

## Evidence on: Failure to Progress

### **“Failure to Progress” is the number one reason for unplanned Cesareans in the U.S.**

In 2013, researchers published a report on 38,484 people who had their first Cesarean (primary Cesarean) in the United States (U.S.) during a six year period. The overall primary Cesarean rate in the sample was 21.3%, and the Cesarean rate among people giving birth for the first time was 30.8%. One-third (35%) of the primary Cesareans in the overall sample were due to a diagnosis of “Failure to Progress,” or slow progress in labor. Nearly half (41.3%) of the Cesareans in first-time moms were due to Failure to Progress. This means that from 2002 to 2008, approximately one in ten (13%) of all first-time mothers in the U.S. had a Cesarean for Failure to Progress ([Boyle, Reddy et al. 2013](#)).

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More than four in ten of the first-time mothers who had Cesareans for Failure to Progress had not reached five cm dilation before they were taken to surgery ([Boyle, Reddy et al. 2013](#)). Six cm is now considered the beginning of active labor, so this means that many of these people were still in very early labor (or maybe not truly in labor at all) when they were told that they weren’t dilating fast enough (ACOG 2014).

Out of people who reach the pushing phase (second stage) of labor, one in three Cesareans for Failure to Progress were performed before three hours of pushing in first-time mothers, while one in four Cesareans for Failure to Progress were performed before two hours of pushing in people who had given birth before ([Zhang et al., 2010b](#)). This is of concern because the American College of Obstetricians and

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Gynecologists (ACOG) and the Society for Maternal Fetal Medicine (SMFM) released recommendations in 2012 and 2014 that define “arrest of labor” as longer than three hours of pushing in first-time mothers and longer than two hours of pushing in people who have given birth before, giving an extra hour or more on an individual basis, such as in those who have epidurals (Spong et al. 2012; [ACOG 2014](#)). The majority of people giving birth in the U.S. have epidurals during labor, which can lead to a longer pushing phase ([Zhang et al. 2010b](#)).

A large number of pregnant people also have unplanned Cesareans for Failure to Progress during medical inductions of labor. In a 2010 study that included 233,844 mothers who gave birth between 2002 and 2008, researchers found that half of all those induced who had Cesareans for Failure to Progress had not reached six cm yet, indicating that they were not yet in active labor when their inductions were labeled as “failed” ([Zhang et al., 2010b](#)).

## How often does Failure to Progress occur?

Around the world, there are many different definitions of Failure to Progress, resulting in different rates from country to country. For example, Failure to Progress is the cause of 42% of Cesareans in Queensland, Australia, while Failure to Progress was the cause of 34% of Cesareans in the United Kingdom. Researchers think that these differences from country to country are due to a lack of comprehensive guidelines in some areas and differences in how care providers practice between countries.

“Failure to Progress” is probably over-diagnosed in the U.S. Many people are diagnosed with Failure to Progress before they’ve entered active labor, or before they pushed the length of time that the current guidelines consider to be within the range of normal. It’s difficult to determine how many experience Failure to Progress, because so many researchers use different definitions. Worldwide, it is thought that about 3 to 6% of women have true “arrested labor,” where labor has stopped or is truly abnormally slow ([Dolea and AbouZhar, 2003](#)).

When people give birth at home with midwives, Failure to Progress is the most common reason for transfer to the hospital ([Blix et al. 2014](#)). However, rates of Failure to Progress in planned home births are low—in a recent study of 16,924 planned U.S. home births, only 4% of women were transferred to the hospital for Failure to Progress. A 4% rate of Failure to Progress is much lower than what is seen in hospital settings in the U.S. For example, in the state of Michigan, 20% of all hospital births are diagnosed with Failure to Progress ([Zhu, 2006](#)).

Unfortunately, if a woman lives in a developing country, she may be at risk for something called “neglected obstructed labor.” This is when labor either stops or goes on for much too long and is left untreated or “neglected.” In developing countries, neglected obstructed labor causes 8% of all maternal deaths, and is a cause of stillbirths, newborn deaths, and maternal fistulas ([Harrison et al. 2015](#); [Dolea & AbhouZhar 2003](#)).

A fistula is a hole between the vagina and the rectum and/or bladder, usually caused by the baby’s head pressing on this area for days during a neglected obstructed labor. The end result is that the woman may leak urine or feces through her vagina, causing great physical and emotional suffering, and seriously limiting her ability to function socially and economically for the rest of her life when unrepaired (and most go unrepaired). Fistulas occur in 0.01% to 0.08% of births in the developing world, but are almost unheard of in developed countries ([Dolea & AbhouZhar 2003](#)).





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## Why do so many people have unplanned Cesareans for Failure to Progress?

Until recently, most women in labor were held to a standard called “Friedman’s Curve.” Friedman’s Curve is a graph that care providers have traditionally used to define a “normal” length and pace of labor — giving first-time mothers about 14 hours to go from zero to ten cm and experienced mothers eight hours ([Friedman 1955](#)). If a cervix does not dilate according to this schedule, she may be assigned a diagnosis of Failure to Progress and taken to the operating room for a Cesarean.

## So what is this Friedman’s Curve? When was it invented? Does it apply to labor and birth today?

In 1955, Dr. Emanuel Friedman, of Columbia University, published a study that described the average amount of time it took women to dilate by centimeter during labor, based on his observation of 500 Caucasian patients at a single hospital ([Friedman 1955](#)). Until then, doctors had simply published research studies that described the total length of labor. Dr. Friedman went one step further by plotting the labors on a graph, and then figuring out the average length of time it took to dilate each centimeter. This graph became known as the famous “Friedman’s Curve.”

