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# Optimizing Birth: Creation and Analysis of an Ideal Labor and Delivery Experience

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### Abstract

In this literature review, the author seeks to describe the objectively “best” birth experience for low-risk pregnancies by analyzing studies that compare various outcomes and scenarios of the labor and delivery experience, such as location of birth, body positioning during labor and delivery, medical professionals involved, water births, alternative pain management, sexual activity, and food and drink intake during labor. Components of analysis, or “outcome factors,” include maternal satisfaction, maternal health and safety outcomes, neonatal health and safety outcomes, and cost effectiveness. The ideal birthing experience includes midwife-led care at an alternative birth center. Upright body positions, water immersion, and alternative pain management should also be encouraged as part of the ideal birthing experience, but only as the patient desires. Sexual activity and food and drink intake do not affect outcomes or interventions in the labor and delivery experience, so they can be an option if the patient desires, but are not included as part of the ideal birthing experience. These conclusions create a statistically ideal birthing experience that is not applicable to every laboring patient, so each patient should be advised to individually decide their own best birthing experience.

## Optimizing Birth:

### Creation and Analysis of the Ideal Birthing Experience

#### **Introduction**

For as long as humanity has existed, the birthing process has been essential for continuing the species. Even thousands and thousands of years ago, without any of the medical techniques or knowledge of today, babies were still being born successfully, generation after generation. Despite the historical success of the birthing process, there are those who argue that the only appropriate way to give birth is in a hospital, with the assistance of as much modern medical technology as possible. Others insist that natural home births with doulas and no medical interventions are the proper method of giving birth. There are countless different potential aspects of labor and delivery that come together to create the birthing process, including body positioning during labor, location of birth, medical professionals involved, water births, alternative pain management, sexual activity, and food and drink intake during labor. What combination of these factors forms the best birthing experience? Experiences differ among individuals, and it is impossible to predict precisely the best situation for each individual separately. However, careful analysis of a variety of studies related to the labor and delivery experience may be able to illustrate a theoretically ideal birthing process.

#### **Definitions**

Because the term “ideal” denotes individual subjectivity, it must be carefully defined within objective parameters. An integration of several factors will define “ideal birth experience” in this review. These factors (maternal satisfaction, maternal health and safety outcomes, neonatal health and safety outcomes, and cost effectiveness) will be collectively referred to as

“outcome factors.” This review will also focus exclusively on low-risk pregnancies and births, so any discussion of birth experiences in this review can be assumed to be low-risk.

### **Methods**

To perform this literature review, the author searched for articles using the CINAHL, PubMed, and ProQuest databases. The search terms used included “labor and delivery” or “birth,” along with the various interventions, outcomes, or components of birth discussed in this review. An article was included if it was scholarly, peer-reviewed, and described a component of the birthing process and its effect on one or more outcome factors. A total of 31 articles were found and analyzed using these methods.

### **Potential Components Affecting Labor and Delivery**

#### **Body Positioning During Labor**

A laboring patient’s body position during labor and delivery may affect the outcome factors of labor and delivery. Most traditional hospital labor and delivery units employ a semi-recumbent position in a bed throughout labor and delivery, but it is possible that more upright positions are more useful in decreasing pain and complications during labor and delivery.

Lawrence, Lewis, Hofmeyr, and Styles (2013) performed a Cochrane systematic review to investigate the effects of various body positions and mobility for the laboring patient during the first stage of labor. Their primary outcomes were duration of labor, spontaneous vaginal delivery, operative delivery, maternal satisfaction with body positioning and the childbirth experience, fetal distress, and need for neonatal mechanical ventilation. Their secondary outcomes included maternal pain intensity, use of analgesia, perineal trauma, five-minute Apgar score less than seven, and other maternal and neonatal adverse effects. The authors included 25 studies in their review. These studies compared upright and ambulatory positions with recumbent

positions. The upright and ambulatory positions in this review included sitting, walking, standing, squatting, or kneeling; the recumbent positions included recumbent, supine, and lateral. The authors found that upright and ambulatory positions were significantly associated with decreased duration of labor, increased likelihood of spontaneous vaginal delivery, decreased likelihood of operative delivery (vaginal or Caesarean), decreased likelihood of epidural anesthesia use, and decreased pain intensity. One study did show that upright positions were associated with increased anxiety in laboring patients in their first pregnancy. The authors concluded that upright and ambulatory positions seem to be beneficial in the first stage of labor, so laboring women should be given the opportunity to be in upright and ambulatory positions if they so desire.

Gupta, Hofmeyr, and Shehmar (2012) performed a Cochrane systematic review to study the potential effects of body positioning during the second stage of labor. The authors included 22 studies to determine risks and benefits of various body positions in the second stage of labor. The body positions analyzed in these studies were sitting in a birthing chair or stool, recumbent, semi-recumbent, dorsal, squatting, and lithotomy. Their primary outcome was the duration of the second stage of labor, with the secondary outcomes of mode of delivery, perineal trauma, and blood loss. The authors found no significant reduction in duration of the second stage of labor with any body position. There was a significant reduction in episiotomy use in women using a birth stool or birth chair. The authors concluded that upright positions are more efficient for bearing down during the second stage of labor. They suggested that women should be encouraged to give birth in a position that is most comfortable to them, and that more research must be done before making larger conclusions about the effects of body positioning during the second stage of labor.

