurse-midwife clients in a low-intervention setting found an association between ambulation in labor and decreased risk for operative delivery (including operative vaginal delivery and cesarean surgery, RR 0.5, CI 0.3-0.9) (Albers et al., 1997). No study has shown evidence of harm from ambulation in labor (Storton, 2007).

Maternal Positioning to Correct Complications of Labor. Certain labor complications may be corrected with maternal position changes. These include poor labor progress, "back labor," malposition of the fetus (such as occipitoposterior [OP] position or asynclitism), premature urge to push, persistent cervical lip, and certain fetal heart

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rate abnormalities (Simkin & Ancheta, 2000). While not all these have been studied in well-designed controlled trials, position changes that are consistent with anatomic principles (such as squatting or kneeling positions to enlarge the pelvis) are generally safe and acceptable to women. Thus, they represent an optimal first-line approach to correcting a complication when the mother and fetus are in stable condition. Most positions are feasible (or may be modified to be feasible) for women with epidurals or electronic fetal monitoring, or both, or who are otherwise confined to the bed for medical reasons. No study has shown that ambulation increases the duration of labor in these circumstances (Storton, 2007), and a randomized controlled trial of laboring women with ultrasound-proven OP fetuses recently demonstrated that brief periods in the hands and knees position significantly reduced the likelihood of persistent severe back pain and was acceptable to the participants (Stremler et al., 2005).

Care Practice No. 3: Continuous Labor Support

In a recent survey of childbearing women, 82% labored with a husband or partner present (Declercq et al., 2006). While women valued this support and rated the quality of support highly, there is evidence to suggest that continuous labor support from a doula (a female companion with specialized training) has a particular beneficial effect that is not observed when only the partner is present (Hodnett, Gates, Hofmeyr, & Sakala, 2007; Simkin & O'Hara, 2002).

Benefits of Continuous Labor Support. The beneficial effects of continuous labor support are thought to be derived from a reduction in maternal anxiety and a related decrease in stress hormones. Increased catecholamines in labor may result in vasoconstriction and a reduction in uterine blood flow (Coad & Dunstall, 2001), which can in turn pose a potential harm to the fetus and slow labor progress.

Studies of continuous labor support have suffered from methodological flaws such as selection bias (Sosa, Kennell, Klaus, Robertson, & Urrutia, 1980), high attrition (Gordon et al., 1999; Thomassen, Lundwall, Wiger, Wollin, & Uvnas-Moberg, 2003), or problems with randomization (Trueba, Contreras, Velazco, Lara, & Martinez, 2000) and are heterogeneous in terms of the populations studied, baseline characteristics of the participants and the hospital environment, training of the labor support providers, and type, timing, and consistency of

labor support. However, two systematic reviews of the better designed studies yielded consistent results.

Hodnett et al. (2007) conducted a meta-analysis of 16 randomized controlled trials involving more than 13,000 women and found that, when compared with routine care, continuous labor support resulted in a higher likelihood of spontaneous vaginal birth, lower likelihood of cesarean surgery, lower likelihood of vaginal instrumental delivery, fewer requests for intrapartum analgesia, and fewer reports of dissatisfaction with the childbirth experience. Simkin and O'Hara (2002) reviewed nine trials that were conducted in North America and concluded that in most circumstances, continuous labor support was associated with a decrease in the use of pain medication including epidural analgesia and improved postpartum perception of the childbirth experience.

Factors That Moderate the Beneficial Effect of Continuous Labor Support. Subgroup analyses by Hodnett et al. (2007) revealed that laboring women derived greater benefit from continuous labor support when the person providing the support was not employed by the hospital, when the support began earlier in labor, and when labor took place in a setting where epidural analgesia was not readily available. Simkin and O'Hara (2002) further concluded that continuous labor support results in decreased epidural use when the support is provided by trained doulas but no difference when the support is provided by nurses. Doula care also appears to be most effective at reducing epidural rates among low-income women without another source of labor support (i.e., friend or family member).