Although it was published over 60 years ago now, Friedman’s Curve still served as the basis for how most physicians defined normal labor until very recently ([Gabbe, Niebyl et al. 2012](#)). In other words, most care providers used this graph to dictate how best to manage a woman’s labor.

However, this all began to change in the early 2010s. In 2012, the National Institute of Child Health and Human Development (NICHD), SMFM, and ACOG held a workshop aimed at “preventing the first Cesarean.” The summary stated that too many people were inaccurately being diagnosed with Failure to Progress. In 2014, SMFM and ACOG released a consensus statement called “Safe Prevention of the Primary Cesarean Delivery.” In this statement, they re- defined normal and abnormal labor, and stated that Friedman’s Curve should no longer be used as the basis for modern labor management ([ACOG 2014](#)). A recent ACOG statement reaffirmed the importance of using the updated definitions to limit intervention during labor and birth ([ACOG Committee Opinion, 2017](#)).

Dr. Friedman, now in his 90s, criticized the new guidelines in several editorials. He stated that Friedman’s Curve “has served many women well for decades,” and that a “time-tested approach” is now being “abandoned in favor of new recommendations that have not been validated” ([Cohen & Friedman 2015](#)).

Although some hospital systems have already adopted the new consensus recommendations, it may take time for care providers around the world to do so. In the meantime, Friedman’s Curve will still affect people whose providers are using the older method of diagnosing Failure to Progress. So, let’s take a look at Friedman’s Curve.

## Who were the women in Friedman’s Curve?

Dr. Friedman’s study focused on 500 first-time mothers who gave birth at term in 1954. Their age ranged from 13 to 42 years old, and 70% were between the age of 20-30. More than half of the women had forceps used on them during delivery (55%), and only nine people (1.8%) gave birth by Cesarean. There were 14 breech births (2.8%), four twin births (0.9%), and four stillbirths or newborn deaths. The babies ranged in weight from 4 lbs. 9 oz. to 10 lbs. 6 oz., with most babies falling into a normal weight range (5 lbs. 8 oz. to 8 lbs. 13 oz.). Pitocin was used to induce or augment labor in 69 people (13.8%). “Twilight sleep” was common practice at the time, and so 117 of the women (23%) were lightly sedated,

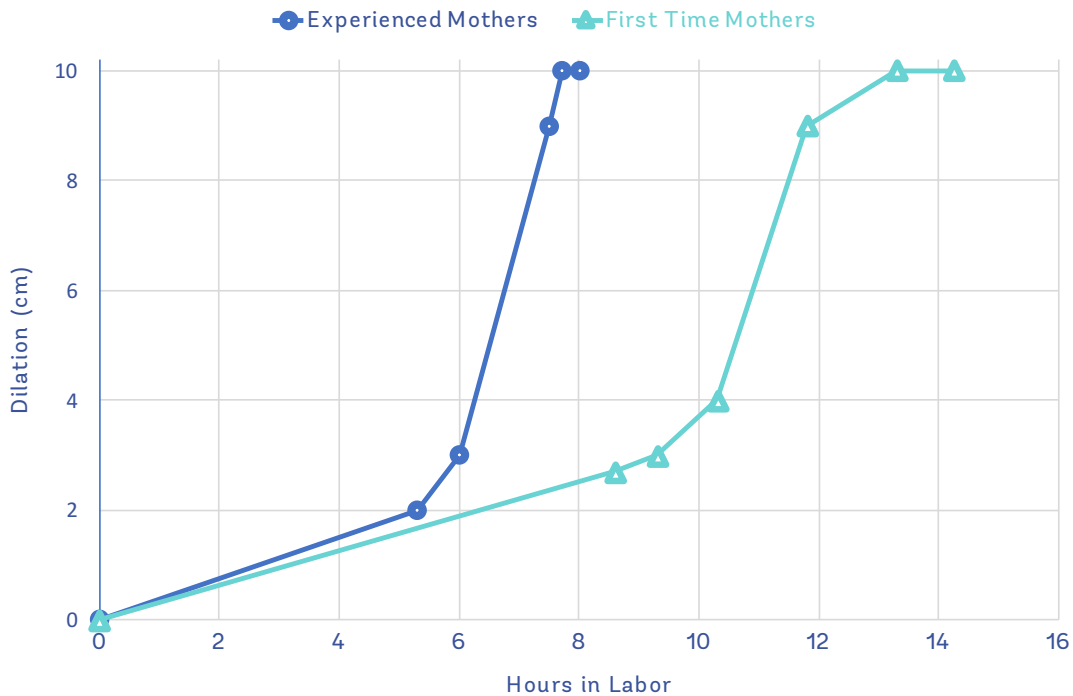




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210 (42%) were moderately sedated, and 154 (31%) were deeply sedated (sometimes “excessively” sedated) with Demerol and scopolamine—meaning that 481 (96%) of the women were sedated with drugs (Friedman 1955).

Figure 1: Friedman’s Curve (1955-1956)



A depiction of Friedman’s Curve, based on data from Friedman, E. A. (1955). “Primigravid labor; a graphicostatistical analysis.” *Obstet Gynecol* 6(6): 567-589. and Friedman, E. A. (1956). “Labor in multiparas; a graphicostatistical analysis.” *Obstet Gynecol* 8(6): 691-703.