These two Cochrane systematic reviews shed some light on the effects of body positioning during labor. It seems that upright positions, in both the first and second stages of labor, are useful for advancing labor and delivery, compared to recumbent positions. In the first stage of labor, upright and ambulatory positions are associated with decreased duration of labor, increased incidence of spontaneous vaginal delivery, decreased pain intensity, and decreased use of epidural anesthesia, but may also be associated with increased anxiety in women having their first child. In the second stage of labor, upright positions seem more efficient in the bearing down and “pushing” process. The upright positions of sitting in a birth stool or birth chair are also associated with a decreased incidence in episiotomy use. Women should be able to position themselves during labor and delivery in a position that is most comfortable for them, with encouragement about the potential benefits of upright and ambulatory positions.

### **Location of Birth**

Alternative birth centers and home births are becoming increasingly common locations for birth, but there is uncertainty about whether they are as safe for laboring mothers and their babies as traditional hospital labor and delivery units.

Dixon, Prileszky, Guilliland, Hendry, Miller, and Anderson (2012) investigated the safety and efficacy of free-standing midwife-led birthing units compared to traditional obstetric units or home births by assessing various components of maternity care in a literature review. They found, in free-standing midwife-led birthing units compared to obstetric units, decreased use of medical interventions, increased rates of spontaneous vaginal birth, decreased augmentation of labor, decreased rates of third and fourth degree perineal tears, higher Apgar scores, and lower rates of admission to neonatal intensive care. The authors concluded that there were significant

benefits for the health and safety of laboring women and their babies to give birth in a free-standing midwife-led birthing unit instead of a traditional obstetric unit.

Malloy (2010) studied infant outcomes in home births attended by certified nurse midwives compared to infant outcomes in hospital births and birthing center births attended by certified nurse midwives. The adverse outcomes analyzed in this study included anemia, birth injury, hyaline membrane disease, need for mechanical ventilation, meconium aspiration, and five-minute Apgar score less than four. The author found that, compared to in-hospital births, in-home births had a higher risk of mortality, need for mechanical ventilation, five-minute Apgar score less than four, and neonatal seizures; birthing center births had a higher risk of anemia. In-hospital births had a higher risk for hyaline membrane disease and birth injury. The most common cause of neonatal death in both in-hospital and in-home births was congenital anomalies. The author concluded that home births have a higher risk of neonatal adverse health and safety outcomes than hospital births, so pregnant women desiring home births should be informed of the increased risk involved with home births.

Alliman and Phillippi (2016) performed an integrative literature review to investigate maternal outcomes in birth centers compared to hospitals. They used 23 articles in their review and analyzed several maternal outcomes, including mode of birth, pain relief, perineal integrity, augmentation of labor, length of labor, serious maternal outcomes, and maternal satisfaction. They found that rates of spontaneous vaginal delivery were higher and rates of Caesarean and assisted births were lower in birth centers compared to hospitals. Rates of epidural analgesia and other pain relief methods were varied among studies. There were significantly lower rates of episiotomy and significantly higher rates of perineal integrity in the birth center groups compared to the hospital groups, but there was no significant difference in the rates of third- and

fourth- degree perineal tears. Rates of augmentation of labor using oxytocin were significantly lower in the birth center groups than the hospital groups. The duration of labor was significantly longer in birth centers than in hospitals. Maternal satisfaction was increased in the birth center groups compared to the hospital groups. The authors concluded that birth centers are safe and effective locations for women to give birth, with few severe adverse maternal outcomes and increased maternal satisfaction, and that women should be encouraged to deliver at a birthing center if they so choose.

Hodnett, Downe, and Walsh (2012) performed a Cochrane systematic review to study various birthing locations, particularly comparing alternative birth settings to conventional birth settings. Their outcomes included spontaneous vaginal birth, maternal death, no use of analgesia or anesthesia during labor and delivery, labor augmentation, positive reviews of care during labor and delivery, and perinatal death. Their secondary outcomes include instrumental vaginal delivery, Caesarean delivery, postpartum hemorrhage, use of epidural analgesia, episiotomy, need for neonatal intensive care, five-minute Apgar score less than seven, and breastfeeding. The authors analyzed ten studies in their review. They found that alternative birth settings were more associated with spontaneous vaginal birth and birth without the use of analgesia or anesthesia and were less associated with augmentation of labor using oxytocin than conventional birth settings. There was no increased risk of maternal morbidity or mortality in the alternative birth settings. Alternative birth settings also had decreased incidence of epidural analgesia, instrumental vaginal birth, Caesarean birth, and episiotomy, and increased satisfaction with care. There was no significant difference in five-minute Apgar score less than seven, postpartum hemorrhage, need for neonatal intensive care, or perinatal death. One trial indicated that babies born at an alternative setting were more likely to breastfeed six to eight weeks after birth. The

authors concluded that alternative birth settings, such as birth centers, are associated with decreased use of medical interventions during labor and delivery, and increased satisfaction with the childbirth experience, without increased risk to the mother or the baby, compared with conventional birth settings, such as traditional hospital labor and delivery units.

Gottvall, Waldernström, Tingstig, and Grunewald (2011) studied interventions and outcomes in an in-hospital birth center compared to a traditional labor and delivery unit in the same hospital. The group that delivered in the birth center had decreased rates of epidural analgesia, Caesarean delivery, episiotomy, and anal sphincter tears, and the infants born in the birth center had decreased rates of respiratory distress, infection, and hyperbilirubinemia. There was no significant difference in rates of five-minute Apgar score less than seven or perinatal death. The authors concluded that the birth center had fewer medical interventions than the standard birthing unit with no increase in adverse effects or risks to the mothers or infants, and that the birth center may even result in improved outcomes for the mothers and infants.

