



Baby's Birth Plan: A Review of the Research on Pregnancy and Birth Audio Transcription Lori Nicholson

Cover Slide

Hello and welcome. This is Lori Nicholson with Joyful Birth HypnoBirthing®, and I'm happy to share this presentation with you, Baby's Birth Plan: A Review of the Research on Pregnancy and Birth.

Disclaimer

A short disclaimer before we get started here. I am not a medical care provider. I'm a childbirth educator and a researcher by training. So nothing in this presentation should be construed as medical advice. Please seek medical care from your care provider. This presentation is informational in nature only.

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We'll be taking a look at the medical model versus the physiological model of birthing. The medical model looks at pregnancy as a pathology and it includes potentially invasive interventions, including unnecessary routine interventions in low-risk situations; whereas the physiological model involves trusting in nature's way of birthing. There's more of a hands-off, loving support for the mom, baby, and partner. Which one is best supported by evidence-based research?

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Evidence-based medicine is generally defined as: individual clinical expertise, coupled with best external evidence, merged with—very importantly—patient values and expectations.

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Why isn't evidence-based care standard practice? One study found that care providers do not follow clinical practice guidelines due to: lack of awareness or familiarity with the evidence; lack of agreement with what the guidelines recommend; lack of self-efficacy, in other words, they don't trust their ability to change; lack of positive expectancy, in other words, they don't expect a positive outcome from making the change; lack of willingness or motivation to overcome the inertia of previous practice; and lack of policies which require implementing the guidelines; in other words, if they're not made to implement them, they just won't.

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Believe it or not, even the guidelines produced by the American College of Obstetricians and Gynecologists, otherwise known as ACOG, are not evidence-based. According to one group of researchers, one-third of the recommendations put forth by the College in its practice bulletins are based on good and consistent scientific evidence; another third are based on limited or

inconsistent evidence; and the final third are based on consensus and opinion which are subject to bias. As one researcher who reviewed ACOG's guidelines concluded, "When compared to the guidelines from the Royal College of Obstetricians and Gynecologists, 28% of obstetric recommendations were the same, 56% were not comparable, and 16% were opposite."

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So how can we make evidence-based care standard practice? Well, if you're a part of a pregnant couple, the change has to come from you, truly—requesting evidence-based care and questioning current practices, when appropriate; you are really going to drive the change in this system. Those of us who are childbirth educators can educate couples on where the evidence can be found and how to access it. We childbirth educators, cannot tell couples what to do based upon what the evidence demonstrates. Couples must decide this in consultation with their care providers. The change has to come from the pregnant couples.

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The research that I accessed in preparing this presentation came from a variety of highly regarded sources including: the Cochrane Collaboration, which produces reviews and meta-analyses on a variety of medical topics; articles from PubMed or PubMed Central, which is part of the National Center for Biotechnology Information, which is part of the U.S. National Library of Medicine. PubMed usually just offers summaries of the articles whereas PubMed Central offers entirely free articles. And then I also accessed Google Scholar.

It's important to note that these resources are highly regarded enough in the medical field that several national organizations produce practice guidelines based upon the data found in these resources and databases, for instance: the U.S.-based American Congress of Obstetricians and Gynecologists, or ACOG; the U.K.-based National Institute for Health and Care Excellence, or NICE; the U.K.-based Royal College of Obstetricians and Gynecologists, or RCOG; the Royal Australian and New Zealand College of Obstetricians and Gynecologists; and the Society of Obstetricians and Gynecologists of Canada.

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I approached this presentation from the perspective of the baby. If I were the baby, what type of care does the evidence say I should want for my mom and myself throughout pregnancy, labor, and birth? It follows the chronological progression of medical care from before conception, through the first days of the baby's life. At the end of each section, there are slides labeled, "The Research Shows." These slides are based upon the evidence shown in the research. Each section is summed up with a slide labeled, "As the Baby, I Want..." These slides represent my opinion based upon a review of the literature. The "Notes" sections that were included in the original PowerPoint presentation have been covered by me in this audio presentation.

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As the baby, the first thing I want is for my mom to be healthy prior to conceiving me.

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So let's begin by talking about the development of the baby's healthy microbiome. The section that follows is a very abridged version of a longer presentation that I've created entitled, Seeding

Lifelong Health: The Impact of Pregnancy, Birth, and Infant Care on the Baby's Developing Microbiome. If this section interests you, be sure to look for that presentation as well.

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So what exactly is our microbiome? Our microbiome is simply all of the organisms that live within and on us including bacteria, fungi, viruses, protozoa. And they live all over our body, in our intestines, our mouth, our vagina, on our skin. And truly, we need diversity in our microbes in order to be able to fight pathogens and stave off disease. So they're really integral to our lifelong health.

And there are certain things that can have a negative impact on our microbiome. Those include antibiotics and antimicrobial products. And our lifestyle and diet has really started affecting our microbiomes globally as well, because we've lost a lot of our microbes due to changes in our diets and the widespread use of antibiotics. So in response to this, in 2007, the National Institutes of Health launched the Human Microbiome Project in order to study how microbiomes may lead to various non-communicable diseases and what impact on our lifelong health our microbiomes and the changes in our microbes might be having on our lifelong health.

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Several non-communicable diseases, in fact, have been associated with the poorly developed microbiome, such as allergies, asthma, Celiac Disease, irritable bowel syndrome, diabetes, eczema, mental health issues—perhaps even including autism spectrum disorder—necrotic enterocolitis in newborns, and obesity as well.

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So the answer to why does the baby's developing microbiome matter is that we're laying the groundwork for the lifelong health of our children through the way in which we prepare our bodies for conception, care for our bodies during pregnancy, and birth our babies.

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This slide shows a visual model of the development of the healthy microbiome, showing that vaginal birth followed by skin-to-skin contact with the mother, followed by breastfeeding is what really helps set the baby's healthy microbiome in process.

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If you're interested in learning more about the microbiome, there's lots of information out there. The American Microbiome Institute has a wealth of information, as does Gut Microbiota World Watch, which is a European group. There's an entire journal devoted to the microbiome called *Microbiome* and, of course, there's the NIH Human Microbiome Project. Those links are listed here for your benefit.

Also, as I mentioned previously, I've created a much more thorough overview of the baby's developing microbiome in a separate presentation entitled, Seeding Lifelong Health: The Impact of Pregnancy, Birth, and Infant Care on the Baby's Developing Microbiome, so be sure to look for that.

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So, the research shows very clearly that we need diversity in our microbes in order to fight pathogens and stave off disease. These microbes are integral to our immune and metabolic health. In addition, the research shows that human microbial colonization begins in utero and develops in a non-random way. In other words, the baby inherits its microbiome from its mother, and this seeding of microbiota that the baby receives from his or her mother trains the baby's immune system. This happens prior to birth in utero, at birth, and immediately following birth. There's no do-over for this important seeding event.

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Furthermore, the research shows that the fetal immune system depends on adequate maternal nutrition. The mother's intake of the micronutrients folate, iodine, and vitamin D, and the fatty acid DHA, is especially important. An unbalanced microbiome has been associated with several health challenges, including asthma, eczema, diabetes and obesity. The greatest challenges to the healthy development of the baby's microbiome are: Cesarean delivery; antibiotic exposure before, during, or after birth; and formula feeding. Therefore, the most important steps that can be taken to ensure the proper seeding of the baby are: step one, vaginal birth; step two, immediate skin-to-skin contact with the mother following birth; and step three, exclusive breastfeeding, preferably for at least six months.

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If I were the baby who wanted to be conceived, what would I want in terms of the development of my healthy microbiome? Well, I would want my mom to be of healthy weight, with a good healthy microbiome herself prior to conception. One research study found that maternal obesity led to "significant effects on the composition of the gut microbiome of offspring" especially among those of higher socioeconomic status (Galley et al. 2014). I would want her vaginal microbiome rich in *Lactobacilli* which is typically found in normal healthy pregnancies. I would want my mom following good nutritional guidelines, eating fermented foods and those with live cultures that are especially good for gut health. I would want her following the micronutrient and fatty acid recommendations. I would want her exercising regularly, being a nonsmoker, and having low stress levels. In fact, in one study, infants whose mothers were anxious in pregnancy (based upon self-report and clinical evaluations) exhibited poorer adaptive immune response at 6 months of age (O'Connor et al. 2013). Essentially, I want my mom to be healthy in mind, body, and spirit—creating a welcoming environment for me in which I can be conceived.

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Now that we have a good understanding of how the baby's healthy microbiome develops, conception occurs!

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Now that conception has occurred, the pregnant mom will need to make one of the most important decisions that she'll make throughout her entire pregnancy, and that's the selection of her care provider. What I tell all of the moms in my classes is, "You are the hiring manager for *your* birth. If you want or need a Cesarean, you should not hire a midwife. If you want a completely natural birth, you should not hire an OB/GYN who has a 35-40% C-section rate."

This is one of the most important decisions you will make about your birth. The example I always use is as follows: Imagine that you are the hiring manager within your organization, and somebody comes in to interview with you for a job, and they say, “I am very well respected by my peers, I’m highly educated, I have years of experience, but I don’t agree with the mission of your organization.” Would you hire that person? No. None of us would hire that person. You need to hire a care provider whose philosophy and approach match your own.