Dr. Friedman found that the average length of time it took these first-time mothers to get from zero cm to four cm was 8.6 hours ( $\pm 6$  hours). Once women hit four cm, their labors sped up—meaning that they were in “active labor”—and, at that point, they dilated an average of three cm per hour ( $\pm 2$  cm) until they reached 9 cm, after which there was a slight slowing down between nine cm and ten cm. The average length of time it took to get from four cm to ten cm was 4.9 hours ( $\pm 4$  hours). The average length of pushing (second stage) was one hour ( $\pm 0.8$  hours).

The Friedman study was important at the time because it described labor in a way that had never been done before. However, modern researchers have come to the definitive conclusion that we can no longer apply Friedman’s Curve to labors in today’s world. Too many things have changed since 1955. Epidurals have taken the place of sedation in labor; Pitocin is used much more frequently for both labor induction and augmentation; women today are older and tend to weigh more; and the forceps-with-episiotomy method is no longer routine practice. All of these factors can impact the length of labor (Laughon et al. 2012).





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## Factors that may lengthen or shorten labor

It is not easy to apply a specific “curve” to all labors and births, because each person may have different factors that can lengthen or shorten their labor.

### May lengthen labor:

- Epidural use may lengthen both labor ([Alexander et al. 2002](#), [Frigo et al. 2011](#)) and pushing ([Anim-Somuah et al. 2011](#))
- Heavy sedation ([Friedman 1955](#))
- Being overweight or obese ([Kominiarek et al. 2011](#); [Carlhall 2013](#); [Kawakita et al. 2016](#))
- Advanced maternal age ([Sheiner et al. 2002a](#); [Timofeev 2013](#))
- Having labor medically induced ([Sheiner et al. 2002a](#)) ([Vahratian et al. 2005](#))
- Giving birth for the first time ([Zhang, Landy et al. 2010](#)), ([Sheiner et al. 2002a](#))
- Posterior positioning of the baby (i.e. OP, sunny-side up) ([Gardberg & Tuppurainen 1994](#), [Senecal et al. 2005](#))
- Baby’s head is tilted sideways (i.e. asynclitic) ([Malvasi 2015](#))
- Being confined to a bed ([Lawrence et al. 2013](#))
- Dehydration ([Dawood et al. 2013](#))
- Being a survivor of sexual assault ([Nerum et al. 2010](#))
- Giving birth to twins ([Leftwich et al. 2013](#))
- Premature rupture of the membranes (PROM, sac of water releases before labor begins) ([Sheiner et al. 2002a](#))
- Being pregnant with a big baby ([Sheiner et al. 2002b](#))
- Maternal health problems such as gestational diabetes, hypertension or preeclampsia, low amniotic fluid or high amniotic fluid levels, having had a previous infant die during or shortly after labor, and infertility treatment ([Sheiner, Levy et al. 2002a](#); [Sheiner et al. 2002b](#))
- Having a successful external cephalic version for a breech baby ([Basu et al. 2016](#))
- Having been diagnosed with Failure to Progress in a previous birth ([Tobias et al. 2015](#))

### May shorten labor:

- Not having an epidural during labor ([Alexander et al. 2002](#), [Frigo et al. 2011](#)) and pushing ([Anim-Somuah et al. 2011](#))
- Pitocin augmentation/acceleration ([Bugg et al. 2013](#))
- Having given birth before ([Zhang, Landy et al. 2010](#); [Sheiner et al. 2002a](#))
- Upright positions— during labor ([Lawrence et al. 2013](#)) and pushing ([Gupta et al. 2012](#))

### May lengthen or shorten labor, or may not change anything at all:

- Artificially breaking the waters (AROM) ([Friedman 1955](#); [Smyth et al. 2013](#))

In the first genetic study on women who had Failure to Progress (diagnosed with labor arrest, or no dilation over two hours of contractions in active labor), researchers compared the muscle DNA of women who underwent their first Cesarean for labor arrest and those who had their first Cesarean for fetal heart rate concerns or fetal malpresentation. No one in either group was induced. They found that women with labor arrest had different genes for muscle contraction, muscle inflammation, and how muscles respond to low oxygen levels during contractions. Their results—the first of their kind—suggest



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that some people with labor arrest may have genetic differences that affect the muscle cells of their uterus ([Chaemsaitong et al. 2013](#)).

## So how long does it really take for a woman's cervix to dilate?

For people who go into labor on their own, labor tends to last much longer than what Dr. Friedman graphed in 1955.

### Zhang's Study Serves as the Basis of New Guidelines

In one important study published in 2010, researchers looked at the labor records of more than 62,000 women from 19 hospitals across the U.S. Women were included if they gave birth vaginally at term to a single baby who was positioned head-down, if the babies were born healthy, and if the labors started spontaneously (were not medically induced). Most of the women routinely had interventions during their births—overall, about half the mothers had their labors “augmented” or sped up with oxytocin (Pitocin), and 80% had epidurals ([Zhang, Landy et al. 2010](#)).

The researchers found that on average, women did not rapidly dilate starting at three cm like Dr. Friedman saw back in 1955. Instead, active labor was reached at around six cm. This was true for both first-time mothers and those who had given birth before, although experienced mothers tended to dilate faster once they reached active labor (six cm). The average time it took to dilate during active labor was about half an hour for each centimeter (and faster for experienced mothers). The vast majority of people (95%) took less than two hours to dilate one cm during active labor. (See the [Table with exact numbers here](#)).