Laws, Xu, Welsh, Tracy, and Sullivan (2014) used a retrospective cohort study to compare maternal outcomes of women giving birth in a birth center with those of women giving birth in a traditional hospital labor and delivery unit. The authors found that women who gave birth in a birth center had fewer medical interventions than women who gave birth in a hospital. They also found that women who gave birth in a birth center had significantly decreased rates of adverse outcomes, such as episiotomy, postpartum hemorrhage, and postpartum infection, than women who gave birth in a hospital. Women who gave birth in a birth center also had higher rates of breastfeeding and shorter length of stay in the facility after giving birth. The authors concluded that birth centers are a safe and viable location for giving birth, because they found no

increase in adverse maternal outcomes in the birth center group; they only found equivalent or improved maternal outcomes in the birth center group.

These studies and reviews offer similar findings: birth centers, as an alternative birthing location to traditional hospital labor and delivery units, are a safe option for laboring women that use fewer medical interventions, provide similar or even improved outcomes, and increase maternal satisfaction compared to traditional birthing units. None of these studies concluded that birth centers had any increase in adverse outcomes for the mothers or the infants. Home births, however, were found to have increased rates of adverse neonatal health and safety outcomes compared to traditional hospital birthing units, so home births are not advisable as a safe alternative to traditional units.

### **Medical Professionals Involved**

Midwife-led births have been growing in popularity recently, but many have questioned the safety of having midwives instead of physicians in the birth experience. Several studies have investigated the effects of having a midwife instead of an obstetrician on the birth experience and the outcome factors to discover if the risks of adverse effects are changed based on the medical professional involved in the labor and delivery process.

As part of Dahlen, Dowling, Tracy, Schmied, and Tracy's study (2012), in which they analyzed the effects of water birth compared to various birthing positions on perineal trauma, postpartum hemorrhage, and five-minute Apgar scores, they studied differences in outcomes between care provided by obstetricians and care provided by midwives. They found a higher incidence of both major perineal trauma and five-minute Apgar score less than seven in patients whose babies were delivered by an obstetrician, but there was no difference in the incidence of postpartum hemorrhage whether the baby was delivered by an obstetrician or a midwife. They

also found that care provided by midwives was associated with significantly reduced incidence of major perineal trauma and five-minute Apgar scores less than seven and no difference in postpartum hemorrhage, despite a significantly more frequent use of physiological third stage management.

Iida, Horiuchi, and Nagamori (2014) created a study to compare midwife-led care with obstetrician-led care in pregnant women. They used an observational study with a survey questionnaire to gain insight on potential differences between outcomes based on the medical professionals who provided care. The authors found that midwife-led care did not have increased risk of adverse maternal or neonatal outcomes compared to obstetrician-led care. They also found that midwife-led care was associated with higher satisfaction with care, significantly reduced incidence of premature rupture of membranes, significantly higher incidence of breastfeeding postpartum, and significantly lower scores on the Stein's maternity blues scale. In addition, the authors concluded that midwife-led care contributed to more effective communication and preparation for the pregnant woman.

Cragin and Kennedy (2006) studied the effects of obstetric and midwifery care on maternal and neonatal outcomes. They used a model called the Optimality Index (OI) to evaluate both obstetric and midwifery care. The OI analyzes 40 different outcomes and processes. A 100% score on the OI indicates the best possible birth outcome for each specific patient. Higher OI scores indicate more optimal interventions and outcomes during the birth experience. The authors found that patients in the care of midwives had higher optimality scores on the OI, due to decreased use of technology and equal or better health outcomes, than patients in the care of physicians, and the two groups had equally positive neonatal outcomes. They also found that laboring women in the care of physicians were 1.7 times more likely to have Caesarean delivery

than women in the care of midwives. There was no difference in the rates of preeclampsia, anemia, use of prenatal testing, or use of prescription drugs, but patients in the care of physicians were more likely to have vaginal bleeding in the first two trimesters, amniocentesis, and inadequate prenatal care. The authors concluded that midwifery care results in less use of technology and equal or better maternal and neonatal health outcomes than physician care.

Sandall, Soltani, Gates, Shennan, and Devane (2016) performed a Cochrane systematic review to compare midwife-led care with other models of care in pregnancy and labor and delivery. The authors used 15 trials to compare midwife-led care with physician-led care. They used a vast number of maternal and neonatal outcomes to compare the two groups. They found that women receiving midwife-led care were less likely to experience epidural or spinal analgesia, instrumental vaginal birth, preterm birth before 37 weeks of gestation, amniotomy, episiotomy, fetal loss at less than 24 weeks of gestation, and neonatal death. They were more likely to experience spontaneous vaginal birth and a longer duration of labor. The authors found no difference in rates of Caesarean birth, perineal tearing, augmentation of labor, prenatal hospitalization, induction of labor, postpartum hemorrhage, breastfeeding initiation, length of hospital stay, low birthweight infant, five-minute Apgar score less than seven, and need for neonatal intensive care. They also found that women receiving midwife-led care reported higher rates of maternal satisfaction than women receiving physician-led care. The authors concluded that midwife-led care has significant benefits to the mothers and babies, without increasing adverse outcomes.

Wong, Browne, Ferguson, Taylor, and Davis (2015) used a retrospective study to investigate the difference in outcomes between a standard hospital labor and delivery unit and a midwife-led unit in the same hospital for women in their first pregnancy. Their primary outcome

was spontaneous vaginal birth, but they also included secondary outcomes such as mode of birth, onset of labor, augmentation of labor, analgesia and epidural use, postpartum hemorrhage, perineal intactness, five-minute Apgar score less than seven, neonatal death or stillbirth, need for neonatal intensive care, breastfeeding success within one hour of birth, and length of hospital stay after birth. They found that the midwife-led care group had a statistically significant increase in rates of normal vaginal birth, spontaneous vaginal birth, and water birth, with decreased rates of Caesarean section. There were not significant differences in rates of augmentation of labor and episiotomy, but the midwife-led group did have significant reduction in rates of induction of labor and use of epidural anesthesia than the standard care group. The standard care group had significantly higher rates of intact perineum, and the midwife-led group had higher rates of no administration of analgesia. No significant differences were found in neonatal outcomes, but the midwife-led group had higher rates of successful breastfeeding within one hour of birth and shorter length of stay after birth. The authors concluded that, overall, the midwife-led birth center had significantly improved outcomes than the standard care unit, except for perineal intactness.