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I really love this quote and it really informed my own decision-making about care provider selection for my own births. “Having a highly trained obstetrical surgeon attend a normal birth is analogous to having a pediatric surgeon babysit a healthy 2-year-old.”

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Which types of care providers do most pregnant moms select? Well, in the U.S.-based, “Listening to Mothers III” survey from 2013, 78% reported using an OB/GYN, 9% reported using a family physician, 8% reported using a midwife, and 5% reported using another type of care provider.

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Since so many people are so familiar with the standard OB model of birthing, I’ll focus on some of the other care provider selections. Midwives, for instance, recognize the woman as a unique individual in the context of her family and community, and they support and protect the normal physiologic process of labor and birth. They also establish the woman as an active partner in her own care. This quote from the American College of Nurse-Midwives is very important: “Midwives emphasize helping women make changes conducive to healthy pregnancies, infants, and families. Midwifery practice focuses on what is normal, with careful attention to recognizing and managing deviations from normal. All healthcare providers involved in birth can provide care within the midwifery model.” In other words, not just midwives can provide the midwifery model of care. *All* care providers can provide the midwifery model of care.

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This quote just makes me happy. It’s come to be known as the Joint Statement of Practice Relations between OB/GYNs and Midwives, and it reads, “The American College of Obstetricians and Gynecologists (the College) and the American College of Nurse-Midwives (ACNM) affirm our shared goal of safe women’s health care in the United States through the promotion of evidence-based models provided by obstetrician/gynecologists (OB/GYNs), certified nurse-midwives (CNMs), and certified midwives (CMs). The College and ACNM believe health care is most effective when it occurs in a system that facilitates communication across care settings and among providers.”

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Let’s take a look now at doula care. What is a doula? A doula is a trained and experienced professional who provides continuous physical, emotional, and informational support to the mother before, during, and just after birth. That’s the definition of a birth doula. There are also postpartum doulas, which I don’t cover here, but they will come to your house postpartum and help you with your transition into parenthood.

Birth doulas “mother the mother” by assisting the parents in preparing their birth plan: staying with the mother throughout labor; providing emotional support and physical comfort measures throughout labor; assisting the parents in making important decisions about their care throughout labor, and facilitating those discussions with their care providers; and providing support and breaks to the birth companion throughout labor.

I had to laugh when researching this presentation because I came across an article from 2003 entitled “Doula: A New Concept in Obstetrics.” And the reason it made me laugh is because the function that doulas provide during childbirth is much older than modern-day obstetrics. So I just thought that it was funny that the authors decided that this was a new concept when really doulas have been around since the beginning of time. This is how women birthed is that they helped one another with their births.

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Now that we know what midwives and doulas do, what does the research show about the care that they provide? Researchers have found that women who received care from CNMs, or Certified Nurse-Midwives, were more likely than those attended by physicians to have received prenatal education and health promotion information, as well as fewer technological interventions. They also experienced lower rates of labor induction and augmentation, lower use of regional anesthesia, lower than the national average rate for episiotomy, and fewer instrumental births.

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In addition, women who received care from certified nurse-midwives were more likely to experience: significant reduction in the incidence of third- and fourth-degree perineal tears; fewer pre-term births; and fewer babies with low birth weight or hypothermia; lower rates of Cesarean birth; lower infant mortality rates; and higher rates of breastfeeding.

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All at a lower cost and with higher reported maternal satisfaction. The lower costs were due to fewer interventions and lower C-section rates than those women who used OBs. These positive findings for midwifery-led care were confirmed by a 2015 Cochrane review of midwife-led care.

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As far as doula care is concerned, a 2013 meta-analysis found that continuous labor support from a doula led to 31% decrease in the use of Pitocin, 28% decrease in the risk of a Cesarean, a 12% increase in the likelihood of a spontaneous vaginal birth, a 9% decrease in the use of any medications for pain relief, a 14% decrease in the risk of newborns being admitted to the special care nursery, and a 34% decrease in the risk of being dissatisfied with the birth experience. The authors concluded that, “All women should have continuous support during labor.” It’s interesting to note that one study found that new mothers expected their labor and delivery nurse to spend 53% of his or her time offering support, but only 6% to 10% of the nurse’s time was actually spent in labor support activities. So doulas provide an invaluable service during labor and birth.

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Based upon these data, as the baby who has been conceived, I want my mom to hire a midwife for prenatal labor and delivery care, and I want my mom to hire a doula to work with her throughout pregnancy and to attend her during labor.

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Now that we've talked about care provider selection, let's talk about birthing location selection, because these two are really intertwined. If you want to have a hospital birth, you're not going to select a home birth midwife as your care provider. If you want to have a home birth, you're not going to select an OB as your care provider, because providers tend to have privileges in certain locations. So you may want to decide whether to select your care provider or your birthing location first. Of course, if you have an existing relationship with your care provider and you really like your care provider, that may sway you to change your birthing location decision.

In 2009, 7.6% of all hospital costs were attributable to maternity and newborn care, totaling over \$27 billion. Maternity and newborn care was the top expenditure category, in fact, for payments made by both public payers and private health insurance companies to hospitals. Maternity and newborn care, in other words, is "big money" for hospitals.

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Let's take a closer look, then, at the cost of maternity care. For the purposes of this slide, maternity care includes prenatal, labor and delivery, and postpartum care. And you can see here that for commercial payers, the average cost of a Cesarean section birth is \$27,866. In comparison, the average cost of a vaginal birth is \$18,329. So C-sections are 52% more expensive. That percentage difference holds for Medicaid payments as well. Cesarean sections paid for by Medicaid average \$13,590, compared with vaginal Medicaid births which average \$9,131 dollars.

So you can see that Medicaid-covered births are less expensive overall, but C-sections are still 49% more expensive than vaginal births when paid for by Medicaid.

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We'll talk about in-hospital birthing centers, free-standing birth centers, and home births.

In-hospital birthing centers are often staffed by midwives. They may offer care throughout pregnancy and birth, or perhaps only during labor, and they tend to feature specially designed rooms that are more bedroom-like with good ambience. When compared to standard hospital rooms, the alternative setting increased the likelihood of: no intrapartum analgesia or anesthesia; spontaneous vaginal birth; breastfeeding at six to eight weeks; and positive views of care received—in other words, high maternal satisfaction.

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Freestanding birth centers are defined as a home-like setting, where care providers, usually midwives, provide family-centered care to healthy, pregnant women. They tend to subscribe to the wellness model of birth, using interventions only when medically necessary, and they are integrated within the health system for safe, uninterrupted care during transfers. One study found

that 80.9% of the women who gave birth in a freestanding birth center with a collaborative practice group (midwives and physicians working together) gave birth vaginally versus 62.8% in an all-physician group. Since 1990, the 21 countries that were most successful in reducing maternal mortality rates by at least 2.5% per year also had substantial increases in births taking place in freestanding birth facilities attended by midwives.

An excellent resource compiled by the Coalition for Improving Maternity Services (CIMS) reads like an annotated bibliography of studies reporting on birth center births and home births. Please see Sagadi and Romano, 2007, in the resources at the end of this presentation. The American Association of Birth Centers reports on data from the National Birth Center Study II on their website. What they found was: excellent outcomes for moms, with 93% of all women having a spontaneous vaginal birth, 1% an assisted vaginal birth, and only 6% a Cesarean birth. And fetal outcomes that were comparable to outcomes from other studies of low-risk women. The authors conclude that the study demonstrates the safety of birth centers in consistency and outcomes over time, despite a national maternity care environment with increasing rates of intervention.

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Home births were very common in the early 20th century. In the UK for instance, 80% of women gave birth at home in the 1920s, and that number fell to 2.3% by 2011. In the U.S., 50% of women gave birth at home in 1938, dropping to 0.89% in 2012. Rates of planned home births ranged from 0.1% in Sweden to 20% in The Netherlands. Fortunately, we're seeing small but significant increases in the rates of home birth in the past few years, especially in developed countries.

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A 2014 landmark study reported on 16,924 women who planned a homebirth with a midwife, and they used data from the Midwives Alliance of North American Statistics project, otherwise known as MANA Stats. The MANA Stats registry is based upon the gold standard, the medical record, and this study was the largest analysis of homebirth in the U.S. ever published.

The maternal outcomes that they found were: 89.1% of the mothers in this study gave birth at home, and the majority of intrapartum transfers were for failure to progress; only 4.5% required oxytocin, versus national rates of 24% for labor induction and 16% for augmentation in term pregnancies; only 4% used epidural analgesia versus 67% nationally; and there was only a 1.4% rate of episiotomy versus a 25% national average.

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They also found that 93.6% of the women in this study had spontaneous vaginal births. That's amazing. And only 1.2% had assisted vaginal births with forceps or vacuum versus a 3.5% national average. Noteworthy is that only 5.2% had Cesarean births versus a 31% national average. Of the 1,054 women attempting a VBAC, 87% were successful, and there was a low rate of postpartum maternal transfer.