Interestingly, researchers found that before six cm, many people (first-time mothers and experienced mothers) went long periods without any dilation—and this was within the range of normal in the sample. For example, those laboring took an average of 1.8 hours to get from three cm to four cm, but the top 5th percentile of the sample (still in the range of normal) took as long as eight hours. On average, women took 1.3 hours to get from four cm to five cm, but the top 5% took seven hours (see more information [here](#)). All of these women went on to give birth vaginally to healthy babies.

When it came to pushing, or the “second stage” of labor, first-time mothers pushed for an average of 1.1 hours with an epidural and 0.6 hours without an epidural. At the very extreme end of normal, some first-timers (the 5% that pushed the longest) pushed for 3.6 hours with an epidural and 2.8 hours without an epidural. Experienced mothers had much shorter pushing phases—on average, they spent less than 30 minutes pushing with an epidural, and about 15 minutes without an epidural.

### Other Current Research on the Length of Labor

Other researchers have also confirmed that, for various reasons, including an older and heavier population and different clinical practices today, labor lasts longer for modern women than it did in Dr. Friedman's time.

In 2010, researchers combined the results of 18 studies from 1990 to 2008 that reported the average length of labor among a total of 7,009 first-time mothers who went into labor on their own. In these studies, “active labor” was defined as having contractions and being at least three cm to five cm dilated. Many of the studies in the review included people who received Pitocin augmentation, artificial rupture of membranes, and epidurals for pain relief ([Neal et al. 2010](#)).







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Researchers found that for these thousands of first-time mothers, the average length of active labor was six hours, with people dilating an average of 1.2 cm per hour during the active stage. These results were quite different from what Friedman found more than half a century ago. In 1955, Friedman described 1.2 cm per hour as the “lowest acceptable rate” of cervical dilation. But among the subjects in this modern study, 1.2 cm per hour was actually the AVERAGE rate of dilation. Half of the women dilated slower than 1.2 cm per hour, and half dilated faster than this. In other words, what was considered “slow labor” in Dr. Friedman’s day has actually been found to be the normal rate of dilation today.

This presents a problem. If we continue to apply Friedman’s Curve to birthing people today, we are saying that half of all women have “abnormally” slow labors. But if such a large proportion of women are “abnormal” by 1950s’ standards, this might simply mean that we have been using the wrong definitions of “normal” and “abnormal.” Using Friedman’s Curve creates an expectation for first-time mothers to dilate much faster than today’s average, and applying these standards means that many people are being diagnosed with Failure to Progress when what they are experiencing is actually normal. In those cases, Failure to Progress might be more aptly termed “Failure to Wait.”

### But is it harmful to have long first stage labors? What are the risks to mothers and babies?

There have only been three recent studies on the risks of longer labors, and each study used a different definition of “long.” The findings were mixed. Based on these three studies, there does not appear to be any difference in infant mortality if people have a first stage labor that is abnormal by Friedman’s standards. All three studies found no increased risk of postpartum hemorrhage (although one study found people were more likely to be anemic and require a blood transfusion postpartum), one of the studies looked at NICU admission and found a higher risk of NICU admission, and one out of two studies found a higher chance of low Apgar scores.

**Study #1:** In the years 1988 to 1999, Israeli researchers looked at more than 92,000 women who gave birth, comparing the 1.3% of women who were diagnosed with Failure to Progress (using Friedman’s Curve as the basis) to the rest of the group with their “normal” length of labor. (*Interestingly, rates of Failure to Progress seen in this study were much lower than what is seen in the U.S.*)

There were no differences in mortality rates between babies who were born after a prolonged labor and those who were not. However, all of the babies born to women who had Failure to Progress were born by Cesarean, and they were more likely to have Apgar scores of <7 at five minutes after birth (1.3% vs. 0.2%). Mothers diagnosed with Failure to Progress during the first stage were more likely to be anemic after the birth (47% vs. 23%) and need a blood transfusion (5.6% vs. 1%). Unfortunately, we don’t know if the increased risk of complications for birthing people and babies was related to the Failure to Progress or the resulting Cesarean surgery, or both ([Sheiner et al. 2002a](#)).

**Study #2:** In another study, researchers looked at 10,000 first-time mothers giving birth at a single hospital between 1990 and 2008 in the U.S. (Cheng et al. 2010). They excluded all women who had Cesareans for fetal distress from this study, so none of the babies were diagnosed with fetal distress before birth. Babies who were born after a first stage of labor that took longer than 30 hours (the top 5th percentile, or the longest 5% in the sample) were more likely to be admitted to the neonatal intensive care unit (NICU) compared to the labors in the 5th to 95th percentiles (9.8% vs. 4.7%). However, there was no other relationship between long labors and other poor newborn outcomes—including Apgar scores, umbilical cord pH, meconium aspiration, infection, shoulder dystocia, or birth trauma.





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Women with the longest labors were more likely to have an infection of the uterus (23.5% vs. 12.5%) and to have a Cesarean (13.5% vs. 6.1%), but there was no increase in the risk of postpartum hemorrhage. The authors did not describe the number of vaginal exams that women received, which is important, because a higher number of vaginal exams could have contributed to higher infection rates among the women with long labors. (For more information about the risk of vaginal exams after the waters have broken, see the [Evidence Based Birth® article on PROM](#)).