Prelec, Verdenik, and Poat (2014) compared the use of medical interventions and various birth outcomes in a midwife-led unit and an obstetric unit for women in their first pregnancy. The midwife-led unit had significantly lower rates of augmentation of labor, analgesia use, operative vaginal delivery, Caesarean delivery and episiotomy, and significantly higher rates of spontaneous vaginal delivery and breastfeeding. No significant differences were found in rates of spontaneous rupture of the membrane, electronic fetal monitoring, perineal tearing, postpartum hemorrhage, manual removal of placenta, need for neonatal intensive care, or Apgar score less than six. The authors concluded that it is possible that the midwife-led unit used fewer

medical interventions because of the laboring patients' preference to use fewer medical interventions, but the evidence seems to indicate that women in the midwife-led unit had improved outcomes with fewer medical interventions, supporting the use of midwife-led units as opposed to obstetric units.

Toohill, Turkstra, Gamble, and Scuffham (2012) used a non-randomized trial to compare the cost-effectiveness of midwife-led care and standard obstetric care at one hospital. They used data on costs from women's diaries, pregnancy health records, medical records, and the hospital's accounting system. Their primary outcome was the health care costs for the hospital and for the government. They also studied outcomes and interventions used in both groups. Women in the midwife-led care group had decreased use of pharmacological pain relief, epidural analgesia, and induction of labor. The length of stay in the hospital was decreased for women receiving midwife-led care. Neonates in the standard care group were more likely to be admitted to the intensive care nursery and stay there longer than the neonates in the midwife-led care group. The authors found that prenatal costs were the same in the two groups, costs during labor were significantly higher in standard care, and postnatal costs were significantly higher in midwife-led care. Overall, they found that costs were statistically significantly lower in midwife-led care than in standard care. The authors concluded that midwifery care costs less than standard obstetric care, and patients receiving midwifery care receive fewer medical interventions and had better outcomes.

These studies share similar conclusions about midwifery care compared to physician care. Midwife-led care seems to be significantly associated with increased maternal satisfaction, fewer medical interventions used, and equivalent or improved maternal and neonatal outcomes, without any increase in the risk of adverse outcomes. Midwife-led care may lead to an increase

in rates of perineal tearing, but otherwise, no studies found any increased rates of other adverse outcomes. In addition, the cost of midwifery care is significantly lower than the cost of standard obstetric care.

### **Water Births**

Water births have been used as an alternative birthing option for several decades, and even as far back as the first documented water birth in France in 1803 (Weaver, 2014). In 2014, the American Academy of Pediatrics (AAP) and the American College of Obstetricians and Gynecologists (ACOG) released a joint report regarding immersion in water during labor and delivery. They reported that water immersion during the first stage of labor may result in decreased pain, decreased anesthesia use, and decreased duration of labor, but water immersion during the first stage of labor does not appear to have any other effect on maternal or neonatal outcomes. The AAP and ACOG do not recommend water immersion during the second stage of labor, unless in a controlled experimental setting, because of the limited research on efficacy and safety of water immersion during the second stage of labor.

To investigate the safety and physiology of water immersion during labor and delivery, as and to scrutinize the validity of the AAP and ACOG's concerns, Harper (2014) performed a literature review of several European studies and a Cochrane systematic review. She found that water immersion did not have an effect on Apgar scores, and there were either decreased rates of or no effect on Caesarean section and operative delivery with water immersion. None of the studies showed an increase in maternal or neonatal infection with water immersion. She did find that water immersion was shown to increase relaxation and maternal satisfaction, but decrease perineal trauma, pain, use of analgesic pharmaceuticals, and labor duration. She also found no evidence that water immersion during labor and delivery increases risks or adverse effects for the

mother or the neonate. Harper states that the AAP and ACOG's recommendations are unfounded, and her opinion is that the AAP and ACOG did not review the existing evidence as thoroughly as they should have. The AAP and ACOG want to study randomized controlled trials to form conclusions about the safety and efficacy of water immersion during birth, but retrospective and prospective case studies on water births are much more common than randomized controlled trials. Harper concludes that, while more research on the matter will certainly be helpful, there is no existing data that indicates any need for concern about water immersion during labor and delivery.

Dahlen, Dowling, Tracy, Schmied, and Tracy (2012) created a study to analyze the effects of water birth compared to various birthing positions on land on perineal trauma, postpartum hemorrhage, and five-minute Apgar scores. They compared water immersion with six land positions: all fours/kneeling, semi-recumbent, lateral, standing, sitting on a birth stool, and squatting. They found a higher incidence of major perineal trauma and postpartum hemorrhage in patients who used birth stools than in patients who had water births. The incidence of five-minute Apgar score less than seven was slightly higher in the semi-recumbent position than in water births. There was a higher incidence of major perineal trauma in patients who delivered large-for-gestational-age babies, had second stages of labor lasting longer than two hours, or were primiparous. There was a higher incidence of postpartum hemorrhage in patients who delivered large-for-gestational-age babies, had second stages of labor lasting longer than two hours, were primiparous, or had major perineal trauma. There was a higher incidence of Apgar score less than seven in patients who delivered large-for-gestational-age babies or were primiparous. The authors concluded that water births resulted in reduced incidence of perineal

injury and postpartum hemorrhage compared to birth stools, and reduced incidence of five-minute Apgar scores less than seven compared to the semi-recumbent position.