Care Practice No. 4: No Routine Interventions

Declercq et al. (2006) reported that in the sample of women giving birth in the United States in 2005, only 40% drank anything in labor and only 15% ate anything in labor; 80% received intravenous fluids; 59% had amniotomies and 55% had oxytocin augmentation; 93% had electronic fetal monitoring, either continuously or for most of the time in labor; and 76% had epidurals. Each of these interventions and restrictions may interfere with the normal physiology of labor in important ways. Although there are specific medical indications for each, there is no evidence to support their routine use.

Eating and Drinking Restrictions. Eating and drinking in labor provides essential nutrition and energy for the laboring woman. Labor is hard, active work that requires calories, not just hydration (Simkin, 1986). Restricting oral intake is an obstetric intervention that began in the 1940s, when women often gave birth under general anesthesia without airway protection. The rationale was that fasting reduced the chance of stomach contents

entering the lungs (aspiration) in case of vomiting. However, fasting does not guarantee an empty stomach, clear liquids leave the stomach almost immediately, and calories ingested in labor are digested (Kubli, Scrutton, Seed, & O'Sullivan, 2002; O'Sullivan, 1994; Scrutton, Metcalfe, Lowy, Seed, & O'Sullivan, 1999). Furthermore, general anesthesia is rare in modern obstetrics, and aspiration is rare in modern anesthesia. Epidural rather than general anesthesia is used when possible, which reduces the risk of vomiting and is safer for mother and baby. Also, airway protection is now standard medical practice for general anesthesia, so even if a patient does vomit under general anesthesia, the risk of aspiration is extremely small (American Society of Anesthesiologists Task Force on Obstetric Anesthesia, 2007).

A randomized clinical trial of the effect of unrestricted oral carbohydrate intake on labor progress found no differences in the incidence of dystocia or in the incidence of maternal or neonatal complications (Tranmer, Hodnett, Hannah, & Stevens, 2005). A systematic review of the research determined that there was no evidence of benefit in restricting food or fluids in labor (Goer et al. 2007). In addition, laboring women preferred to eat and drink rather than fast. Considering the lack of evidence of benefit, there is no rationale for routine restrictions on oral intake in labor.

In light of this evidence, the American Society of Anesthesiologists (ASA) and ACOG recommend that women at low risk drink clear liquids during labor (ACOG, 2002; American Society of Anesthesiologists Task Force on Obstetric Anesthesia, 2007). The American College of Nurse-Midwives (ACNM) recommends that healthy women experiencing normal labors determine appropriate intake for themselves (ACNM, 2000). The Cochrane Pregnancy and Childbirth Group recommends a low-residue, low-fat diet during labor (Enkin et al., 2000).

Intravenous Fluids. Intravenous fluids are used to prevent dehydration in women restricted from eating and drinking and to provide quick access to a vein in case of emergency. Intravenous therapy did not become a routine practice until the mid-1970s (even though oral intake had been restricted for much longer), and its value and safety are questionable (Begum, Sengupta, Chattopadhyay, Thornton, & Sengupta, 1999). If women eat and drink as desired in labor, the need for replacement fluids and calories disappears. Despite the fact that emergencies do occur in labor, no studies demonstrate that routinely placing an IV in laboring women at low risk averts poor outcomes in these cases (Enkin et al., 2000; Goer et al., 2007). Intravenous lines prevent women from moving freely, may raise stress levels, may cause fluid overload in both mothers and babies, and

do not provide adequate nutrient and fluid balance for the demands of labor (Simkin, 1986).