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As far as infant outcomes are concerned, among these women who planned a home birth with a midwife, their babies were at very low risk for: being born prematurely, with a rate of 2.5%;

being born too small, with a rate of less than 1%--in fact, the babies weighed an average of 8 pounds at birth. The babies were at very low risk for having a low 5-minute Apgar score; only 1.5% had that. And the babies were at low risk for requiring a transfer to a hospital after being born at home; only 1% of babies experienced that. Ninety-eight percent (98%) of the infants were being breastfed, and the majority, 86%, were being exclusively breastfed at six weeks of age. In fact, excluding lethal anomalies, intrapartum, early neonatal, and late neonatal mortality rates were similar to the rates found in other studies and in national data.

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When selecting a birthing location, let's remember the microbiome. When the baby is born, he or she is seeded with mom's microbes and the microbes in his or her environment. As we discussed earlier in this presentation, the foundation for baby's long-term health is laid at this time. We have no research to inform what impact different birthing environments may have on the baby's microbiome. However, being in one's home environment may support this seeding process, exposing baby only to his or her own family's microbes. In addition, babies born in a hospital or birthing center may benefit from being exposed only to those items that have been brought from home, for example, blankets and clothing, immediately following birth.

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So let's review what the research shows for selecting a birthing facility. First off, maternity care is incredibly profitable for hospitals. In addition, C-sections are approximately 50% more expensive than vaginal births. Indeed, the move from home to hospital birth has really led to a greater use of technology and a loss of autonomy for midwives. Health systems where midwives do not practice have been found to have higher rates of interventions, inequalities in care provision and outcomes, and higher elective Cesarean rates. Strong evidence, in fact, shows that hospital policies for laboring women—for instance, electronic fetal monitoring, IV fluids, no food or drink, restriction to bed, artificial induction—these hospital policies do no good and may indeed cause harm.

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The research shows that in-hospital birth centers are associated with: lower rates of medical interventions during labor and birth; and higher levels of maternal satisfaction, without increasing risk to mothers or babies. Free-standing birth centers lead to excellent outcomes for mothers, with a C-section rate four times lower than what is seen in the general low-risk population of pregnant women in America. And they lead to excellent outcomes for babies, all at a large cost savings to the health system.

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Regarding home births, a 2012 Cochrane review found no strong evidence to favor either a planned hospital-based birth or a planned homebirth for low-risk women. Maternal outcomes related to planned birth at home have been consistently positive and this was recently confirmed through the landmark 2014 MANA Stats homebirth study, as well as through a 2015 review of the literature.

Most investigations of planned homebirth versus hospital birth have found no difference in intrapartum fetal deaths, neonatal deaths, low Apgar scores, or admission to the neonatal intensive care unit.

In the 2014 homebirth study, babies were at very low risk for: being born prematurely; being born too small; having a low five-minute Apgar score; or requiring transfer to a hospital after being born at home. In addition, infant mortality rates were similar to the rates found in other studies and in national data.

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However, in the 2014 home birth study, more first-time moms had to transfer, and more postpartum hemorrhages were experienced than in national studies, even though only 1% had to transfer as a result of this. Also, breech babies were at 12 times higher risk of death during labor than babies born in a vertex position.

To summarize, research shows that planned home birth is a safe option for low-risk women, especially for those who have given birth vaginally previously. And yet, planned home birth is best supported in an environment where: good risk selection criteria are in place, there is an adequate transportation infrastructure for transfers, and a good referral system is in place.

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Therefore, as the baby in my mom's womb, I would like her to: seek midwifery-led care, whether in a hospital-based birthing center or elsewhere; and I would like her to consider a birthing center birth or a planned home birth, following a discussion of the risks with her care provider.

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And here we have mom getting bigger as I, the baby, gestate.

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Let's talk now about estimated due dates or, as I like to call them, a "set-up for anxiety." Due dates are typically calculated as 280 days, which is 40 weeks or 10 lunar months, from the first day of the last menstrual period. As a shortcut, you can add seven days to the first day of the last menstrual period and count forward nine months, or you can count back three months and add one year. This calculation is known as Naegele's Rule which assumes a typical 28-day cycle. None of the professors who originally wrote in the 18th and 19th centuries about how to calculate due dates ever specified whether the counting should begin with the first day of the woman's last menstrual period, or the last day of the woman's last menstrual period.

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In fact, only 3.6% of deliveries take place on the estimated due date when relying on LMP, or last menstrual period, dating. Early ultrasound increases that slightly to 4.3 up to 5% of births occurring on the estimated due date. Two-thirds of births occur within seven days of the

estimated due date, with no meaningful differences in the estimated dates based upon the timing of the ultrasound scans.

Several researchers have found that ultrasound estimation of gestational age predicts the expected date of delivery to be three days later than relying on Naegele's rule would suggest. Ultrasound is most accurate during weeks 11 to 14, with accuracy declining sharply after 20 weeks of gestation. ACOG states, in fact, that "high quality ultrasound measurement of the embryo or fetus in the first trimester is the most accurate method to establish or confirm gestational age" and "subsequent changes to the estimated due date should be reserved for rare circumstances."

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To summarize, the research shows that estimated due dates are not particularly accurate, and that third trimester ultrasounds are not as accurate as earlier ultrasounds or the LMP in determining due date. Researchers have suggested various alternative dating systems. For instance, based upon a retrospective population-based study in Sweden, researchers have suggested adding ten days to the first day of the LMP to better fit the data from ultrasound dating, basal body temperature dating, and the modal duration of pregnancy. Other researchers have suggested offering women a range of time during which they are likely to give birth. About 50% of first-time moms will give birth by 40 weeks and 5 days. For experienced moms, 50% will have given birth by 40 weeks and 3 days. A group of Canadian researchers have introduced a new "Maternity Care Calendar Wheel" which is designed to reflect "the biological realities of pregnancy" and which includes prompts for prenatal education and antenatal care. Another group of researchers concluded, "Much anxiety would be alleviated if a range of dates from 38 to 42 weeks was substituted for a specific date of delivery."

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Therefore, as the baby, I want for my mom to be provided with a range of dates during which she is likely to give birth, to be based upon my mom's LMP and possibly one early ultrasound, completed between 11 to 14 weeks of gestation. In addition, I would like for me and my mom to be treated with patience and expectant management in the absence of any special circumstances.

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Exercise during pregnancy. Excessive weight gain during pregnancy has been associated with: gestational diabetes, pregnancy-related hypertension, macrosomia, and an increased risk of Cesarean section and stillbirth. In addition, excessive weight gain has been associated with greater maternal postpartum weight retention and higher childhood body mass index, or BMI. Guidelines for engaging in physical activity while pregnant generally support moderate intensity physical activity throughout pregnancy, with cautions against participating in sports with risks of collisions, trauma, or falls.

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A 2006 Cochrane review of 14 trials involving 1,104 low-risk pregnant women found that regular aerobic exercise helped them improve or maintain their physical fitness. There's no surprise there. In addition, a 2011 meta-analysis of 12 randomized controlled trials of 1,073 low-risk pregnant women found significantly lower average gestational weight gains in the

intervention group—those who were engaging in physical activity—versus the control group. And the exercises included in this particular analysis include: aerobics; running; cycling; water aerobics; or muscle strengthening for at least three sessions per week, for 20 to 60 minutes per session. A 2014 Cochrane meta-analysis of 49 randomized controlled trials including 11,444 women reported that interventions involving low glycemic foods in diets, supervised or unsupervised exercise only, or diet and exercise combined, all led to similar reductions in the number of women who gained excess weight during pregnancy—each reducing the risk of excessive weight gain during pregnancy on average by 20% overall. Maternal hypertension was also reduced in the intervention group.

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A 2010 study found that providing individualized nutrition and exercise programs to overweight and obese pregnant women reduced the risk of excessive pregnancy weight gain and minimized weight retention at two months post-partum. In fact, 80% of the women did not exceed recommended pregnancy weight gain as a result of these individualized nutrition and exercise programs. A separate review of the literature on physical activity during pregnancy found “sufficient empirical evidence to support the promotion of moderate to vigorous prenatal physical activity for maternal health benefits.”

A separate Canadian study found that even small amounts of maternal physical activity—20 minutes of moderate exercise three times per week during pregnancy—“enhances the newborn child's brain development.” So this is really interesting. The exercise not only helps the mother, but helps the offspring as well. A secondary analysis found that obese pregnant women were more likely to exercise if they had: a history of miscarriage, children living at home, lower pre-pregnancy weight, no nausea and vomiting, and no lower back pain during pregnancy.

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Researchers have found a very interesting connection between exercise during pregnancy and gestational diabetes. A 2011 meta-analysis of eight studies including 35,000 women, found that engaging in physical activity both prior to conception and throughout pregnancy helped decrease the risk of developing gestational diabetes significantly. Higher levels of pre-pregnancy physical activity led to a 55% reduction in the risk of developing gestational diabetes. Physical activity undertaken in early pregnancy led to a 25% lower risk. Therefore starting exercise earlier and being in good shape prior to conception is really important. Exercise guidelines for women with gestational diabetes include: moderate aerobic and resistance training exercises three times per week, for 30 to 60 minutes per exercise session.