Bovbjerg, Cheyney, and Everson (2016) used a retrospective cohort study to compare outcomes of women who delivered their babies underwater against outcomes of women who did not deliver underwater and women who intended to deliver underwater, but did not. Among their three categories of birth (waterbirth, nonwaterbirth, and intended waterbirth), the authors found no significant differences in the following neonatal outcomes: five-minute Apgar score less than seven, immediate transfer to a hospital, neonatal hospitalization within six weeks of birth, or intensive care admission within six weeks of birth. In maternal outcomes, waterbirth was found to have significantly reduced risk for immediate transfer to a hospital and maternal hospitalization within six weeks of giving birth. The authors found an increased incidence of genital tract trauma in the waterbirth category. There was no evidence indicating an increased risk of uterine, endometrial, or perineal infection in the waterbirth category. The neonates born underwater were not found to be at increased risk for any adverse outcome compared with the nonwaterbirth and intended waterbirth categories.

Burns, Boulton, Cluett, Cornelius, and Smith (2012) performed a prospective observational study to describe characteristics, interventions, and outcomes for women who gave birth in a birthing pool. Their study also illustrated differences in characteristics, interventions, and outcomes based on the locations of the birthing pools, whether in obstetric units, alongside midwifery units, or in the community. The authors found that the use of water immersion in a birthing pool during the birthing process was related to a high incidence of spontaneous delivery and normal vaginal birth. Interventions and maternal outcomes differed, depending on the birth setting; however, neonatal outcomes were similar across all birth settings. Neonatal infections

were rare. They found that nearly every incidence of umbilical cords snapping occurred during water births. The authors concluded that umbilical cord snaps during water births may be due to excess traction on the cord as the neonate is pulled out of the water. Therefore, the authors recommend that extra care should be taken during water births to be sure that no excess traction on the umbilical cord occurs as the baby is pulled out of the water.

Cluett and Burns (2009) performed a Cochrane systematic review to investigate potential risks and benefits of water immersion during labor and delivery. They reviewed 12 trials, nine that pertained to the first stage of labor, two that pertained to the first and second stage of labor, and one that pertained to the second stage of labor. The authors measured the following maternal outcomes: blood loss during labor, infection, perineal trauma, postpartum depression, pain intensity during labor, mode of delivery, satisfaction, and sense of control during labor and delivery. They also measured the following neonatal outcomes: five-minute Apgar score less than seven, cord pH immediately after birth, need for intensive care, respiratory support, lung hypoplasia, infection, neurological pathology, snapped umbilical cord, and birth injury. Between water immersion and no water immersion, the authors found no significant differences in blood loss, maternal infection, perineal trauma, postpartum depression, augmentation of labor using oxytocin infusion, pain intensity, rate of Caesarean section, fetal heart rate abnormalities, gestational age at birth, birth weight, five-minute Apgar score less than seven, cord pH immediately after birth, need for neonatal intensive care, neonatal infection, or breastfeeding. There was a significant reduction in the amount of pharmaceutical analgesia used, such as epidural, spinal, and paracervical analgesia and anesthesia, in patients who experienced water immersion during the first stage of labor compared to patients who did not. There was also a significant decrease in the duration of the first stage of labor in patients who experienced water

immersion, but no statistical difference in the durations of the second or third stages of labor. One study found that, with immersion in the second stage of labor, there was a significantly higher level of satisfaction with the birthing process than without immersion; however, another study showed no significant difference in satisfaction level. The authors of this Cochrane systematic review concluded that the reduction in rate of spinal, epidural, or paracervical analgesia is statistically significant, and indicates that water immersion during the first stage of labor reduces the need for spinal, epidural, and paracervical analgesia during labor. They found no evidence that water immersion during labor results in poorer outcomes for neonates, longer labors or more complicated births. They also state that there is not enough evidence about the effects of water immersion in the second stage of labor to draw accurate conclusions; the existing evidence neither supports nor opposes the practice of giving birth in water.

These studies indicate that, while there is not necessarily benefit to the neonate or the mother from immersion in water during labor, there is also no harm from the practice. Water births may even be a useful method of decreasing pain and thus decreasing the need or desire for spinal, epidural, and paracervical analgesia during labor. Water immersion in the first stage of labor is also associated with decreased duration of the first stage of labor. One study indicated an increased risk for snapped umbilical cord in babies born underwater, so it is imperative to remember not to apply excess traction to the cord after delivery when pulling the baby out of the water. Otherwise, no studies indicated increased or decreased risk of any other adverse outcomes for the neonate or the mother.

### **Alternative Pain Management**

Managing pain during labor and delivery is an enormous aspect of improving the birthing experience. Many alternative methods have been used throughout the years to cope with the

pains of labor, but it may be difficult to know whether these methods are effective at decreasing pain. A series of Cochrane systematic reviews were performed to study a variety of pain management techniques during labor.

Madden, Middleton, Cyna, Matthewson, and Jones (2012) performed a Cochrane systematic review to study the effects of hypnosis on pain management during labor. Their outcomes were the use of pharmacological pain relief during labor and delivery, maternal satisfaction with the pain management, a sense of coping with the labor experience, and spontaneous vaginal birth. Other secondary outcomes included pain intensity, satisfaction with the childbirth experience, operative delivery or assisted vaginal delivery, five-minute Apgar score less than seven, cost, length of labor, length of hospital stay after delivery, and any other adverse effects. One study reviewed found that pain intensity was lower and length of labor was shorter in the hypnosis group. Another found that the length of stay in the hospital after delivery was decreased in the hypnosis group. Otherwise, no significant differences were found between the hypnosis group and the control group for any other primary or secondary outcome. The authors concluded that, since many of the studies used in their review had small sample sizes, it is difficult to draw accurate general conclusions about the effectiveness of hypnosis on pain management during labor, but hypnosis may be somewhat helpful during labor.