**Study #3:** In 2016, researchers in the U.S. ([Hamilton et al. 2016](#)) set out to determine the relationship between dilation and four labor-related complications: Cesarean for a Failure to Progress diagnosis, Cesarean for fetal heart rate concerns, postpartum hemorrhage, and newborn breathing problems. They looked at the medical records of 4,703 women who gave birth to single babies in the years 2012 and 2013. They excluded women with breech babies and those with a prior Cesarean. Slightly more than half of the women in this study were first time mothers (56.8%). Overall, there was a 41.2% induction rate, 23.8% augmentation rate, and 23.7% Cesarean rate.

The researchers found that very few women had arrested labor during the active stage (six cm dilation or greater). In looking at first-time mothers who went on to give birth vaginally, only 3.5% experienced active labor arrest. Furthermore, labor arrest in active labor occurred in only 30.6% of women who had Cesareans for diagnosed first stage labor arrest, meaning that the other 70% of the women who received Cesareans for Failure to Progress were not yet in active labor (six cm) as it is defined in the new guidelines. Labor arrest in the first stage was not a good predictor of fetal heart rate concerns, postpartum hemorrhage, or newborn breathing problems.

## What are the risks of pushing for longer periods of time?

Due to the large amount of research on this topic, we limited our review to studies that have been published in the past ten years. Since 2007, there have been seven observational studies and one randomized trial on the length of pushing ([Cheng et al. 2007](#); [Allen et al. 2009](#); [Laughon et al. 2014](#); [Cheng et al. 2014](#); [Hung et al. 2015](#); [Altman et al. 2015](#); [Grobman et al. 2016](#); [Gimovsky & Berghella, 2016](#)). Below, I have provided a brief summary of the observational research and described the findings from the one randomized trial.

### Observational studies

In the seven observational studies that have been published on the length of pushing since 2007, several findings were consistent across the studies.

First, researchers have repeatedly found that people with epidurals have much longer pushing times than those without epidurals. For example, one study found that half of all first-time mothers without an epidural gave birth by the time they reached 47 minutes of pushing. But when they looked at first-time mothers with an epidural, it took 120 minutes (two hours) of pushing for half of the people to give birth—the other half took longer. When they looked at the 95th percentile (the length of the second stage by which 95% of those pushing had already given birth, considered the upper range of normal), 95% of first-time mothers without an epidural gave birth within 3 hours and 17 minutes, while 95% of first-time mothers with an epidural gave birth within 5 hours and 36 minutes! ([Cheng et al. 2014](#)).

It's encouraging to note that in research studies, the majority of people with longer pushing times still ended up with vaginal births. However, evidence shows that the longer someone pushes, the more likely it is that they will experience a Cesarean birth or forceps- or vacuum- assisted birth.







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Researchers also consistently found that longer pushing times are related to higher chances of problems for the mother. For example, first-time mothers with an epidural who pushed more than three hours had postpartum hemorrhage rates of 5.9%, compared to 3.7% in those who pushed less than 3 hours. Infection of the uterus also went up with prolonged pushing in first-time mothers (1.2% vs. 0.4%), and the 3rd or 4th degree tear rate also went up (10.1% vs. 5.8%). However, it's not clear whether the higher rates of these complications are due to the prolonged pushing phases themselves, or because of the higher rates of intervention that happen with longer pushing phases, or both. For example, the higher use of forceps or vacuum could contribute to the higher rates of severe tears (Laughon et al. 2014).

For babies, longer pushing times have been related to higher rates of NICU admissions, low Apgar scores, and other newborn health problems. However, the overall rate of these complications is low. For example, in one study that looked specifically at experienced mothers, babies born after three or more hours of pushing had a NICU admission rate of 5.4%, compared to 2.9% in babies who were born after less than one hour of pushing. Several researchers stated that their results support the new guidelines—that people should have additional time to push, because rates of vaginal birth are high and overall complication rates are low (Allen et al. 2009; Laughon et al. 2014; Cheng et al. 2014).

One researcher pointed out that any decision about whether to push for longer periods of time or not should take into account the benefits and risks for each woman's unique situation. Some examples of individual factors that may influence the decision include how well the baby is handling the pushing, how much the baby has traveled down into the pelvis, and if the baby is continuing to descend with pushing efforts (Grobman et al. 2016).

### Randomized controlled trial

In [2016](#), [Gimovsky et al.](#) carried out the first randomized trial on the length of the pushing stage. This was a small study (78 women) that took place in 2014 to 2015 at a single hospital in Pennsylvania. Women could be in this trial if they were having their first baby (single baby, head-first position at term), and if they had normal fetal heart monitor results during labor. If women reached the three hour pushing phase mark with an epidural, they were randomly assigned (like flipping a coin) to either an “extended care” group (41 women) or a “usual care” group (37 women). Those in the extended care group were given the option of continuing pushing for one additional hour, in line with the new ACOG/SMFM guidelines. Women in the usual care group were given no additional time to push. In both groups, when a woman's time was up, she gave birth with either Cesarean, vacuum, or forceps. (Gimovsky & Berghella, 2016)

It's important to note that this study only included women with epidurals. Women without epidurals all either gave birth before three hours of pushing or declined to be in the study. Those who were included, then, all had medically managed labor and births: all of the women had epidurals, about half of them were induced (43-54%), and most of them had labor augmented with Pitocin (81-83%). Most women (81-83%) were also instructed to delay pushing for about an hour because they did not have an immediate urge to push once they were fully dilated. This delay was included in the total time they were given for the pushing phase. Typical practice in this hospital was to instruct those pushing to hold their breath while pushing, and most women pushed while lying on their backs (93-97%). There was a low crossover rate between groups. Two women who were assigned to the extended group received usual care, and nine of those in the usual care group had extended care.