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So let's review what the research shows. Research and guidelines encourage pregnant women to engage in regular, moderate intensity physical exercise both prior to conception and throughout pregnancy. This will help them improve or maintain physical fitness, reduce gestational weight gain, reduce maternal hypertension, reduce postpartum weight retention, and decrease the chances of developing gestational diabetes. Higher levels of pre-pregnancy physical activity led to a 55% reduction in the risk of developing gestational diabetes, whereas physical activity undertaken in early pregnancy led to a 25% lower risk. Research also suggests that pregnant

women who undertake moderate physical exercise for just 20 minutes per session, 3 times per week, may enhance their newborn baby's brain development.

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Therefore, as the baby, I want my mom to engage in regular, moderate intensity exercise both before her pregnancy and during her pregnancy, for her health and mine.

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Prenatal ultrasound. So many care providers seem to be recommending so many prenatal ultrasounds for pregnant moms these days. Let's see what the evidence has to say about that. Prenatal ultrasound has been used for first- and second-trimester organ scans, biophysical profiles, amniotic fluid index testing, placental grading, and Doppler umbilical uterine and fetal artery velocity testing.

These studies have been undertaken on tens of thousands of women. Just for the record, biophysical profile includes: ultrasound monitoring of fetal movements; fetal tone and fetal breathing; ultrasound assessment of liquor volume, with or without assessment of the fetal heart rate.

These tests are used to attempt to identify fetal growth restriction, suspected placental insufficiency, and suspected postdate pregnancy. In the "Listening to Mothers III" Report, 98% of mothers indicated that they had had at least one ultrasound during their pregnancy, with the majority, 70%, having 3 or more, and 23% having six or more.

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What about the safety of prenatal ultrasound? One review of the literature found that, between 1985 and 1992, the intensity limits for prenatal ultrasound increased dramatically—more than 15 times—without "a comprehensive research program to evaluate possible risks in diagnostic ultrasound."

In fact, this same review stated that, due to the way in which diagnostic ultrasound was brought to market through a 510(k) pre-market approval process, it was "introduced with a tacit assumption of safety allowed by a federal law enacted in 1976 for then-existing medical ultrasound equipment."

Therefore, according to this author, any safety assurance we have regarding prenatal ultrasound has to rely on: "1) an assumption of safety for pre-1976 ultrasound devices, 2) theoretical consideration of important bio-effect mechanisms, and 3) interpretation of published research studies, which may or may not have any relation to obstetrical ultrasound."

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What about the efficacy of prenatal ultrasound? Is it bringing about its desired result? Well, a 2008 Cochrane review found that "available evidence from randomized controlled trials does not support the use of BPP, or biophysical profile, as a test of fetal well-being in high-risk pregnancies." A 2010 Cochrane review found no benefits to the use of uteroplacental Doppler ultrasound in the second trimester of pregnancy among women at low risk for hypertensive

disorders. Other researchers have found that, based upon the results of two Cochrane reviews, their own meta-analysis, and other randomized controlled trials, “there is no evidence that routine ultrasonography has any impact on perinatal mortality compared to the selective use of ultrasonography based upon the clinician’s judgement.” A more recent 2015 Cochrane review found no conclusive evidence that the use of routine umbilical artery Doppler ultrasound, or a combination of umbilical and uterine artery Doppler ultrasound in low-risk or unselected populations, benefited either mother or baby.

Finally, another 2015 Cochrane review found that routine late pregnancy ultrasound in low-risk or unselected women, versus no routine ultrasound testing, led to no difference in the primary outcomes of perinatal mortality, preterm birth less than 37 weeks, Cesarean rates, or induction of labor rates. There were not enough data in this study to assess other primary outcomes, such as preterm birth less than 34 weeks, maternal psychological effects, and neurodevelopment at age 2.

Slide 60

A very recent 2015 Cochrane review found that early ultrasound—in other words, ultrasound at less than 24 weeks of gestation—“improves the early detection of multiple pregnancies,” and improves gestational dating, which may result in fewer inductions for postmaturity. Now, there was no evidence of a significant difference between the screened and control groups for perinatal death. And routine scans were not shown to reduce adverse outcomes for babies, or lead to less health service use by mothers and babies.

Slide 61

Furthermore, there are concerns with the accuracy of ultrasound. A 2006 study on the use of ultrasound for prenatal diagnosis of surgical anomalies found overall false positive rates of: 12% in 2000, 11% in 2001, and 9% in 2002. One study found that 34% of ultrasound fetal weight estimates were outside the expected “plus or minus 10%” range. In another study, 4% of first-trimester ultrasounds where the woman was told there was no viable pregnancy were wrong. These are called false negatives. Ultrasound could not reliably identify a nuchal cord or determine whether the cord was tight in another study in 2010. 3D Doppler ultrasounds used to detect the cord in labor were only able to detect 35% of cords around the neck, 60% of cords that were wrapped twice around the neck, and had a 20% false positive rate. This is very concerning. ACOG states that the ability of ultrasound to find gross anomalies varies from 13% to 85%. That’s a wide range of accuracy.

Slide 62

What about the timing of prenatal ultrasound? Finnish researchers found that ultrasound at any time between 8 to 16 weeks was more accurate than the LMP, or last menstrual period, at dating the pregnancy. In fact, these early ultrasounds decreased the number of post-term pregnancies from 10.3% to 2.7%. Other researchers found that the most accurate time to perform an ultrasound to determine gestational age is 11 to 14 weeks. It’s more accurate than LMP dating or ultrasound done at any other time. In fact, these researchers found that ultrasound accuracy declined sharply after 20 weeks.

Slide 63

To summarize, early ultrasound improves the detection of multiples and gestational dating, which may impact interventions that women are offered. Other studies, literature reviews, and a meta-analysis found that, “No routine ultrasound screening protocol improves outcomes.” Couple this with the fact that dramatic increases in intensity limits and peak exposures for ultrasound have been implemented without a coordinated effort to study the safety of these new higher limits—let alone the initial limits, which were assumed safe. The lack of accuracy of ultrasound is also very concerning. If an ultrasound is going to be performed for gestational dating purposes, it should take place between 11 to 14 weeks of gestation.

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Based upon these data, as the baby gestating in my mother’s womb, I may want my mom to have one early ultrasound prior to 20 weeks, and preferably between 11 to 14 weeks for gestational dating, and to detect whether she is carrying a twin. I would want her to decline late second-trimester and all third-trimester ultrasounds, including for amniotic fluid index testing or for conducting a biophysical profile, unless there was a reason for concern that she discussed thoroughly with her care provider. And I would like to see a coordinated effort undertaken to study the safety of ultrasound, rather than just having it presumed to be safe.

Slide 65

I’m growing in my mother’s womb, and the time for my birth is drawing near!

Slide 66

To help prepare my mom’s body for my birthing day, let’s talk about prenatal perineal massage. Research has shown that spontaneous tearing rates range from 44 to 79%, based upon studies where episiotomies were restricted. Tears are more likely during first vaginal births and those births where forceps or vacuum assistance are used. A 2013 Cochrane review found that perineal massage undertaken by the woman or her partner, “for as little as once or twice a week from 35 weeks,” was able to reduce the likelihood of perineal trauma requiring suturing and the risk of episiotomy for first time moms, and reduced the risk of pain at three months post-partum for moms who had previously birthed vaginally.

Slide 67

A 2011 Cochrane Review reported that warm compresses on the perineum during labor were found to reduce third- and fourth-degree tears to a significant degree, and were found to be acceptable to the women and their care providers. This same review found that perineal massage versus hands-off was found to reduce third- and fourth-degree tears. Hands-off had a significant effect on reducing the rate of episiotomy though.

Slide 68

The research shows that prenatal perineal massage reduces the risk of episiotomy and perineal trauma for first-time moms. In addition, prenatal perineal massage decreases pain at three months postpartum for those women who have given birth vaginally previously. And a warm compress on the perineum during labor is associated with fewer instances of perineal trauma.

Slide 69

Therefore, as the baby, I want my mom to practice perineal massage on herself, or with the help of her partner, a few times per week, from 35 weeks onward. And I want my mom to feel free to use a warm compress on her perineum during labor to ease me out into the world.

Slide 70

It's finally time for me to be born! Happy birthing day!

Slide 71

We'll now discuss several medical policies and procedures which could impact the birth, and see whether those are evidence-based or not. We'll start with the saline lock, otherwise known as Hep-lock. Many hospitals have policies that require laboring women to have a saline lock or Hep-lock just in case. Just in case what? Just in case the woman requires an emergency C-section—all women tend to be treated as potential C-sections for liability reasons—just in case the woman experiences postpartum hemorrhage, just in case the woman experiences retained placenta. Saline locks are routinely inserted if: the woman needs antibiotics due to testing GBS positive, the woman is experiencing discomfort or nausea, or the woman is being induced.