Smith, Levett, Collins, and Jones (2012) did a Cochrane systematic review to study the effects of manual stimulation, such as massage and reflexology, on pain management during labor. The outcomes they studied involved effects and safety of the manual interventions, such as pain intensity, satisfaction with pain management, sense of control during labor, and satisfaction with the childbirth experience, mother/baby interaction, breastfeeding success, assisted vaginal or operative delivery, five-minute Apgar score less than seven, other adverse effects for the

mother and the neonate, and cost. They also investigated many secondary outcomes. They used six studies in their review, all of which pertained to the use of massage in labor. No other methods of manual stimulation were studied. They found a reduction in pain intensity, less anxiety, and lower stress levels during the first stage of labor when massage was used. The authors stated, though, that the results may not be universally applicable due to small trial sizes. They recommended that further research should be performed before conclusions are made about the effectiveness of massage on labor outcomes.

Smith, Levett, Collins, and Crowther (2011) performed a Cochrane systematic review to study the effects of various relaxation techniques, such as yoga, instructed relaxation, and music therapy on pain management during labor. Their outcomes included pain intensity, satisfaction with pain management, assisted vaginal or operative delivery, satisfaction with the childbirth experience, and length of labor. They found that relaxation was linked to decreased pain intensity during the early and active phases of the first stage of labor. With instructed relaxation, they found increased satisfaction with pain relief and decreased incidence of assisted vaginal delivery. With yoga, they found decreased pain intensity, increased satisfaction with pain management and the childbirth experience, and reduced length of labor. With music therapy, they found no differences in outcomes. They did not find differences in any other outcomes with any of the interventions. The authors concluded that yoga and instructed relaxation seemed to be helpful in reducing pain and increasing satisfaction with pain management during labor, as well as reducing the incidence of assisted vaginal delivery. They also recommended the need for further research, particularly on the effects of music therapy.

Smith, Collins, Cyna, and Crowther (2006) performed a Cochrane systematic review to study a variety of complementary and alternative interventions (such as acupuncture, audio

therapy, acupressure, aromatherapy, hypnosis, massage, and relaxation) and their effects on pain management during labor. The authors used fourteen trials to analyze the effects of these various interventions. They found that acupuncture was associated with a decreased use of other pain relief methods. Self-hypnosis was associated with decreased use of pain medication, including epidural analgesia. Self-hypnosis was also associated with an increase in satisfaction with pain management during labor. The other interventions did not show differences in outcomes. The authors concluded that acupuncture and self-hypnosis may be useful methods of managing labor pain, but further research should be performed on all complementary and alternative interventions before more generalized conclusions can be made.

These four Cochrane systematic reviews offered a few conclusions about potentially helpful methods of managing pain during labor, but the most definitive conclusion from these reviews is that more research needs to be done on the effects of complementary and alternative pain management techniques during labor. These reviews suggested that hypnosis, massage, yoga, instructed relaxation, and acupuncture may be beneficial for reducing pain and improving outcomes during labor, but further research is needed before more general conclusions can be made.

### **Sexual Activity**

It is commonly believed that sexual activity with vaginal intercourse can induce labor. Possible reasons that could contribute to the induction of labor via sexual intercourse include the release of oxytocin during female orgasm and nipple stimulation, physical stimulation of the cervix during vaginal penetration, and the chemical effects of prostaglandins found in semen on the cervical mucus (Castro, Afonso, Carvalho, Clode, & Graça, 2014). Several studies investigated this belief to determine whether sexual intercourse could be linked to the onset of

labor. Schaffir (2006) surveyed women at term in their pregnancies about whether they had engaged in sexual intercourse within the previous week. Approximately one-half of the women had engaged in sexual intercourse within the previous week, and the other half had been abstinent within the previous week. The results of this study indicated no clinically significant difference in the average gestational age of babies born, regardless of the mother's sexual activity in the final weeks of her pregnancy. This study also examined potential effects of coital frequency on gestational age at birth, but found no meaningful relationship between the two. Castro, Afonso, Carvalho, Clode, and Graça (2014) created a randomized controlled trial to one of two groups: an abstinent control group or a vaginal intercourse experimental group. The experimental group was asked to have vaginal intercourse at least twice a week. The authors did not find a statistically significant difference in spontaneous labor onset between the two groups. There were also no significant differences in five-minute Apgar score, birth weight, or neonatal or maternal morbidity.

Kavanaugh, Kelly, and Thomas (2001) performed a Cochrane systematic review to seek to identify a relationship between sexual intercourse and induction of labor. The authors were only able to find one study with a limited sample size and limited data, from which they could not draw any meaningful conclusions about the relationship between sexual intercourse and the induction of labor. Tan, Yow, and Omar (2007) created a study to investigate the effects of coital activity on the onset of labor. There were two separate groups: an experimental group that was advised to have sexual intercourse, and a control group that was neither encouraged nor discouraged to have sexual intercourse. The participants were asked to record instances of coitus and orgasm in a diary. The experimental group had a significantly higher percentage of sexual activity than the control group. However, there was no significant difference in the rate of

spontaneous labor. They also found no significant differences in the rates of Caesarean delivery or neonatal outcome between the two groups.

It is difficult to compile a large quantity of research on the effects of sexual activity on the positive outcome factors outlined in this review, because most of the research on sexual activity in pregnancy focuses on its adverse effects and negative outcomes (Adair, 2000). However, the studies discussed here all indicate a similar conclusion: sexual activity does not seem to have a significant effect on the onset of spontaneous labor. In pregnancies at term, there is no evidence to suggest that sexual intercourse will hasten the onset of labor or affect other outcomes of labor and delivery.