The researchers found that women in the extended-time pushing group had a much lower Cesarean rate than individuals in the usual care group—19.5% vs. 43.2%. The researchers estimated that for every four women who received an additional hour during pushing, one woman would avoid a Cesarean.





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Rates of spontaneous vaginal birth (giving birth vaginally without the help of vacuum, or forceps) were also much higher in the extended care group (51.2% vs. 18.9%). The study was too small to tell differences in postpartum hemorrhage, maternal infection, severe tears, and NICU admissions—however, NICU admission rates were high in both groups (32% and 38%).

According to the author, the reason the overall NICU rates were high is because this particular hospital admits every baby to the NICU whose mother had suspected chorioamnionitis, (personal communication, Dr. Gimovsky, July 2016). Although the definition of suspected chorioamnionitis (infection of the fetal membranes) was not clarified, it could mean that any mother with a temperature above a certain number could be seen as having suspected chorioamnionitis (even if the fever simply related to having an epidural—a known common side effect of epidurals). This study also had high rates of 3rd and 4th degree tears (ranging from 3% to 14%), and chorioamnionitis (27% to 35%), but with no statistical differences between groups. There were zero cases of newborn blood infections, seizures, or deaths.

### So what are the evidence-based definitions of normal and abnormal labor?

Because of all of the updated research evidence that has come out in the past ten years, the newly proposed definitions of normal and abnormal length of labor look quite different than the old definitions. In 2012, new definitions for normal and arrested labor were issued out of the NICHD/SMFM/ACOG workshop on preventing the first Cesarean ([Spong et al. 2012](#)), and reaffirmed in the 2014 “Preventing the Primary Cesarean” guidelines ([ACOG 2014](#)). Here is a comparison:

**Table 1 (page 19) shows the old and new definitions of Failure to Progress.**

### What about failed induction of labor? How is it diagnosed?

In the past, there was no consensus in the medical community on what made up a “failed induction.” However, the question of how to define or diagnose a failed induction is important, because more than four out of ten first-time mothers in the U.S. have their labors medically induced ([Laughon et al. 2012](#)).

ACOG’s 2009 guidelines on elective induction state that women should be “allowed” at least 12 to 18 hours of latent (early) labor before diagnosis of a failed induction (Obstetrics 2009). But in the 2014 consensus guidelines, a new definition was proposed—and this one gives people at least 24 hours of oxytocin (Pitocin) and water breaking before a failed induction can be diagnosed (this clock starts after cervical ripening, if necessary, has happened) ([Spong et al. 2012](#)).

### Should people be given more time before an induction is labeled as “failed?”

Recent evidence supports giving people a longer period of time during an induction before diagnosing the induction as “failed.”

In 2011, researchers ([Rouse et al. 2011](#)) looked at a group of people who had taken part in a clinical trial testing fetal pulse oximetry (the baby’s oxygen status before birth). For this secondary study, the authors looked only at those who were first-time mothers, were induced with oxytocin, and had an unripe cervix (n = 1,347). Nearly all of the women (98%) had epidurals. The 1,219 people who started the induction with their water intact received Pitocin for an average of three hours before having their water broken, and the average total length of induction was about 16.5 hours (within a wide range of 4 to 123 hours). Once women received Pitocin and had their water broken, it took about six hours for 70% of them





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to reach active labor (active labor was defined as five cm and any effacement at all or four cm and 90% effaced).

Although the risk of a Cesarean went up the longer an induced woman was in early (latent) labor, nearly 40% of women who had an early labor that lasted more than 12 hours still went on to have a vaginal delivery. Laboring mothers with longer early phases were more likely to have chorioamnionitis or endometritis (uterine infection) (31% for those with early labors that lasted more than 12 hours vs. 16% for those with early labors less than six hours). Although the researchers said they recorded the exact time of each cervical exam, they did not report the number of exams in the article. This is important because higher numbers of cervical exams (also called “vaginal exams”) are strongly associated with more infections in women whose waters have broken ([Seaward et al., 1997](#)). It is not clear whether the higher infection rates in this study for people with longer labors were due to the longer time itself or due to additional vaginal exams. People with longer early phases of labor also had higher rates of uterine atony (11.3% vs. 5.7%), a condition when the uterus stops contracting after birth, increasing the risk of postpartum hemorrhage. There were no significant differences in the incidence of perineal tears, blood transfusions, NICU admissions, or any newborn outcomes ([Rouse et al., 2011](#)).

When Rouse’s research was published in 2011, a hospital in Texas decided to implement the study authors’ protocol that same year. Three years later, in 2014, that hospital published a study describing the success of the protocol, using data from patients’ medical records. The researchers described rates of failed induction and Cesarean among women who received protocol-adherent care, and among those who did not receive protocol-adherent care ([Rhinehart-Ventura et al., 2014](#)).

The protocol that this hospital put into place for inductions followed what Rouse et al. (2011) had laid out, included options for cervical ripening followed by oxytocin plus an intra-uterine pressure catheter to measure the strength of contractions, artificial breaking of the waters within 24 hours of the start of the induction, and at least 12 hours of oxytocin after membrane rupture (and up to 18 hours of oxytocin) before the induction could be called failed. They defined a “failed induction” as a Cesarean that happened because the laboring person did not reach active labor.