Slide 72

Despite widespread, almost universal, use of saline locks during labor, I could find no research studies of any design on this topic. While we have no data on saline locks doing any harm, we also have no research on saline locks being necessary during labor. Are saline locks being inserted merely for the convenience of the hospital staff—just in case? One analysis has been produced by Evidence Based Birth which concluded that “There's little to no evidence for the use of a saline lock during an unmedicated labor.”

Slide 73

So what does the research show? Well, the answer is nothing. I could find no research studies on saline locks or Hep-locks during labor at all.

Slide 74

As the baby, assuming my mom is low risk, I would like her to politely decline the saline lock, so that she can focus more on her deep relaxation for an easier, gentler birth.

Slide 75

What about fetal monitoring? Is fetal monitoring evidence based? During labor, baby's heart rate can be monitored either intermittently—meaning at regular intervals throughout labor—or continuously, which may restrict the mother's movements. Various methods can be used to monitor baby's heart rate. You can use a fetal stethoscope while palpating the mother's uterine contractions; this is known as intermittent auscultation. You can use a handheld Doppler ultrasound device while palpating the mother's uterine contractions, also known as intermittent auscultation. You can use a cardiotocograph, or CTG, to electronically record baby's heart rate and the mother's uterine contractions on a paper trace. This is known as external CTG and it can be used either continuously or intermittently. Or you can use a CTG and scalp electrode attached to baby's head to monitor baby's heart rate, known as internal CTG, and this is only used continuously.

Slide 76

During continuous fetal monitoring, the ultrasound sensor to monitor baby's heart rate and the pressure sensor to monitor the mother's uterine contractions are never removed except for brief bathroom breaks. Intermittent CTG is rarely used, but would require at least 20 minutes of monitoring per hour. Using intermittent auscultation, or IA, a care provider listens to the baby's heart rate for 60 seconds using a fetal stethoscope, otherwise known as a fetoscope; or they could use the handheld Doppler. And this type of monitoring takes place every 15 minutes during the first stage of labor—in other words, during the thinning and opening stage—or every 5 minutes during the second stage of labor, while nudging, pushing, or breathing your baby down.

Slide 77

In the 2007 “Listening to Mothers II” study, 87% of U.S. mothers described receiving continuous fetal monitoring, while only 4% received intermittent EFM during labor. Three major literature reviews have found that continuous CTG leads to a decrease in the rate of neonatal seizures, but an increase in the rate of C-sections and operative vaginal deliveries. All three of these literature reviews found that the reduction in neonatal seizures was consistent across the trials and subgroups, although the incidence of neonatal seizures varied considerably between trials, and the protective effect for neonatal seizures was only evident in studies with high quality scores.

It is estimated that EFM leads to one additional C-section for every 58 women monitored, and one additional C-section for every 12 high-risk women in labor. One set of researchers concluded, “Intermittent use of electronic fetal monitoring at regular intervals with stethoscopic auscultation in between appears to be as safe as continuous electronic fetal monitoring in low-risk labors.”

Slide 78

A 2012 Cochrane Review compiled results from four randomized controlled trials with more than 13,000 women and found: there was no evidence of benefit for the use of the 20-minute fetal monitoring CTG upon admission for low-risk women; admission CTG increases the C-section rate by approximately 20%; and women who were allocated to the “EFM upon admission” group were more likely to experience continuous EFM throughout their labors. So, in other words, there's not only no benefit, but there's possible harm in that the C-section rate is increased and the likelihood of having continuous EFM throughout labor is increased as well.

Slide 79

What about the efficacy and safety of fetal monitoring? A 2008 National Institute of Child Health and Human Development Workshop report on EFM reported that, “With the high penetrance of this technology into obstetric practice, well-designed studies are needed to fill gaps in knowledge.” A separate updated technology assessment of EFM and CTG stated that, “Our findings of insufficient evidence of efficacy and concerns about safety have been confirmed by subsequent research.” Might hospital policies that support continuous EFM be based upon liability fears, as opposed to clinical research?

Slide 80

So the research shows that compared to intermittent auscultation, continuous EFM helps to decrease the risk of newborn seizures, which is a rare outcome. However, continuous EFM increases the risk of C-section and the risk of forceps or vacuum delivery. In addition, continuous EFM may restrict the movements of the mother throughout labor. Also, EFM upon admission leads to more continuous fetal monitoring throughout labor and higher rates of C-section. Furthermore, the efficacy and safety of continuous EFM have been called into question.

Slide 81

Therefore, as the baby, I want my mom to have intermittent auscultation during labor.

Slide 82

Let's talk now about the length of labor. What does the research say about patience during the labor process?

The typical labor curve impacts care providers' expectations about the progression of labor. If the care provider is concerned about how labor is progressing, he or she may declare "failure to progress," and offer or recommend additional intervention such as: amniotomy, which is artificial rupture of the membranes; oxytocin or Pitocin augmentation; Cesarean delivery for "failure to progress." Any of these are possible outcomes.

Once a laboring woman enters the hospital, she is put on the clock. First off, women tend to dislike being turned away from the labor ward before admission for delivery. And yet, researchers have found that low-risk, first-time moms who are admitted in pre-active labor are more likely to experience oxytocin augmentation and are more likely to have Cesarean delivery than low-risk, first-time moms admitted in active labor. So, waiting is actually to the benefit of the mom.

Slide 83

The typical labor curve that I referenced is known as the Friedman Curve, developed by Dr. Friedman in the 1950s. Dr. Friedman reported the mean number of hours of active labor among first-time moms as 4.4 to 4.9 hours. The upper limit of normal labor was considered 11.7 hours. Since the 1950s, many researchers have found that the Friedman Curve creates unrealistically fast expectations about the progression of labor.

Slide 84

A 2002 study found that dilation from 4 centimeters to 10 centimeters took approximately 5.5 hours compared to the expected 2.5 hours under the Friedman curve. It was not uncommon in this study for the women to experience no cervical dilation for more than two hours at a time until they reached seven centimeters. The slowest rates of dilation at the fifth percentile were all below one centimeter per hour.

A 2010 literature review found that, for low-risk, first-time moms with spontaneous labor onset, the slowest-yet-normal linear dilation rate is approximately 0.5 centimeters per hour when starting at dilations normally associated with active labor onset. Therefore, this means that the rate of dilation is likely slower than 0.5 centimeters per hour in earlier active labor and likely

faster in more advanced active labor. The weighted mean duration of active labor was 6 hours and the calculated dilation rate was 1.2 centimeters per hour.

Slide 85

In 2010, researchers reviewed data from a large cohort of women in the 1960s using data from the National Collaborative Perinatal Project, or CPP, and found that the active phase of labor for experienced moms may not begin until approximately five centimeters. For first-time moms in the CPP, they experienced a slower, more gradual transition to the active phase than the experienced moms. First-time moms began active labor around six centimeters. The researchers concluded that a two-hour threshold for diagnosing labor arrest may be too short prior to the woman reaching six centimeters. And they also concluded that a four-hour threshold may be too long once the woman has reached six centimeters of dilation. Dr. Friedman describes three stages in the active phase: acceleration, maximal slope, and deceleration. These researchers found no deceleration in their review of the CPP cohort.

A separate study in 2010 by the Consortium on Safe Labor assessed labor progression in a large multi-center, retrospective study and found that labor may take over six hours to progress from four to five centimeters, and it may take over three hours to progress from five to six centimeters. First-time moms and experienced moms progressed at similar rates prior to six centimeters. After six centimeters though, labor accelerated much faster among the experienced moms as compared to the first-time moms.

Slide 86

In 2012, researchers compared data from the CPP Cohort from the 1960s, with data from the CSL Cohort. The CSL Cohort includes data from 2002 through 2008, with most women in the cohort giving birth between 2005 and 2007.

In comparing those two data sets from the 1960s versus the early 2000s, the researchers found that women in the CSL group—the group from the early 2000s—were older; heavier; more racially diverse; and had higher epidural and oxytocin use; experienced Cesarean rates four times higher than the CPP group; and had heavier babies, despite giving birth earlier on average than the CPP group. The CSL group experienced fewer episiotomies and fewer operative vaginal deliveries. Also, they found that labor is longer in the modern obstetrical cohort, with the first stage of labor in the CSL group lasting longer by a median of 2.6 hours among first-time moms, and 2.0 hours among experienced moms, even after adjusting for maternal and pregnancy characteristics.

Slide 87

When labor takes longer than care providers expect, they are more likely to suspect dystocia and label the labor as “failure to progress.” Failure to progress is the most common reason for C-sections in the United States, with 35.4% of primary Cesareans attributable to failure to progress. In one study, among those women who experienced primary Cesarean for failure to progress, “42.6% of primiparous women and 33.5% of multiparous women never progressed beyond five centimeters dilation” before being taken to the operating room. Among women who reached the pushing phase, 17.3% of women who had reached the pushing phase were given a C-section for arrest of descent at less than two hours.

In another large study, among women who reached the pushing phase, one of every three C-sections that were performed for failure to progress during pushing, were performed at less than three hours for first-time moms, and one of every four C-sections were performed at less than two hours for experienced mothers. However, the 2003 ACOG guidelines define arrest of descent as greater than 3 hours for first-time moms with epidurals, and greater than two hours for experienced moms with epidurals, because epidurals can lead to a slower pushing phase. So, in other words, all of these moms were being given C-sections prior to reaching the timing listed in the ACOG guidelines.