Continuous Electronic Fetal Monitoring. Electronic fetal monitoring (EFM) was introduced into obstetrics in the 1970s and quickly became standard practice for all hospital births, even though there were no controlled trials at the time to support its value for low-risk births. EFM does provide more information than intermittent auscultation, but does this extra information lead to better outcomes? When auscultation was compared to continuous EFM, EFM was shown to decrease neonatal seizures in babies exposed to high-dose oxytocin induction protocols, but this benefit has not been linked to improvements in long-term outcomes, and no significant benefit has been demonstrated in babies not exposed to high-dose oxytocin in labor. Meanwhile, there is a clear and consistent increase in the rate of cesareans and operative vaginal deliveries for mothers who have continuous EFM, with no clear benefit for babies (Goer et al., 2007; Thacker & Stroup, 2001). In most cases, continuous electronic fetal monitoring severely restricts maternal mobility, and it almost always restricts access to comfort measures like a shower, bath, or use of a birth ball. Both the ACOG (2005) and the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN, 2000b) recommend intermittent auscultation rather than continuous EFM for healthy women with no complications.

Augmentation of Labor. Speeding up labor may sound appealing, but research shows that routinely interfering with the pace and length of labor is no beneficial (Enkin et al., 2000). Arbitrary time restrictions lead to overuse of high-risk interventions with known side effects, such as amniotomy and administration of oxytocin, rather than low- or no-risk techniques, such as position changes or addressing emotional concerns of the laboring woman.

There is some evidence that routine amniotomy shortens labor by a modest amount (Fraser, Turcot, Krauss, & Brisson-Carrol, 1999) but early amniotomy has less effect than amniotomy later in labor (Fraser, Marcoux, Moutquin, & Christen, 1993) and it has risks, including risk of pressure injury as well as greater risk of infection (Fraser et al., 1993). Research also shows an increase in cesareans with early rupture of membranes (Fraser et al., 1999). Because of the increased risk of infection after membranes rupture, a cascade of interventions can be the result. If labor does not progress rapidly, oxytocin is used, making contractions stronger and harder to handle. Because exogenous oxytocin does not cross the blood-brain barrier, women do not benefit from the release of endogenous endorphins to decrease pain perception and help her manage contractions. It also necessitates continuous EFM and an IV. The stronger contractions, the loss of endorphins, the additional interventions, and the restricted

mobility brought on by oxytocin all increase the possibility of requiring an epidural, adding additional risks (Mayberry, Clemmens, & De, 2002).

A systematic review of the research suggested that only women with truly abnormal labor progress should have amniotomy and that only women with truly prolonged labors and sluggish uterine activity should receive oxytocin (Fraser et al., 1999). Neither intervention should be used routinely or liberally. According to the Cochrane Collaboration, letting women move around and eat and drink as they please may be at least as effective—and certainly more pleasant—for many women who need augmentation (Enkin et al., 2000, p. 237).

Epidural Analgesia. Although epidural analgesia provides excellent pain relief, it interferes in important ways with the normal physiology of labor and birth. Relaxation of the pelvic muscles makes it more difficult for the baby to rotate and descend, and the absence of pain can interfere with the natural release of oxytocin. The risk of hypotension requires the use of EFM and intravenous fluids. Both the changes in the physical process of birth and the interventions required to ensure safety during an epidural introduce risks (Mayberry et al., 2002). Two systematic reviews linked epidurals with fewer normal vaginal deliveries, more instrumental deliveries, and longer labors, particularly for first-time mothers (Anim-Somuah, Smyth, & Howell, 2005; Lieberman & O'Donoghue, 2002). There is an increased likelihood of both hypotension and oxytocin use in women with epidurals (Anim-Somuah et al.). Women with epidurals are more likely to have fever during labor, and as a result, their babies are more likely to be evaluated and treated for infection (Anim-Somuah et al.; Lieberman & O'Donoghue).

There is some evidence (though less conclusive because of conflicting results) that epidural use—especially by first-time mothers—increases the risk of cesarean surgery (Anim-Somuah et al., 2005; Lieberman & O'Donoghue, 2002). Klein (2006a) pointed out that the Cochrane reviewers (Anim-Somuah et al.) did not evaluate the effect of late versus early epidural administration. If they had, Klein noted, they would have found that early epidural placement more than doubled the likelihood of cesarean.

