The Context & Clinical Evidence for Common Nursing Practices During Labor
The current state of intrapartum nursing practice is the result of an evolution of knowledge and technologies since childbirth moved from home to the hospital. However, much of what we do is still based on nonscientific routines (Enkin et al., 2000). We know that childbirth is a natural physiologic process, but it’s often hard to keep this concept in clear focus when practicing in the high-tech clinical environments that characterize most busy labor and delivery units in the United States today. What is clear is that the evidence for some of these high-tech practices is lacking.

Excellent intrapartum care requires a team effort. Members of the interdisciplinary perinatal team have complementary, and sometimes overlapping, roles and responsibilities. Although many nursing interventions during labor and birth are based on physician orders, there are many care processes that remain mainly within the realm of nursing practice. For example, women are admitted to the labor and delivery unit by physicians with the assumption that nurses will carefully monitor the mother and baby during the labor process. Nurses identify maternal-fetal risk factors on admission and plan the type and amount of assessment based on both those initial data and ongoing data gathered as labor progresses. The decision for labor induction or augmentation rests with the physician, while titration of the oxytocin infusion is often based on the nurse’s assessment of labor progress and the maternal-fetal response. In many institutions, nurses identify when second-stage labor has begun and choose the method of second-stage care. They remain at the bedside during second-stage pushing, encouraging the mother in her efforts to effect fetal descent, and notify the physician when birth is imminent.

The focus of review of evidence in this article is on the three most common clinical practices for which nurses have primary responsibility in most settings and that comprise the majority of their time in caring for women during labor: (1) maternal-fetal assessment, (2) management of oxytocin infusions, and (3) second-stage care. Evidence exists for these nursing interventions that can be used to promote maternal-fetal well-being, minimize risk, and enhance patient safety.

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involved in caring for women during labor and birth, yet no evidence exists as to which model is best for patients and members of the perinatal healthcare team (James et al., 2003). Intrapartum nursing is generally thought of and described as a discrete area of nursing practice with a specific set of clinical skills, requisite knowledge, and responsibilities, that is, a recognized and universally defined specialty. In reality, however, intrapartum nursing practice consists of an assortment of different roles depending on the circumstances, hospital setting, and context in which it takes place. A variety of practice models have evolved as a result and in response to the range of sizes, locations, and provider practice styles found in hospitals providing obstetric services. A summary of intrapartum nursing models is presented in Figure 1.

Most inpatient institutions in the United States are community hospitals. Of the 3,024 U.S. hospitals that provide obstetric care, only 241 are academic medical centers (American Hospital Association, 2005). Fifty percent of hospitals in the United States that provide obstetric care have less than 500 births per year (American College of Obstetricians and Gynecologists [ACOG] & American Society of Anesthesiologists [ASA], 2000). Based on these data, it can be assumed that nurse-managed labor is the predominant model of intrapartum nursing care in the United States; however, research about interventions during labor and birth is more likely to be conducted in academic centers.

A fundamental determinant of each nursing care model is the predominant type (face-to-face on-site versus off-site via telephone) and amount of communication that occurs between the labor nurse and the primary healthcare provider. Other key distinctions between models include the amount and type of hands-on assessment and care by the labor nurse and the primary care provider. Limited nurse-physician communication and limited hands-on care by primary care providers suggests additional nursing discretion in making clinical decisions; thus, increasing amounts of nursing autonomy are required (Kramer & Schmalenberg, 2003). The distinctions between intrapartum nursing models are not mutually exclusive. Within a given clinical setting, multiple degrees of intrapartum nursing autonomy simultaneously coexist depending on the primary care provider for each patient.

Terms to describe perinatal services such as labor-delivery-recovery (LDR), labor-delivery-recovery-postpartum (LDRP), single-room maternity care (SRMC), labor and delivery, well-baby nursery, special care nursery, neonatal intensive care, antepartum, postpartum, etc., are usually assumed to be indicative of the practice model but in reality often just reflect the physical layout of the unit. With the wide variety of descriptive terms and settings discussed in the literature, it is difficult to determine whether one type of care model promotes better outcomes as compared with another. Published research reports about intrapartum nursing practice have not routinely provided descriptions of the model of nursing care on the units in which nursing interventions were studied (Corbett & Callister, 2000; Gale, Fothergill-Bourbonnais & Chamberlain, 2001; Hodnett et al., 2002; Miltnner, 2002; Sleutel, 2000).