Women could be in the study if they had given birth after 24 weeks of pregnancy to a single baby in head-first position, received an oxytocin induction, and were not dilated more than two cm at the start of the induction. The researchers included 599 subjects in the study—369 had protocol-adherent care and 230 had care that was not in line with the protocol. The results showed that those who had protocol-adherent care had a very low rate of failed induction—only 1.4%. Meanwhile, the women who had care that was not in line with the protocol had a failed induction rate of 7.8%. Furthermore, the Cesarean rate was only 22% in the protocol-adherent group, compared with 33% in the non-adherent group. When they looked only at first-time moms, the Cesarean rate was 34% in the protocol-adherent group and 66% in the non-adherent group.

Other studies have found that there are no harmful effects to the baby if a laboring person is given more time to labor with an induction, as long as both the mother and baby are doing well. In three studies in which researchers examined long inductions and infant outcomes, there was no link between a longer early phase of labor during an induction (up to 12 or 18 hours) and newborn health ([Rouse et al. 2000](#), [Simon and Grobman 2005](#), [Rouse et al. 2011](#)).





# Evidence On: Failure to Progress

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## What increases the risk that an induction will fail?

Evidence shows that a pregnant person's own unique circumstances at the time of the induction and the way their hospital and individual care provider practice affects their personal risk of ending up with a failed induction and Cesarean.

**Whether or not their cervix is ripe:** In one study, researchers compared 143 first-time mothers who were electively induced with an unripe cervix, 286 first-time mothers who were electively induced with a ripe cervix, and 1,771 first-time mothers who went into labor on their own. All of the inductions that were done used Pitocin, and the people with unripe cervixes had their cervixes ripened using the Foley bulb method, which is where a small saline balloon is inserted into the cervix filled with saline and acts as a mechanical dilator.

The researchers found that people who had unripe cervixes and were electively induced were 3.5 times more likely to have a Cesarean compared to those people who went into labor on their own. The women who had unripe cervixes when they were induced also had much slower labors compared to those who were induced with ripe cervixes ([Vahratian et al. 2005](#)).

Recently, researchers have begun to disagree about whether or not the “Bishop score” (the pre-labor scoring system meant to predict if a cervix is ripe) can predict success or failure of an induction. For more information about the controversy about Bishop's score and its ability to predict success with an induction, read this free full-text review by Banos et al. (2015) [here](http://bit.ly/2q8KDu1) (<http://bit.ly/2q8KDu1>).

**Body mass index:** Several studies have also found that having a higher body mass index is associated with higher rates of failed induction ([Wolfe et al. 2011](#); [Kawakita et al. 2016](#)). However, researchers say it's unclear if higher rates of failed induction are related to the pregnant person's physiology, or care provider bias against people of size, or a combination of both factors ([Kawakita et al. 2016](#)). For example, in one Australian study, researchers found that care providers hold stigmatizing attitudes towards birthing people of size ([Mulherin et al. 2013](#)).

**The hospital:** One study in Portugal found that the Cesarean rate for people who were induced was significantly different from hospital to hospital—even after taking into account the “risk level” of the people who gave birth there. The percentage of first-time mothers who ended up with Cesareans for failed inductions ranged from 27% to 55% for elective inductions and 35% to 56% for medically necessary inductions. This means that, at least in Portugal, different hospitals use very different criteria to diagnose a failed induction, and a person may end up at a hospital with care providers who are significantly more likely to “diagnose” a failed induction ([Teixeira et al., 2013](#)).

Marroquin et al. (2013) published an example of a U.S. hospital with a very high Cesarean rate for people who were induced. At a large facility in New York City, first-time mothers who were induced at 41 weeks with an unripe cervix had a failed induction rate (i.e., Cesarean rate) of 49%.

**The health care provider:** It is likely that there is also a “physician effect” when it comes to the risk of Cesarean with elective induction. At a large urban hospital in the U.S., for example, researchers looked at all of the first-time mothers who gave birth to head-first, single babies over a two-year period. When they looked at all the different risk factors for Cesareans, the individual physician was one of the strongest predictors of whether or not an elective induction would turn into an unplanned Cesarean. On average, elective induction doubled the risk of unplanned Cesarean in first-time mothers, but that risk could be higher or lower, depending on who the attending physician was (no midwives were included in this study) ([Luthy et al. 2004](#)).





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## Could changing the definition of “normal” dilation help prevent the preventable Cesarean?

Out of the 2012 NICHD/SMFM/ACOG joint workshop on preventing the first Cesarean, the summary statement concluded that lowering the number of diagnoses of first- or second-stage arrest (often referred to as Failure to Progress) and failed induction, would have a large effect on preventing first-time Cesareans (Spong et al., 2012).

Importantly, the workshop summary declared that non-medical factors play an important role in Cesareans that are performed for Failure to Progress. Time limits, labor and delivery scheduling issues, operating room staff availability, and limited space and resources to support long labors and inductions are all factors that encourage providers to label (or mislabel) a person’s labor as Failure to Progress. Other factors that lead to an overabundance of Failure to Progress diagnoses include care provider fatigue, high workload, and sleep deprivation. In fact, evidence has shown that Cesarean rates for Failure to Progress go up when the care provider knows that they can go to sleep, or when they could be doing office hours instead of participating in a long labor and vaginal birth (Klasko et al. 1995, Spetz et al. 2001, Spong et al. 2012).