There is growing evidence that women with epidurals have an increased likelihood of malposition of the fetal head (Anim-Somuah et al., 2005; Lieberman & O'Donoghue, 2002). Lieberman, Davidson, Lee-Parritz, and Shearer (2005) conducted a prospective cohort study of 1,562 pregnant women at low-risk expecting their first babies. Using periodic ultrasound examinations during labor, they evaluated fetal position and the relationship with epidural analgesia. Women who

received epidural analgesia were no more likely than the women who did not receive epidurals to have a baby in the OP position prior to or at the time of the epidural administration, but epidural analgesia was strongly associated with delivery from the OP position: 12.9% of women with an epidural versus 3.3% of women without an epidural.

Compared with newborns of women who do not receive intrathecal narcotics, the newborns of women who receive intrathecal narcotics may experience more difficulty breastfeeding in the first hours, days, and weeks after birth (Beilin, Bodian, Weiser, Hossain, & Arnold, 2005; Jordan, Emery, Bradshaw, Watkins, & Friswell, 2005; Lieberman & O'Donoghue, 2002; Radzyminski, 2003, 2005; Torvaldsen, Roberts, Simpson, Thompson, & Ellwood, 2006). Babies of medicated mothers cried longer and were more likely to have hyperthermia than babies of unmedicated mothers (Ransjo-Arvidson et al., 2001). If women have access to a wide variety of comfort measures and are able to work actively with the increasingly painful contractions as labor progresses, and if they have continuous emotional and physical support, they are less likely to need epidurals—or will need them later in labor, when epidural-associated complications are less likely to arise.

Care Practice No. 5: Spontaneous Pushing in Nonsupine Positions

The *Listening to Mothers II* survey reported that 57% of the women gave birth in supine positions with an additional 35% birthing from a semisitting position (Declercq et al., 2006). Using a variety of positions during second stage allows women to respond to the fetus' changing position as he or she descends, rotates, and moves through the birth canal. Standing, kneeling, and squatting help gravity bring the baby down and protect the birth canal and baby from excessive pressure. Gravity-neutral positions—kneeling on all fours, side-lying, and semisitting—allow women to rest between contractions and help women conserve energy during contractions.

Pushing in upright postures shortens second stage and decreases the incidence of severe maternal pain and abnormal fetal heart rate (Enkin et al., 2000; Gupta & Nickoderm, 2000). Squatting widens the pelvic diameter, creating more room for the baby to descend (Johnson, Johnson, & Gupta, 1991). The Cochrane Collaboration (Gupta, Hofmeyr, & Smyth, 2004) found that although the methodological quality of 20 randomized trials was variable, the use of lateral or upright positions, compared with supine or lithotomy positions, was associated with a shorter second stage, a small reduction in assisted deliveries, a reduction in episiotomies, fewer reports of severe pain during second stage, and fewer abnormal fetal heart rate patterns. The upright group

had more second-degree tears and increased blood loss compared with those giving birth from the supine or lithotomy position. However, at least a portion of the excess lacerations likely resulted from the lower episiotomy rate in the upright group because some of the women who did not get episiotomies had intact perinea, while others had spontaneous lacerations. The increased blood loss found in the upright group deserves further study, but the review provided no evidence that the excess blood loss had negative consequences such as anemia or need for transfusion. The authors concluded that women should be encouraged to give birth in positions that they find most comfortable, including upright positions.

There are no data to support a policy of directed pushing during second stage of labor and some evidences to suggest that it is harmful (Albers, Sedler, Bedrick, Teaf, & Peralta, 2006; Enkin et al., 2000). In a secondary analysis of a randomized controlled trial of perineal management techniques, directed pushing with breath holding increased the risk of trauma requiring sutures in primiparous women (Albers et al., 2006). In another RCT of nulliparous women with low-risk, term pregnancies and no epidurals, the directed pushing group had significantly more pelvic floor dysfunction 3 months postpartum compared with women who received no specific instructions of how to push (Schaffer et al., 2005).