For the most part, intrapartum nursing practice has been considered monolithic and homogenous by nurse researchers; however, this assumption is not valid. Perhaps previous published research results would have been different if data had been analyzed based on the practice model of the units studied. Although one recent study suggests nurses working in the nurse-managed labor model enjoy autonomy in practice (James et al., 2003), it is not known if labor nurses would select one care model over another if they were given a choice and had sufficient knowledge of alternative models available. Likewise, there are no data available concerning patient preferences for a distinct model of nursing care. These are important questions that should be evaluated by nurse researchers. Future research about intrapartum nursing practice should include clear descriptions of the model of the units in which study interventions were implemented. This factor could have important implications for generalizability of findings and application to specific clinical practice.
Intrapartum Nursing Care Practices
Maternal-Fetal Assessment During Labor

Maternal

There have been no randomized trials comparing type and amount of nursing assessment for women during labor. Individual unit protocols are based on established routines and what seems to make sense based on perceived patient needs and staffing availability. Usually, protocols for fetal assessment are linked to maternal assessment and include vital signs, uterine activity, and the woman’s overall condition. In an attempt to gather all of the data required, nurses often use automatic blood pressure (BP) devices and pulse oximeters to mechanically record maternal vital signs simultaneously. This practice has become more common. However, there are data to suggest that these devices do not provide accurate clinical information in this population.

During pregnancy, labor, and the postpartum period, use of a manual BP cuff and stethoscope is the more accurate method of assessing BP. Automatic BP devices tend to overestimate systolic BP by 4 to 6 mmHg and underestimate diastolic BP by 10 mmHg when used for childbearing women (Brown et al., 1994; Franx et al., 1994; Natarajan et al., 1999; Pominini, 2001). Inaccuracies in BP data can lead to inappropriate treatment. For example, a diastolic BP of 95 mmHg obtained by a nurse using a manual BP cuff and stethoscope would be recorded as 85 mmHg by an automatic BP device; thus, with this practice an elevated BP would potentially be missed and not treated appropriately or in a timely manner. In contrast, an underestimated diastolic BP could result in treatment for hypotension following epidural dosage, potentially leading to fetal compromise if a vasopressor is given for hypotension that does not actually exist.

There is the perception that use of continuous pulse oximetry will assist with distinguishing between the maternal and fetal heart rate and decrease liability by producing an uninterrupted recording of both rates permanently on the fetal monitoring strip. Pulse oximeters are designed to measure oxygen saturation (SpO₂) rather than heart rate. They are subject to variations in accuracy due to placement, maternal position, blood flow, and the patient’s condition. Often they produce inaccurate data for some time before noted by the nurse because the data are automatically generated and printed on the strip while the nurse is away from the bedside. When periods of inaccurately recorded low SpO₂ readings are accompanied by nonreassuring fetal heart rate (FHR) patterns, there is increased liability risk. Claims that the mother was inadequately oxygenated when low SpO₂ readings occurred during nonreassuring FHR patterns have been made successfully in obstetric malpractice cases. Although during real-time recording on the fetal monitoring strip the data from the pulse oximetry are lighter than the FHR, when printed from the electronic archival system later as part of the retrospective review process that occurs during litigation these maternal and fetal data are virtually indistinguishable. Inability to distinguish between the rates during retrospective review is an additional source of liability.

Direct bedside evaluation of maternal status should coincide with times of assessment data recorded in the medical record. When these data are automatically generated in the nurse’s absence, there is no ability to retrospectively know whether maternal conditions at that time could have contributed to the findings. For example, the mother may have repositioned herself or may be having a uterine contraction when the BP device is activated, or the BP cuff and/or pulse oximeter may be malpositioned. These factors affect device accuracy.

There is no evidence or standards for routine continuous use of automatic devices for maternal assessment during labor; preliminary data even suggest that they can be a liability risk. Studies about maternal discomfort and activity restriction with their use do not exist; however, anyone who has had their BP assessed by an automatic BP device can appreciate the discomfort, multiplied by the number of times these devices activate during labor, particularly if they are set for every 5- to 15-minute assessments. When women in labor are attached to multiple devices, their ability to reposition for comfort is likely limited and they may fear that their movement will affect the monitors. Routine use of automatic maternal vital sign assessment devices during labor should be questioned.