Slide 88

Body Mass Index, or BMI, can significantly affect the length of labor. And as we saw earlier, cohorts of data from the early 2000s included women who are heavier; they had higher BMIs, both pre-pregnancy and during pregnancy, than earlier cohorts from the 1960s. As Body Mass Index increases, labor proceeds more slowly. The time difference to reach 10 centimeters dilation was 1.2 hours from the lowest to the highest BMI categories for first-time moms. This was found in a 2011 study. That same study reported that for first-time moms—women who have never given birth—the median time to progress from 4 to 10 centimeters was 5.4 hours for those women with a BMI less than 25, versus 7.7 hours for those women with BMIs greater than or equal to 40. In the same study, for women who had given birth two or more times previously, the median time to progress from 4 to 10 centimeters was 4.6 hours for those women with BMIs lower than 25, versus 5.4 hours for those women with BMIs greater than or equal to 40. So labor truly does proceed more slowly with higher BMI.

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Data from the Consortium on Safe Labor, which we've discussed previously, demonstrate how: 1) contemporary labor is slower than historically described, and 2) active labor does not begin until six centimeters of dilation. In 2014, ACOG determined that “a prolonged latent phase should not be an indication for Cesarean delivery.” And ACOG defined prolonged latent phase as greater than 20 hours in first-time moms and greater than 14 hours of labor in multiparous women. ACOG concluded, “Given these data, as long as fetal and maternal status are reassuring, cervical dilation of six centimeters should be considered the threshold for the active phase of most women in labor. Further, Cesarean delivery for active phase arrest in the first stage of labor should be reserved for women at or beyond six centimeters of dilation with ruptured membranes, who fail to progress despite four hours of adequate uterine activity, or at least six hours of oxytocin administration with inadequate uterine activity and no cervical change.”

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A joint workshop of ACOG, the Society for Maternal Fetal Medicine, and the National Institute for Maternal and Child Health came to many conclusions: “Care providers should stick to proper definitions of labor arrest and avoid using the vague term ‘failure to progress.’ Women should be given an adequate time for both labor and pushing, and an adequate time is much longer than what has traditionally been allowed in the past. Induction should only be labeled ‘failed’ after at least 24 hours of Pitocin, plus water broken if possible. This clock should not start until after cervical ripening is completed, if needed. Women, particularly first-time mothers with an unripe cervix should not be induced unless the delivery is medically necessary. And each care provider

should receive quality control feedback on how often they improperly diagnose labor arrest or failed induction.”

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The research shows that women’s labors tend to be much slower today than when Friedman created his labor curve, even when adjusting for maternal and pregnancy characteristics. Friedman’s lowest acceptable rate of cervical dilation was 1.2 centimeters per hour. However, that would now be considered either normal or quick. Modern cervical dilation times range from a slowest-yet-normal rate of 0.5 centimeters per hour to an average of 1.2 centimeters per hour. Active labor does not begin until 6 centimeters and does not happen in a smooth curve. In other words, there may be long times when no dilation occurs. “Six is the new four” for active labor.

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The research shows that women may go several hours without experiencing any dilation at all and may not experience any deceleration as Friedman reported. Care providers are not following ACOG’s guidelines for arrest of descent, which some researchers have found may be too stringent to begin with. Women are not experiencing “failure to progress” so much as “failure to wait” by their care providers. Failure to progress is the number one reason for unplanned C-sections in the United States and many are diagnosed far too early. For better birth outcomes, low-risk first-time moms should labor at home for as long as possible, only presenting at the hospital or birthing facility when in active labor. Patience is the keyword.

Slide 93

As the baby, here’s what I want. If my mom is birthing in a birthing facility or a hospital, I would like for her to labor at home until she is in active labor. I want my mom to be given an adequate amount of time to labor and to breathe or nudge me down—what other people call pushing. I want my mom’s birthing space to be supportive of her natural birth wishes. In other words, emergency resuscitation equipment can be out of plain sight. My mom should experience privacy, and we should have a sacred space in which to give birth, with access to props and tubs as requested. I want my mom to have supportive, patient care providers who will provide her with comfort measures and the gift of time—no rushing.

Slide 94

Now, let’s take a look at what research says about birthing positions. Researchers have found that women in developed countries who give birth in a health facility tend to labor in bed, not because of any advantage to the woman or her baby, but because it is more convenient to staff. A separate group of researchers found that most women value the option to be mobile during labor, and feel that normal birth processes should not be interfered with unless medically necessary.

Several studies have found advantages to movement in labor including: reducing fear; helping women cope with discomfort during labor; and helping move the bones of the pelvis to help the baby find the best fit. And yet, despite these data, hospital policies are often in conflict with this need for movement and changing positions. And sometimes, procedures are used, which are not evidence-based, such as continuous fetal monitoring; or for which there are no data to show whether they’re evidence-based or not, such as intravenous infusions or saline locks.

Slide 95

What does the research say about birthing positions during the first stage of labor, otherwise known as the thinning and opening stage? Women who adopt an upright position, including sitting, or who walk during the first stage of labor, tend to experience: reduced length of first stage labor; reduced likelihood of having epidural analgesia; lower levels of reported pain; less likelihood of a Cesarean section; and higher reported satisfaction with their childbirth experience than those women who used semi-recumbent or supine positions.

One study found that the first stage of labor is not shortened by using an upright position, but that upright positions are safe and well accepted by women. In fact, women tend to naturally move around when experiencing contractions or surges in order to manage any discomfort that they may feel. Researchers have concluded that upright maternal positions during the first stage of labor is a safe practice that may benefit patients.

Slide 96

So researchers have found that assuming an upright position during the first stage of labor may or may not be helpful, but there's no harm in it and it may improve maternal satisfaction with the labor and birth.

What does research show about birthing positions during the second stage of labor—otherwise known as pushing or breathing the baby down? Several physiological advantages have been associated with assuming an upright position during the second stage of labor. Doing so: increases the size of the pelvic outlet; allows for better alignment of the baby when passing through the pelvis; leads to more efficient uterine contractions or surges; eases blood flow to the baby by keeping the mother from lying flat on her back; and uses the force of gravity to help bring the baby down.

Despite these significant benefits from using an upright position, women in the United States tend to use the following positions during pushing or breathing the baby down: 68% give birth lying on their back; 23% give birth in a semi-sitting or lying position with the head of the bed raised up; 4% squat or sit; 3% give birth in a side-lying position; and 1% report giving birth in a hands-and-knees position.

Slide 97

A 2012 Cochrane review looked at 22 randomized controlled trials of more than 7,200 women. And these trials looked at women who were randomly assigned to upright positions during the pushing phase—upright being defined as sitting, kneeling, or squatting positions—versus those women who gave birth in a side-lying, semi-sitting, or back-lying position. And they found that those women randomly assigned to upright positions experienced: fewer assisted deliveries with forceps or vacuum; fewer episiotomies; and no additional risk of second-degree tears if a birth cushion was used. There was an increased risk of tearing if a birth cushion was not used in an upright pushing position though. And these women also experienced fewer abnormal fetal heart rate patterns. Researchers found that an increased risk of blood loss greater than 500 milliliters was noted in the upright group; but since this was based upon provider observations and estimates, the researchers question this reported outcome.

Slide 98

Other studies have found that women who push in an upright position experience: a shorter second stage; less perineal trauma; fewer instrumental deliveries; fewer episiotomies than those women who deliver on their backs; and greater satisfaction with their birth experience.

According to current research, no one position is optimal, so women should assume positions that feel comfortable to them.

Slide 99

In one Dutch study, when women were offered suggestions for birthing positions by their care provider, they were generally offered squatting or hands-and-knees positions. When women asked for a specific birthing position, it was usually a vertical position, such as squatting or sitting. Women never asked for a semi-recumbent position.

Two studies found that women with epidural analgesia, who remained in an upright position for the second stage of labor, experienced: significantly shorter times from epidural insertion to delivery, and significantly shorter pushing times than women who were randomly assigned to remain lying down throughout the pushing phase.

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To summarize the research, women without an epidural who adopt an upright position during the first stage of labor experience: shorter labors; less use of epidurals; less pain; fewer C-sections; and greater satisfaction with their births. Women without an epidural who push in an upright position during the second stage of labor experience: a shorter second stage; less perineal trauma or no additional risk for second-degree tears when a birthing cushion is used; fewer instrumental deliveries; fewer episiotomies; fewer abnormal fetal heart rate patterns; and greater satisfaction with their birth experience.

Slide 101

The research has also shown that upright positions during the second stage of labor have been found to be beneficial to women with epidural analgesia as well. Researchers have concluded, “The results do not justify the continuation of the routine use of the supine position during the second stage of labor.” In other words, women should push in any position they find most comfortable.

Slide 102

Therefore, as the baby, I want my mom to nudge, push, or breathe me down in whichever position feels most comfortable to her, with an emphasis on more upright positions and an emphasis on changing positions whenever she feels the need or desire.