In a secondary analysis of this trial, Bloom, Casey, Schaffer, McIntire, and Leneno (2006) found that the average length of second stage was 13 minutes shorter in the coached pushing group compared with the uncoached group, but no difference was found in the number who pushed more than 2 to 3 hours, route of delivery, or any other maternal or newborn outcome. Klein (2006b) critiqued the study methods and urged caution in interpreting this study to mean that coached pushing is safe for newborns. AWHONN recommends that all pregnant women receive information about the benefits of upright positions and that nurses encourage squatting, semisitting, standing, and upright kneeling positions (Mayberry et al., 2000). In addition, AWHONN recommends that women do not begin pushing until they feel the urge to do so, and when they do push, they push spontaneously in response to the urge to push rather than in a directed way.

Care Practice No. 6: No Separation of Mother and Baby

Separation of mothers from their neonates at birth has become standard practice, despite mounting evidence that this may have harmful effects (Moore et al., 2007). Only 34% of mothers surveyed reported that babies were in their arms after birth (Declercq et al., 2006). Newborns (including premature babies) held skin-to-skin by their mothers cry less and stay warmer than

newborns placed in warming cribs (Bystrova et al., 2003; Christensson et al., 1992; Christensson, Bhat, Amadi, Eriksson, & Hojer, 1998). The mother's temperature adjusts naturally to keep her baby warm (Mikiel-Kostyra, Mazur, & Boltruszko, 2002). Skin-to-skin contact also exposes babies to their mothers' normal bacteria, not the hospital germs, which lowers their risk of acquiring infections (World Health Organization, 1998).

Other benefits of skin-to-skin contact for newborns are easier, more regular breathing; higher, more stable blood sugar levels; and a natural progression to breastfeeding (Christensson et al. 1992; Christensson, Cabrera, Christensson, Uvnas-Moberg, & Winberg, 1995; Johanson, Spencer, Rolfe, Jones, & Malla, 1992). Most babies kept skin-to-skin with their mothers after birth instinctively crawl to the breast, latch on, and start lactating. Even brief separation can interfere with their ability to do this (Righard & Alade, 1990).

The Cochrane systematic review of early skin-to-skin contact (SSC) for mothers and their healthy newborn infants provides support for its importance (Moore et al., 2007). Thirty trials involving 1,925 mother-baby pairs were included. The reviewers found significant positive effects of early skin-to-skin contact on maternal affectionate touch and contact behavior during breastfeeding within the first few days, breastfeeding initiation and duration, maintenance of infant temperature, infant crying, newborn blood glucose and cardiopulmonary stabilization, and maternal satisfaction. Newborn benefits were pronounced in late-preterm infants (born between 34 and 37 weeks). Differences in some maternal attachment behaviors between groups persisted as long as 1 year after the skin-to-skin contact occurred. No negative effects of SSC were found.

The research findings are so compelling that experts now recommend that right after birth, a healthy newborn should be *routinely* placed skin-to-skin on the mother's abdomen or chest and should be dried and covered with warm blankets (Academy of Breastfeeding Medicine Protocol Committee, 2003; American Academy of Pediatrics ACOG, 2002; AWHONN, 2000; World Health Organization, 1998). All routine infant care can be done with baby skin-to-skin with mother, including assigning Apgar scores and obtaining vital signs.

Discussion

Our review of the evidence suggests that interfering with the normal physiological process of labor and birth increases the risk of complications for mother and baby. The lack of significant improvements in maternal or infant mortality amid an ever-rising cesarean rate in the United States suggests that more technology does not necessarily translate into better outcomes. Women's choices are routinely restricted in modern maternity set-

> If women have access to comfort measures, work actively with contractions as labor progresses, and have continuous emotional and physical support, they are less likely to need epidurals.

tings, even despite compelling evidence that the "obstetric package" of care does more harm than good.

In the current maternity care environment, providing evidence-based nursing care that promotes, protects, and supports normal birth is a challenge. Respecting the basic physiology of labor and birth and allowing it to unfold on its own means do less to women. It means simply being with women, responding to needs that are emotional and physical, not intellectual, technical, or medical. Modern obstetric units are well equipped to deal with high-risk or complicated births, but the policies, protocols, and physical infrastructure are not ideal for physiological birth. However, nurses are in a unique position to reintroduce the care practices that support normal birth. The heart of nursing is providing individualized care, promoting comfort, addressing emotional needs within a holistic health model, and teaching wellness and self-care.