Fetal

The basis for the traditionally recommended fetal assessment frequencies during labor is a series of randomized controlled trials comparing intermittent auscultation (IA) and continuous electronic fetal monitoring (EFM) that were conducted after the introduction of EFM into clinical practice (American Academy of Pediatrics [AAP] & ACOG, 2002). When using protocols that included one-to-one nursing assessment of FHR patterns every 15 minutes during the active phase of the first stage of labor and every 5 minutes during the second stage of labor for patients...
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MacKenzie, & Lopez-Bernal, 2000). Once the stable phase has been reached (after 3.5 to 4.5 hours of administration), any further increase in dosage will not result in more frequent normal uterine activity, but rather a risk of medication side effects such as hyperstimulation and nonreassuring FHR changes (Phaneuf et al., 2000). Uterine oxytocin receptor sites decrease significantly during prolonged oxytocin-induced or augmented labor compared to spontaneous labor. This desensitization is directly related to oxytocin dosage rate and length of administration (Phaneuf et al., 2000). Thus, although it seems counterintuitive to many practitioners, more exogenous oxytocin does not result in more effective contractions.

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A meta-analysis of low-dose versus high-dose oxytocin for labor induction by Crane and Young (1998) found that low-dose protocols resulted in fewer episodes of excessive uterine activity, fewer operative vaginal births, a higher rate of spontaneous vaginal birth, and a lower rate of cesarean birth. Pharmacologic agents increase the risk of uterine hyperstimulation, nonreassuring FHR due to hyperstimulation, and cesarean birth for nonreassuring FHR patterns (ACOG, 1999; Crane, Young, Butt, Bennett, & Hutchens, 2001; Rayburn, 2002). Since 50% of hyperstimulation results in a nonreassuring FHR pattern (Rayburn, 2002), this is a significant concern for the nurse who is responsible for titrating the oxytocin infusion to labor progress and the maternal-fetal response (Clayworth, 2000).

Often during oxytocin infusion, nurses are focused on the rate increase section of the protocol while ignoring the clinical criteria for dosage increases (Simpson & Atterbury, 2003). For example, if cervical effacement is occurring or if the woman is progressing in labor at approximately 1 cm per hour, there is no need to increase the oxytocin rate, even if contractions appear to be mild and infrequent. Labor progress and maternal-fetal response to the drug should be the primary considerations (Simpson, 2002). When there is evidence of a nonreassuring FHR pattern or contractions are excessive in strength and/or frequency, the dosage should be decreased or discontinued based on the individual clinical situation. Although recommended nurse-to-patient staffing is 1:2 while caring for women receiving oxytocin (AAP & ACOG, 2002), providing the type of intensive nursing care required to carefully monitor more than one mother and baby is often difficult. Failure to recognize and timely treat hyperstimulation and resultant nonreassuring FHR patterns is a significant source of successful claims against physicians, nurses, and healthcare institutions (Simpson & Knox, 2003).

Second-Stage Labor

There are two methods of nursing care when the second stage of labor begins. One method is to coach the woman to push immediately and the other method is to allow passive fetal descent until the woman feels the urge to push. The immediate pushing method involves instructing the woman to hold her breath while pushing three to four times with each contraction while the nurse counts to 10 to help the woman focus on pushing for at least 10 seconds with each pushing effort. Women are told to bring their knees up to their chest with their elbows outstretched and not to make a sound. The Valsalva maneuver is instituted, resulting in an increase in intrathoracic pressure, impaired blood return from the lower extremities, and initially increased and then decreased blood pressure, resulting in a decrease in blood flow to the placenta (Caldeyro-Barcia et al., 1981). Periods of 9 to 15 seconds of closed-glottis pushing results in a decrease in maternal pO2 and increase in pCO2, thus affecting the pO2 and pCO2 of blood flow to the placenta and ultimately to the fetus (Caldeyro-Barcia & Ferrer, 1998). There are two methods of nursing care when the second stage of labor begins. One method is to coach the woman to push immediately and the other method is to allow passive fetal descent until the woman feels the urge to push. The immediate pushing method involves instructing the woman to hold her breath while pushing three to four times with each contraction while the nurse counts to 10 to help the woman focus on pushing for at least 10 seconds with each pushing effort. Women are told to bring their knees up to their chest with their elbows outstretched and not to make a sound. The Valsalva maneuver is instituted, resulting in an increase in intrathoracic pressure, impaired blood return from the lower extremities, and initially increased and then decreased blood pressure, resulting in a decrease in blood flow to the placenta (Caldeyro-Barcia et al., 1981). Periods of 9 to 15 seconds of closed-glottis pushing results in a decrease in maternal pO2 and increase in pCO2, thus affecting the pO2 and pCO2 of blood flow to the placenta and ultimately to the fetus (Caldeyro-Barcia & Ferrer, 1998).