Slide 103

And now, it's the birthing day for me and my mom. Happy birthday to me!

Slide 104

Let's talk now about the importance of immediate skin-to-skin contact or immediate skin-to-skin care, sometimes referred to as kangaroo care. As one researcher has pointed out, "Separation of human mothers and newborns is unique to the 20th century and is a complete break from natural human history."

Kangaroo care or kangaroo mother care includes three major components: 1) skin-to-skin care or contact; 2) frequent and exclusive, or nearly exclusive, breastfeeding; and 3) treating the mother and baby as a dyad, what is sometimes referred to as couplet care. Following discharge from the hospital, skin-to-skin care is often used to refer to babywearing, although rarely are these babies skin-to-skin with their mothers.

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Skin-to-skin care for the mom-baby dyad following birth has many benefits. It releases oxytocin, which is the love or bonding hormone, and thus, lowers cortisol levels that may have been created during the birth. In addition, it aids with infant temperature stabilization, as mom's body warms up to warm up baby. It helps baby regulate breathing and blood sugar levels. It decreases stress and crying for the baby. It helps with neurobehavioral development. It increases maternal satisfaction and confidence, and it leads to an improved breastfeeding relationship.

Slide 106

It's interesting to ponder why, when researchers study human mother/newborn contact, keeping mothers and babies together is always considered the experimental intervention. And yet, in nature, when researchers study non-human mammals, the experimental intervention is separating the newborns from their mothers. We are programmed to want to be with our mothers. That is the default safety mechanism of survival. So something has really shifted, and perhaps gone wrong, with our healthcare system such that we think it's unusual for mothers and babies to be kept together. That is actually the norm.

Slide 107

A 2010 Cochrane review found that for preterm and/or low-birthweight babies, skin-to-skin care "was shown to be effective in reducing the risk of hypothermia when compared to conventional incubator care for infants." As one researcher has said, parents are the original incubators.

Other Cochrane reviews have found skin-to-skin care to be effective at decreasing procedural pain for neonates, infants and young children—for instance, when performing heel sticks or lances.

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One landmark Russian study found long-term effects of mother-infant interactions following birth. "Skin-to-skin contact for 25 to 120 minutes after birth, early suckling, or both, positively influenced mother-infant interaction one year later when compared with routines involving separation of mother and infant."

In addition, mother-infant bonding outcomes were worse when swaddling was used, and poor mother-infant bonding outcomes from immediate separation were not ameliorated when

rooming-in was used for the remainder of the hospital stay. In other words, what happens immediately following birth for that mom-baby dyad is so important for their long-term bonding.

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As we discussed earlier in this presentation, skin-to-skin contact is the second crucial component to helping the baby develop a healthy microbiome, which is really important for the baby's lifelong health.

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When the baby is born, immediate skin-to-skin care for the mom-baby dyad leads to the skin-to-skin transfer of skin bacteria from the mom to the baby. Baby has to get his or her microbes from somewhere. We want the baby's immune system primed with the right type of bacterium. As discussed, this impacts the choice of birthing environment and facility as well. This is when the baby's immune system learns what is "friend" versus what is "foe." Scientists believe the microbes have one chance to do this: during birth and immediately thereafter. You can correct the balance of microbes with probiotics later in life, but you cannot retrain the immune system.

For additional information about the development of the baby's microbiome, please see my other presentation entitled, [Seeding Lifelong Health: The Impact of Pregnancy, Birth, and Infant Care on the Baby's Developing Microbiome](#).

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To summarize the research, it shows that immediate or very early skin-to-skin care has both physiologic and psychologic benefits to the mother-baby dyad at a very sensitive developmental time for both bonding and the microbiome. Early skin-to-skin care has a positive effect on: breastfeeding, respiration, blood glucose levels, and lessened crying for the babies; as well as less breast engorgement and anxiety for the mothers—all with no apparent short- or long-term negative effects. Skin-to-skin care may be even more important for low-birthweight babies than for normal babies, as it leads to: lower rates of mortality, sepsis, hypothermia, severe illness, respiratory problems, and long hospital stays; while also assisting those low-birthweight babies with better growth, breastfeeding, temperature regulation, and bonding with their mothers.

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The research also shows that very early skin-to-skin contact after a Cesarean is not only safe and beneficial, but it helps babies with: temperature regulation, lessened crying, and better breastfeeding relationships.

Skin-to-skin care is the second stage in the all-important development of the baby's microbiome and thus, the baby's immune system for life. There is no do-over for this critical contact.

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Therefore, as the baby, I want my mom and me to experience immediate skin-to-skin contact. I'd like for us to be left undisturbed for bonding, initial breastfeeding, and the seeding of my microbiome from skin contact with my mom during "The Golden Hour" and beyond. And I'd like for care providers to do any newborn checks *while* I am experiencing the skin-to-skin contact with my mom; hands-off from the care providers as much as possible.

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Let's take a look now at what the evidence says about when to clamp the umbilical cord. When the baby is born, nearly one-third of the baby's total blood volume is still in the placenta. This is equal to the amount of blood needed to fully perfuse the baby's lungs, liver, and kidneys. Within one minute, 50% of that blood will transfuse into the baby, and by three minutes of age, 90% of that blood will have transfused into the baby. Waiting only three minutes allows the baby the benefit of receiving 90% of the blood that was in the placenta and umbilical cord. In addition, the concentration of stem cells in the fetal blood—which play an essential role in the development of the immune, respiratory, cardiovascular and central nervous systems—is higher at birth than at any other time of life.

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Delayed cord clamping has been associated with many large benefits to the baby. These include: smoother cardiopulmonary transition at birth; an increase in antioxidant capacity and moderation of inflammatory effects in newborns; higher birth weight and hemoglobin concentrations; increases in iron reserves up to six months after birth. Babies have low levels of iron at birth and get very little through breastfeeding, so until they start eating solid foods, they really need a higher store of iron, and delayed cord clamping helps give this to them. In addition, delayed cord clamping has been associated with fewer transfusions for anemia and lower risk of necrotizing enterocolitis, or infection of the bowel, for the baby.

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When looking at the research on cord clamping, all of the studies compare *immediate* cord clamping to *delayed* cord clamping, rather than comparing varying cord clamping times with the normal physiological condition of no clamping at all. Several studies and a 2013 Cochrane review found no relationship between the timing of the cord clamp and postpartum hemorrhage in the mom, which is one of the major reasons given usually for wanting to perform immediate cord clamping.

Blood flow immediately after birth is primarily one-way, from placenta to baby, so concerns about backflow to baby are unwarranted. This is confirmed by the fact that delayed cord clamping leads to approximately 30% greater neonatal blood volume than does immediate cord clamping. According to one researcher, “In a process that begins during labor and accelerates as the newborn begins to cry, the pulmonary blood vessels, which receive very little blood flow during pregnancy, open and fill. This relatively sudden change causes the newborn's blood pressure to fall below the pressure in the placenta. Placental blood, driven by strong uterine contractions, follows the pressure gradient and flows through the umbilical vein into the baby. As the newborn's oxygen saturation increases, the umbilical arteries close, which stops nearly all blood flow from baby to placenta. The umbilical vein, which isn't sensitive to oxygen, remains open somewhat longer, allowing a final bit of blood to flow from placenta to baby before it too closes.” That's from Doctor Sloan.

What about the height at which baby is held following birth? How does that affect the flow of blood? Well, gravity affects the speed of the placental transfusion, but it is still safe to place baby immediately skin-to-skin on mother's belly while the cord finishes pulsing. Babies held below

the level of the placenta receive a full transfusion in about three minutes. For those babies receiving immediate skin-to-skin contact with their mother, they are, of course, going to be held above the level of the placenta, and these babies will receive a full transfusion in approximately five minutes. So it takes a little bit longer, but these babies will still experience the benefit of having received their blood from the placenta.

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Most studies have found no significant difference in bilirubin levels, which may cause neonatal jaundice, in delayed cord clamped babies versus immediate cord clamped babies. Why do babies have significantly increased blood volume, and yet have relatively stable bilirubin levels? Well, as Doctor Mark Sloan explains, “It may have to do with increased blood flow to the neonatal liver that comes with the higher total blood volume associated with delayed cord clamping. Yes more blood means more bilirubin which in turn could mean more jaundice. But better blood flow allows the liver to process bilirubin more efficiently.”

A 2013 Cochrane review, which was an update of a 2009 review, found no adverse maternal or neonatal outcomes from delayed cord clamping, with the possible exception of an increased need for phototherapy as a result of increased bilirubin levels. Of the 40 studies considered for inclusion in this Cochrane review, 15 of which were ultimately included, one was an unpublished study by the Cochrane review’s lead author. When the unpublished data is removed, the results lose their significance.

The two studies added between the 2009 and 2013 Cochrane reviews found no association between delayed cord clamping and increased bilirubin levels requiring phototherapy.

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No studies have found a problem with hyperviscosity, or thick blood, as a result of delayed cord clamping; and routinely, sick babies—both term babies and preterm babies—have been found to have better outcomes with delayed cord clamping.