Implications for Prenatal Education

Women need to know about normal physiological birth. Our informal and formal teaching should emphasize that birth is intended to happen simply and without distress or danger. Our teaching should reflect best evidence rather than the menu of options available at the hospital. To do this will require in some instances resisting pressure from employers to withhold information. When time or institutional constraints prevent us from providing full information to childbearing women, we have an obligation to teach them how to find and determine the quality of evidence-based information from other sources such as books or the Internet. The Lamaze Institute for Normal Birth has developed position papers and related materials about each of the six care practices discussed in this article. (These are available at www.lamaze.org.) Childbirth Connection (www.childbirthconnection.org) is another resource of evidence-based information. If women are to make informed decisions, they need full information and an opportunity to discuss the implications of their choices, whether they consent to or refuse an intervention or care practice.

It can be hard to teach women that the standard obstetric package of care may be based on what is best for hospitals and maternity care staff and not for women and babies, but we must instill in expectant parents the courage to question authority and demand the evidence that supports the care they are receiving. The goals of prenatal education are to build women's confidence in their own ability to give birth, to provide knowledge about normal birth, and to help women develop individualized

birth plans that provide a road map for keeping birth as normal as possible even if complications occur. Further research is needed to determine the models of prenatal education that best achieve this.

Implications for Labor, Birth, and Postpartum Care

Creating labor and birth environments that protect, promote, and support normal birth will require dramatic changes in the typical American hospital. For example, to ensure true freedom of movement, there must be safe, private spaces to walk, availability of movement aids such as birth balls, and access to tubs and showers. Nonseparation of mothers and babies may require a close look at our habits and routines so that the radiant warmer is no longer seen as the only site for newborn care. It will require a shift in priorities such that establishing skin-to-skin contact, initiating breastfeeding, and protecting the mother-baby continuum are paramount, and routines and interventions are designed to accommodate the new relationship between the mother and the baby, not vice versa.

Perhaps the most problematic change is to shift away from routine continuous electronic fetal monitoring. The cost of reallocating and retraining hospital staff to safely implement intermittent auscultation protocols and the perceived need for continuous documentation of the fetal heart rate in the case of future malpractice claims are the most frequent excuses for the persistence of continuous fetal monitoring in the face of irrefutable evidence of harm (Wood, 2003). However, in a 1990 clinical commentary, Sandmire (1990) described how two Wisconsin hospitals provided intermittent auscultation for a high percentage of patients using existing nursing staff. Indeed, hidden costs—that may in fact include *increased* risk of liability—add to the cost of electronic fetal monitoring. Staff training, maintenance and cleaning of the monitor components, and electricity to operate the electronic fetal monitoring machines may not be captured by traditional economic analyses, and costs associated with the downstream effects of overuse of EFM, most notably unplanned cesarean surgeries, could be eliminated by implementing intermittent auscultation protocols (Lent, 1999). In her detailed legal analysis of electronic fetal monitoring published in the *Stanford Law Review*, Lent demonstrated that rather than insulating obstetricians and hospitals from liability, use of EFM may actually expose them to greater malpractice risk by providing a permanent record for plaintiffs' witnesses to reinterpret in hindsight. She also argued that, given the great body of literature supporting intermittent auscultation and physicians' legal obligation to "keep abreast of progress" in their field and "use best judgment," the courts would deem intermittent auscultation "at the very least, an equally effective, equally acceptable alternative to EFM" (p. 820).

Nurses have an opportunity to provide leadership in pushing hospitals to provide evidence-based care that promotes healthy outcomes. Nurses will begin to question orders that do not reflect best evidence in the same way that we question medication orders that are not appropriate. We can begin by asking ourselves and our colleagues why a care practice is happening in the first place. Is it for the convenience of the staff or "hospital efficiency" or is it for the best interest of the individual mother and baby? Does it reflect outdated research or the best available evidence? Is it rooted in fear of a poor outcome or a lawsuit or in confidence in women's ability to give birth normally? Is it based on rituals and routines or individualized care?