**Figure 2.** Recommended clinical practices based on available evidence.

- Avoid the use of automatic blood pressure devices during labor.
- Promote intermittent auscultation for fetal assessment during labor.
- Evaluate the fetal heart rate (FHR) based on patterns that are known to suggest fetal compromise, pattern evolution, and clinical context.
- Initiate appropriate intrauterine resuscitation techniques in a timely manner based on the FHR pattern.
- Use the lowest dose of oxytocin possible to promote adequate labor progress.
- Avoid hyperstimulation of uterine activity, and if it occurs, treat in a timely manner.
- Allow passive fetal descent during second-stage labor until the woman feels the urge to push.
- Avoid coached closed-glottis pushing techniques; allow the woman to bear down as long as she feels is appropriate.
et al., 1981). Over the course of the average 2-hour second stage, these maternal hemodynamic changes have the potential to have a progressive negative effect on fetal status (Bassell, Shaesta, Humayun, & Marx, 1980; Nordstrom, Achanma, Nuka, & Arulkumaran, 2001).

Coached closed-glottis pushing beginning at 10-cm cervical dilation and continuing until birth has been used more frequently in the last 15 years since the increased incidence of epidural anesthesia, yet it has no scientific basis (Roberts, 2002). Proponents of this method intuitively believe that it results in a clinically significant shortening of the second stage and decreases risk of cesarean birth; however, results of recent randomized clinical trials do not support these beliefs (Fraser et al., 2000; Hansen, Clark, & Foster, 2002; Mayberry, Hammer, Kelly, True-Driver, & De, 1999; Parnell, Langhoff-Roos, Iversen, & Damgaard, 1993; Vause, Congdon, & Thornton, 1998).

In an alternative but less common approach (also known as “laboring down,” “passive descent,” and “physiologic second stage”), pushing is delayed until the woman feels the urge to push, passive fetal descent is allowed, and open-glottis pushing is encouraged when the woman reports the urge to push. If the fetus has not descended sufficiently after a 2-hour period of passive fetal descent, the woman is encouraged to grunt without holding her breath (open-glottis) and bear down during contractions. There is no count to 10 or instruction to hold her breath. No more than three push es are encouraged with each contraction and the woman bears down as long as she feels the urge (AWHONN, 2000; Roberts, 2002). This method has been found to be as effective in aiding fetal descent as traditional closed-glottis pushing, but without the negative maternal hemodynamic implications of the Valsalva maneuver and its effects on fetal status such as FHR decelerations, hypoxemia, and abnormal acid-base changes (AWHONN, 2000; Mayberry, Wood, et al., 2000; Roberts, 2002; Simpson & James, 2005a). Additional benefits include less operative vaginal births, less maternal fatigue, less perineal trauma, protection of the pelvic floor, and avoidance of incontinence and pelvic organ prolapse in the future (Fraser et al., 2000; Handa, Harris, & Ostergaard, 1996; Hansen et al., 2002; Mayberry, Gennaro, Strange, Williams, & De, 1999; Sampselle & Hines, 1999; Schaffer et al., 2005).

An evidence-based practice resource with a review of the literature and recommendations for second-stage nursing care has been published by AWHONN (2000). Although more data are needed about all aspects of second-stage care, there is enough evidence to support delayed pushing until the woman feels the urge to push and avoiding coached closed-glottis pushing and the supine lithotomy position (Roberts, 2002). These practices will not increase risk of cesarean birth or result in a clinically significant lengthening of the second stage (Fraser et al., 2000; Hansen et al., 2002; Mayberry, Hammer, et al., 1999).

Summary
Recommendations for these three common nursing practices during labor based on the evidence to date are listed in Figure 2. Clearly there is a need for more evidence about our intrapartum care practices, and since nurses provide the majority of this care, nurses are in an ideal situation to conduct meaningful studies. The foundation for safe and effective nursing care during labor and birth should be the results of rigorous research. Science rather routine should guide what we do every day. We have a collective obligation to keep mothers and babies safe during the childbearing process. Nursing practices based on solid evidence will contribute to our ability to fulfill this responsibility. Suggestions for future nursing research on these important topics are listed in Figure 3. Nurses in the clinical setting should explore partnership with their colleagues in the academic setting to design and conduct research studies that will add to what is known about how to provide the most optimal care for mothers and babies during labor and birth.

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References