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In addition, global health policy supports delayed cord clamping. According to the World Health Organization, “Late cord clamping is recommended for all births, and the improved iron status associated with it may be particularly relevant for infants living in low-resource settings with reduced access to iron-rich foods.”

Likewise, the UK-based group known as the National Institute for Health and Care Excellence, recently updated its guidance on clamping a baby’s umbilical cord: “Do not clamp the cord earlier than one minute from the birth of the baby, unless there is concern about the integrity of the cord or the baby has a heartbeat below 60 beats per minute that is not getting faster. Clamp the cord before five minutes in order to perform controlled cord traction as part of active management. If the woman requests that the cord is clamped and cut later than five minutes, support her in her choice.” So we’re seeing a lot of shifts in health policy in recognition of the evidence showing that delayed cord clamping is optimal.

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To summarize the research, “Many maternity care providers continue to clamp the umbilical cord immediately after an uncomplicated vaginal birth even though the significant neonatal benefits of delayed cord clamping—usually defined as two to three minutes after birth—are now well known.”

In addition, no adverse maternal or neonatal outcomes have been found, with the possible and controversial exception of an increased need for phototherapy due to increased bilirubin levels. The benefits to baby of delayed cord clamping include: higher blood volume (up to 30% higher); higher birth weight; higher hemoglobin concentrations; smoother cardiopulmonary transition; increased number of beneficial stem cells; higher iron stores; increased antioxidant capacity; decreased inflammatory effects; and decreased risk of anemia and necrotizing enterocolitis—huge benefits for baby.

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Therefore, as the baby, I want my cord to finish pulsing before it is clamped.

Slide 122

Let’s talk now about breastfeeding. Entire books, wonderful books, have been written on the topic of breastfeeding. So here I will give the briefest of overviews of the benefits of breastfeeding for both the baby and the mom, and focus more of my energy talking about how breastfeeding can help establish a healthy microbiome in the baby’s gut for lifelong health.

Globally, less than 40% of infants under six months of age are exclusively breastfed and yet researchers have found that, “If every child was breastfed within an hour of birth, given only breast milk for the first six months of life, and continued breastfeeding up to the age of two years, about 800,000 child lives would be saved every year.”

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In fact, the World Health Organization recommends exclusive breastfeeding for the first six months of life, at which time solid foods can be introduced to complement breastfeeding for up to two years or more. Breastfeeding should begin within an hour of birth, according to the WHO. Breastfeeding should be on demand, as often as the child wants, day and night; and bottles or pacifiers should be avoided.

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Breastfeeding is associated with huge short-term and long-term benefits for babies. It provides the nutrients the baby needs for healthy development. In fact, the World Health Organization calls it the ideal food for newborns and infants. In the short-term, breastfeeding decreases the baby’s risk of diarrheal diseases, ear infections, pneumonia, and other respiratory illnesses. Breastfed infants also experience appropriate jaw, teeth, and speech development, as well as overall facial development. In the long-term, breastfeeding decreases the risk of obesity, diabetes, asthma, and allergies for the baby. Breastfed infants have also been found to perform better on intelligence tests later in life. And the bonding of the mother-baby dyad is significantly enhanced through the breastfeeding relationship.

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Breastfeeding is also highly beneficial to the mother. It releases prolactin and oxytocin, which helps mom and baby fall in love with one another. The oxytocin that is released also reduces uterine bleeding after birth and helps mother's uterus return to its pre-pregnancy size.

Breastfeeding has been associated with burning extra calories to help mothers lose their excess pregnancy weight. Breastfeeding is also associated with a natural, though not fail-safe, method of birth control, providing 98% protection in the first six months with exclusive breastfeeding. It also reduces the risk of postpartum depression for the mother. In the long term, breastfeeding has been associated with reduced rates of breast cancer and ovarian cancer as well.

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Very importantly, breastfeeding is the third crucial step—following vaginal birth and skin-to-skin contact—in the development of a healthy microbiome for the baby. For mothers who cannot breastfeed, donor milk is always an option. Another option is using formulas fortified with prebiotic and probiotic compounds.

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Breastfeeding is the postnatal method for mother/baby microbial exchange. It seeds and selects for particular populations of bacteria. In addition, breast milk has anti-inflammatory hormones, antibodies, and sugars, which are indigestible by the baby. What's interesting is those sugars are eaten by the good bacteria that are newly seeded in the baby's gut. In other words, breastmilk helps the good bacteria thrive. It's pretty amazing.

By the end of the baby's first year, the baby's microbiome has become more complex and stable. The child's microbiome will be similar to an adult's microbiome by three years of age. So in other words, the child's microbiome, at three years old, is likely to be that individual's lifelong signature of microbiota. Those first three years are crucial.

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So to review, the research shows that breastfeeding is extremely beneficial in both the short-run and the long-run, to both babies and their mothers. Breastfeeding is also the third crucial step in helping the baby develop a healthy microbiome for lifelong health.

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Therefore, as the baby, I want my mom to exclusively breastfeed me for six months, at which time I will be introduced to solid foods. I also want my mom to continue breastfeeding me from six months up to two years or even longer as I also eat solid foods.

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We have covered so much evidence-based research in this presentation and as a result, I've created a model, which I call "The Evidence-Based Baby Model (for Low-Risk Women)." Obviously, women with high risks will be experiencing issues that are not covered by this presentation or this model. So what does "The Evidence-Based Baby Model" show the baby should want through conception, pregnancy and birth that baby and mom are co-creating? Well, with respect to the microbiome health, I, as the Evidence-Based Baby, want my mom to have a healthy microbiome herself. I want to experience an antibiotic-free vaginal birth at home or

surrounded by items brought from home. I want to experience immediate skin-to-skin with my mom, followed by couplet care. And I want to be exclusively breastfed for six months or more.

With regard to my mother's care provider decision, I want my mom to hire a midwife for prenatal, labor, and delivery care; and I want my mom to hire a doula to work with her throughout pregnancy and to attend her during labor.

The care provider decision obviously impacts the birthing location decision. Therefore, I want my mom to seek midwifery-led care, whether in a hospital-based birthing center, a freestanding birthing center, or at home. And I want my mom to consider a birthing center birth or a planned home birth, following a discussion of the risks with her care provider.

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With regard to estimated due dates, I want my mom to be provided with a range of likely birth dates based upon my mom's last menstrual period dating, or LMP, and possibly one early ultrasound completed between 11 to 14 weeks of gestation.

What about exercise during pregnancy? Well, I want my mom to engage in regular, moderate intensity exercise both before her pregnancy and during her pregnancy, for her health and mine.

What about prenatal ultrasound? I want my mom to possibly have one early ultrasound, preferably between 11 to 14 weeks of gestation, for gestational dating and to detect whether she is carrying a twin. I want my mom to decline any late-second-trimester and all third-trimester ultrasounds, including those for amniotic fluid index testing or for conducting a biophysical profile—unless there was a reason for concern that she discussed thoroughly with her care provider.

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With regard to prenatal perineal massage, I want my mom to practice perineal massage on herself, or with the help of her partner, a few times per week, from 35 weeks onward. I want my mom to feel free to use a warm compress on her perineum during labor to ease me out into the world; and I want my mom to experience hands-off care by the care providers during labor to the greatest extent possible.

With regard to the decision about a saline lock, I'd like my mom to politely decline the saline lock so that she can focus more on her deep relaxation for an easier, gentler birth.

And when it comes to fetal monitoring, I want my mom to experience intermittent auscultation during labor.

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With regard to the length of our labor, I want my mom to labor at home until she is in active labor. I want my mom to be given an adequate amount of time to labor and to breathe or nudge me down—what other people call “pushing.” I want my mom's birthing space to be supportive of her natural birth wishes. And I want my mom to have supportive, patient care providers who will provide her with comfort measures and the gift of time—no rushing!

With regard to birthing positions, I want my mom to feel free to move around during labor and to change positions whenever she desires. I want my mom to nudge, push, or breathe me down in whichever position feels most comfortable to her, with an emphasis on upright positions and an emphasis on changing positions whenever she desires.

I absolutely want to experience immediate skin-to-skin contact with my mom following birth. I want my mom and me to be left undisturbed for bonding, initial breastfeeding, and the seeding of my microbiome from skin contact with my mom during “The Golden Hour” and beyond. And I want care providers to do any newborn checks while I am experiencing skin-to-skin with my mom; hands-off from care providers as much as possible.

Slide 134

What about the cord clamping decision? Well, I definitely want my cord to finish pulsing before it is clamped.

And last but not least, breastfeeding. I want my mom to exclusively breastfeed me for six months, at which time I will be introduced to solid foods. And I want my mom to continue breastfeeding me from six months up to two years, or even longer, as I also eat solid foods.

And there you have it: “The Evidence-Based Baby Model (for Low-Risk Women).”

Slide 135

Slides 135 to 173 include all of the references, hundreds of references, that I reviewed and compiled in creating this presentation for you. So please check those out. They are there for your use and reference.

I trust that this presentation and “The Evidence-Based Baby Model (for Low-Risk Women)” that it contains will help you make birth better for yourself or for other moms and babies. This is Lori Nicholson. Thank you so much for joining me.