While changing practice will take hard work and challenge some of our long-held beliefs, nurses will reap great benefits, along with mothers, babies, and families. Reducing interventions and easing restrictions will change the focus of intrapartum nursing from medical management to nursing care. And there will finally be time for providing comfort and support, the traditional hallmarks of labor and delivery nursing care.

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Objectives

After reading this article, the learner will be able to:

1. Describe the normal physiology of labor and birth.
2. Analyze the evidence basis for 6 care practices that promote, protect and support normal physiologic birth.
3. Discuss the ways in which nurses can use best evidence to promote, protect and support normal birth.

Questions

1. Initiation of normal term labor is primarily determined by hormonal changes originating in the
   a. fetus
   b. mother
   c. placenta

2. Which of the following represents a physiologic mechanism to modulate women's perception of pain in labor?
   a. requests for pain medication
   b. rise in endogenous beta-endorphins
   c. surge in catecholamines resulting in the "fetal ejection reflex"

3. The "3 Ps" (powers, passenger, pelvis) model of labor progress does not adequately address
   a. elasticity of the genital tract
   b. factors that modulate stress hormones
   c. the role of oxytocin receptors

4. When used to diagnose macrosomia, ultrasound
   a. has high positive predictive value
   b. has low negative predictive value.
   c. is a poor predictor of actual fetal weight

5. Position changes may be an optimal first-line approach to correcting many kinds of non-acute labor complications because
   a. there is strong and consistent evidence of their effectiveness
   b. they are generally safe and acceptable to women
   c. they do not require the support or encouragement of nursing staff

6. Which of the following maternal signs are associated with successful labor induction at term:
   a. absence of fetal fibronectin in the vagina
   b. cervical firmness and lack of dilatation
   c. decreased cervical length on transvaginal ultrasound

7. Women derive the most benefits from continuous labor support when
   a. epidural analgesia is readily available
   b. it is initiated early in labor
   c. it is provided by a hospital employee

8. A systematic review of the literature suggests that restricting eating and drinking in labor
   a. is associated with more labor dystocia
   b. protects mothers and babies
   c. shows no evidence of benefit

9. Intravenous therapy in low risk laboring women
   a. averts poor outcomes in cases of emergency
   b. can cause fluid overload in mothers and babies
   c. provides adequate nutrients for mother and fetus

10. Compared with intermittent auscultation, routine use of continuous electronic fetal monitoring in uncomplicated labor
    a. decreases the risk of neonatal seizures
    b. has no effect on neonatal outcomes
    c. is favored by expert bodies such as AWHONN

11. There is growing evidence that women with epidurals are more likely to
    a. experience fewer breastfeeding difficulties
    b. experience malposition of the fetal head
    c. have a baby with hypothermia

12. Pushing from a non-supine position, such as standing or squatting, is associated with
    a. a shorter duration of the second stage of labor
    b. increased risk of abnormal fetal heart patterns
    c. no difference in the pain women reported

13. Compared with directed pushing with breath holding, encouraging a woman to follow her own urge to push
    a. increases the likelihood that she will need instrumental assistance to give birth vaginally
    b. is associated with fewer tears and less postpartum pelvic floor dysfunction
    c. results in a clinically significant decrease in the length of second stage

14. Based on best evidence, what intervention will most effectively maintain newborn temperature in the immediate postpartum period?
    a. Encourage early and frequent skin-to-skin contact between the infant and mother
    b. Keep infant in a radiant heater until the infant demonstrates thermal stability
    c. Swaddle the infant with pre-warmed blankets and transfer to nursery as soon as possible

15. Strategies to create labor and birth environments that protect, promote and support normal birth include
    a. allocating funding for staff training on routine continuous electronic fetal monitoring
    b. implementing measures to maximize hospital and staffing efficiencies
    c. prioritizing accommodation of the new mother-baby relationship