### **Food and Drink Intake**

The Practice Guidelines for Obstetric Anesthesia (2016) recommends, in order to reduce the risk for aspiration, that laboring patients should avoid any solid foods, and should only receive moderate amounts of clear liquids. However, following this guideline may reduce maternal satisfaction in laboring patients who are hungry during labor. Vallejo, Cobb, Steen, Singh, and Phelps (2013) studied the effects of oral intake on laboring patients. The outcomes they studied were nausea, emesis, and maternal satisfaction. Their control group was given only ice chips or water as needed, and their experimental group was given ice chips or water as needed, as well as a supplemental protein drink. Between the two groups, they found no significant differences in rate of nausea or emesis, but they did find a significant increase in patient satisfaction in the experimental group that was given the protein drink.

O'Sullivan, Liu, Hart, Seed, and Shennan (2009) created a study to analyze the effects of food intake during labor on various outcomes of labor and delivery, such as duration of labor and delivery, need for instrumental delivery and Caesarean section, needing oxytocin to augment

labor, and vomiting. The control group was only able to drink water during labor, and the experimental group was able to eat a low fat, low residue diet as desired. The authors found no significant difference in duration of labor and delivery, or in outcomes, such as rates of instrumental vaginal delivery, Caesarean delivery, maternal vomiting, epidural analgesia, or oxytocin for augmentation of labor. There were also no significant differences in neonatal outcomes, such as Apgar scores or need for neonatal intensive care.

Singata, Tranmer, and Gyte (2013) performed a Cochrane systematic review to investigate the potential benefits and detriments of restricting oral intake during labor. The primary outcomes they studied were the need for Caesarean section, the need for operative vaginal birth, maternal satisfaction, fetal hypoglycemia, and five-minute Apgar score less than seven. Their secondary outcomes included maternal dehydration, maternal electrolyte imbalances, duration of labor, mobility in labor, maternal nausea and vomiting, labor augmentation, use of narcotic pain relief, epidural analgesia, maternal mortality, postpartum hemorrhage, need for intensive care, length of hospital stay, maternal comfort, breastfeeding success, fetal distress, and fetal electrolyte imbalances. They included five studies about oral intake during labor in their review. They found no significant differences in need for operative vaginal birth, or five-minute Apgar score less than seven, regardless of the type or quantity of oral intake. None of the studies used in this review analyzed maternal satisfaction or fetal hypoglycemia, so they were not assessed in the review. They also found no significant differences in the following secondary outcomes: maternal ketosis, duration of labor, maternal nausea, maternal vomiting, augmentation of labor, narcotic pain relief, epidural analgesia, or infant admission to intensive care. Other secondary outcomes were not assessed in the included studies. This review did not analyze studies pertaining to women at an increased risk of

potentially needing general anesthesia. The authors concluded that restricting oral intake during labor has neither benefits nor detriments for the laboring patients, and women should be able to choose whether they want to eat or drink in labor.

The results of these three studies concur: restriction of oral intake does not seem to have a significant effect on maternal or neonatal outcomes. However, the ability to have oral intake of food and fluids, if so desired, did improve patient satisfaction with the birthing process. Laboring patients should therefore have the option of oral intake available so they may choose for themselves if they want to eat or drink while in labor. Oral intake of food and fluids should be neither restricted nor forced during labor; patients should autonomously decide what they want in terms of oral intake.

### **Limitations of Research**

Several of the components of labor and delivery discussed in this review have not been well researched; some of these components have either few studies or small study sizes analyzed in this review, due to a scarcity of substantial research on the subjects. Many of the studies analyzed in this review were done outside the United States, thus potentially limiting applicability to births within the United States. This review did not include much research on care throughout the pregnancy, and focused almost entirely on care during the labor and delivery process; care throughout the pregnancy may have some effect on the outcomes and conclusions discussed in this review. Only one study analyzed differences in cost-effectiveness. This review only analyzed studies on aspects of low-risk pregnancies and births due to a limited amount of research studies on high-risk pregnancies and births. These limitations do not preclude the data presented here from being applicable to low-risk pregnancies in the United States, but anyone

reading this analysis should critically consider their options and decide their best birth experience on an individual basis.

### **Potential Bias**

Any potential bias in the research was addressed by including research with a variety of results, without excluding studies from analysis if their results did not coincide with the results of other studies. Studies with inconclusive results were also included. The author's goal was to create a thorough picture of the ideal birthing process, based on objective analytical parameters. The author's personal bias and subjective feelings about any aspects of the birthing process were not included in the analysis.

### **Conclusion**

During both the first and second stage of labor, women should be encouraged to use whatever body position is most comfortable. There is evidence supporting the use of upright and ambulatory positions during labor and delivery. These upright positions during the first stage of labor can decrease pain, duration of labor, and use of epidural anesthesia, and increase likelihood of a spontaneous vaginal delivery. However, upright and ambulatory positions may increase anxiety in women in their first pregnancy. During the second stage of labor, upright positions may aid in the efficiency of "pushing" during delivery and decrease the use of episiotomy. Women should be informed of the potential benefits of upright and ambulatory positions during labor and delivery, and should be encouraged to use whatever positions feel comfortable throughout the birthing process. The ideal birthing experience should include upright positions and ambulation during the first stage of labor, as well as upright positions during delivery, as long as the patient is comfortable with the positioning. The patient's comfort should always be considered as a priority.

For pregnant women interested in exploring alternative birthing locations, research has indicated that alternative birth centers are a safe option, using fewer medical interventions without increased risk to the mothers or infants. Birth centers may even result in improved maternal and neonatal outcomes, so birth centers can be suggested as an alternative to traditional hospital labor and delivery units. Home births, though, have been found to have increased risk of adverse neonatal effects. Pregnant woman who want to deliver in an alternative setting should be encouraged to use birth centers, and discouraged against using home births. The ideal birthing experience takes place at an alternative birth center, because of the increase in maternal satisfaction, potential for improved outcomes, and decrease in medical interventions.

Midwife-led care, compared with physician-led care, has not been shown to increase risk to the mother or baby. In fact, midwife-led care may improve health and safety outcomes in the laboring mother and the neonate. Midwife-led care is also associated with decreased health care costs, increased maternal satisfaction with the childbirth experience, improved communication and preparation for pregnancy and childbirth, and decreased use of medical interventions, without increased risk of negative outcomes for the mother or baby. Midwifery care, therefore, should be included in the ideal birthing experience, because of the benefits of fewer medical interventions, equivalent or improved outcomes, and improved satisfaction during labor and delivery.

Pregnant women who are interested in water immersion during labor and delivery can be encouraged to do so. There is no evidence that indicates that water immersion increases the risk of adverse effects on the baby or the mother, as long as no excess traction is applied to the umbilical cord during underwater delivery. Even though the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists published a report voicing

concerns about water immersion and water birth, the evidence does not support the need for concern. In fact, water immersion during the first stage of labor may even lead to decreased use of epidural, spinal, and paracervical analgesia, indicating that it may decrease pain during the first stage of labor. Water immersion has also been shown to reduce the duration of the first stage of labor. Since water immersion during the first stage of labor may lead to decreased pain and decreased duration of the first stage of labor, the practice of water immersion during the first stage of labor will be included as a component of the ideal birthing experience.

There needs to be a lot more research done on complementary and alternative methods of pain management, but interventions such as hypnosis, massage, yoga, instructed relaxation, and acupuncture have been shown to be helpful in decreasing pain intensity and improving outcomes. These conclusions may not be universally applicable, but these interventions would certainly not be harmful to laboring women. Nurses can encourage laboring patients to try some of these alternative pain management methods to see if they improve the labor and delivery experience. Any combination of these five alternative methods of pain management should be employed as part of the ideal birthing experience, according to the patient's wishes.

Pregnant women can feel comfortable having sexual intercourse in the late stages of their pregnancy if they want to, but they should not expect sexual activity to have any effect on their onset of spontaneous labor. Nurses should advise pregnant women and their partners asking about sexual activity during pregnancy that they can participate in any level of sexual activity that they desire, but there is no evidence that indicated that sexual activity hastens the onset of spontaneous labor. For the purposes of this review, therefore, sexual activity prior to labor is not a component of the ideal birthing experience, since it does not appear to have any effect on the labor and delivery process.

Despite the American Society of Anesthesiologists' recommendation that oral intake should be restricted during labor, particularly oral intake of solid foods, the evidence appears to show neither increased harm nor benefit of restricting foods and fluids during labor. Nurses should advise laboring patients to eat or drink as they desire during their laboring experience. Oral intake of food and fluids should be an option as part of the ideal birthing experience, so the laboring patient is able to choose for herself whether she would like to eat or drink during labor.

The results of these 31 studies help to provide a more comprehensive picture of what an ideal birthing experience may look like. Based on the conclusions from these studies, for an ideal birthing experience, pregnant patients should be encouraged to deliver at an alternative birth center while receiving midwife-led care, in order to decrease the use of medical interventions, improve maternal and neonatal outcomes, increase maternal satisfaction, and decrease health care costs. Body positioning during labor should be based on the patient's comfort, but laboring patients should be encouraged to ambulate and position themselves in an upright position during the first stage of labor, accompanied by anxiety-reducing measures to lessen the potential for anxiety related to ambulation and upright body positioning. It may also be helpful for patients to assume an upright position in the second stage of labor, as well, to aid in the efficiency of the "pushing" process. Water immersion during the first stage of labor should be encouraged, because it has been associated with decreased use of epidural and spinal analgesia, which may indicate that it helps decrease pain levels in the first stage of labor, and decreased duration of the first stage of labor. Water immersion in the second stage of labor can also be included if the patient desires to have a water birth, but special care must be taken to ensure that the umbilical cord does not receive excess traction as the baby is being pulled to the surface of the water. Interventions such as yoga, hypnosis, massage, instructed relaxation, and acupuncture have been

associated with decreased pain and improved outcomes, so any combination of these alternative pain management techniques can be encouraged, as the patient desires. Sexual activity prior to labor has not been shown to cause induction of labor or hasten the onset of labor, so it should not be recommended as a method of inducing labor. However, sexual activity in late stages of pregnancy has not been associated with any adverse effects during the labor and delivery, so sexual activity can be encouraged as the much or as little as the patient desires, as long as they are aware that it will not induce or hasten the onset of labor. Food and drink restriction during labor and delivery has not been shown to have harm or benefit on the birthing experience, so oral intake should be offered as an option, and the patient should be able to decide whether she would like to have oral intake during labor.

These components of birth are certainly not entirely comprehensive; there are likely infinite various aspects of labor and delivery that could affect outcomes and interventions. However, these components illustrate a complex and thorough picture of the labor and delivery experience, and can be used to make recommendations to patients interested in a theoretically ideal birthing experience based on the outcome factors discussed in this review. These conclusions cannot be applied to every laboring patient, but instead create a theoretical framework for a statistically ideal labor and delivery situation. Each individual patient should be encouraged to decide for themselves the circumstances of their own ideal birthing experience.

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