The workshop summary also stated that there are financial incentives to diagnosing Failure to Progress:

“Financial incentives and disincentives related to work efficiency and staffing workload may also tilt the scale toward more liberal performance of scheduled cesarean deliveries. Given the time required to monitor a complicated labor, *there is a financial disincentive to persevere when labor does not proceed efficiently or if borderline fetal heart patterns are present.* Evidence suggests that doctors who are salaried and participate in profit sharing, thus reducing the financial incentive to limit the time spent managing labor, have lower cesarean rates” (p. 1191).

## To stop over-diagnoses of “Failure to Progress,” the following recommendations were made:

- Care providers should stick to proper, current definitions of labor arrest, and avoid using the vague term “Failure to Progress” (see [Table 1](#) for definitions)
- Women should be given adequate time for both labor and pushing—and “adequate” time is much longer than what has traditionally been allowed in the past
- Inductions 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, if necessary, is completed
- Birthing persons—particularly first-time mothers—with an unripe cervix should not be induced unless the induction is medically necessary
- Each care provider should receive feedback from their hospital on how often they improperly diagnose labor arrest or “failed induction”

## What happens when care providers stop using Friedman’s Curve?

Results from research on what happens when care providers move away from Friedman’s Curve are just starting to be published! So far, we were only able to find one study that has been published, but we will add more information to this section as future studies come out.

[Ragusa, et al. \(2016\)](#) carried out a prospective study in which 419 Italian women were enrolled. Half of the women had standard care based on Friedman’s Curve, and the other half were given a new model of







## Evidence On: Failure to Progress

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care that was more along the lines of the ACOG/SMFM's new consensus guidelines (from 2014). Women could be included in the study if they were giving birth for the first time and were pregnant with a single baby in head-first position. Women could be in spontaneous labor at term, or having an induced labor post-term.

With the old care model, not only was Friedman's Curve used to define normal and abnormal labor, but food was banned, laboring people were usually restricted to bed and told to push on their backs. With the new care model, Friedman's Curve was used as a screening tool, but providers were instructed to have more patience with labor and carry out further assessments before they decided on surgery or medical intervention. In addition, laboring people who had the new model of care were encouraged to walk during labor and to push and give birth in the position they found most comfortable. They were also given free access to food and drink and the care providers used a standardized protocol to diagnose fetal distress.

Women who received the old model of care (strict adherence to Friedman's Curve) had a Cesarean rate more than twice as high as the women in the new model of care group: 22.2% vs. 10.3%. Those in the new model of care group also had fewer interventions overall; fewer women had Pitocin or had their water artificially broken. The percentage of newborns with low Apgar scores or low umbilical cord pH was higher in the old model of care group (2.3% vs. 0.5%). The average length of labor was the same in both groups.

### **If someone is diagnosed with Failure to Progress, are there any other options beside Cesarean?**

First of all, it is important that the proper definitions for "labor arrest" are used (see the Table 1 on [Page 19](#)). Evidence suggests that if a person is in normal labor (not induced), and if they are less than six cm and their labor has stalled, then this is not true "labor arrest" and they should simply receive supportive care.

Supportive care may mean continued observation, Pitocin augmentation if needed, or discharge from the hospital (discharge is recommended if labor has stopped, water is intact, and mother and baby are both in good condition.) If first-stage labor arrest is diagnosed after the mother has reached at least six cm, medical options include breaking the water, Pitocin augmentation, and/or allowing the person to continue to labor, as long as both mother and baby are healthy ([Spong et al., 2013](#); [Shields et al., 2007](#)). Obviously, there will be cases of labor arrest where a Cesarean becomes necessary.

Based on a thorough review of the evidence, authors Goer and Romano suggested using four preventive "P's" to deal with some outside factors that may cause labor to slow down in the first place ([Goer and Romano 2012](#)). These "P's" include:

**Permission:** Give women permission to move about, eat and drink when they want to, and use whatever positions they find comfortable. Natural behaviors should not be restricted "unless there is a compelling medical need to do so and the person has made an informed choice to comply with the recommended restrictions" (p. 182).

**Physical environment:** The birthing space should be large enough for the laboring person and their support team. There should be private places to walk, tubs and showers for water therapy, and birth







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balls and other props that encourage upright positioning. The laboring person should have a say in the physical aspects of her environment, including lighting, sound, and the people who come in and out of the room.

**Practices:** Practices that restrict mobility—such as being hooked up to continuous electronic fetal monitoring or IV fluids—should not be used unless medically necessary. If these practices become necessary, care providers should try to lessen their impact on the woman’s mobility. For example, portable electronic monitors could be used so that the laboring person can remain mobile, instead of requiring them to lie in bed; or a peanut ball could be used to help position a person with an epidural.

**People:** Care providers should be supportive, nonjudgmental, and respect the birthing person’s autonomy. Birthing persons should feel free to express their emotions or needs “without fear of being judged or pressure to comply with staff preferences or expectations” (p. 183).

## So, what’s the bottom line?

The definition of a “normal” length of labor that has been used since the 1950s is obsolete. The new, evidence-based definitions of normal labor, labor arrest, and failed induction should be adopted immediately, and the vague term “Failure to Progress” should be abandoned.

As long as the laboring person and baby are both healthy, and as long as the length of labor does not qualify as an arrested labor, laboring women should be treated as if they are progressing normally.

Pregnant people who are being medically induced should be given more time to complete the early phase of labor.

Importantly, six centimeters—not four centimeters—should be considered the start of the active phase for most people and caregivers should keep in mind that normal early labor (before six cm) sometimes includes a “resting” period in which there may be no change in dilation for hours. People may decide, together with their caregivers, to delay hospital admission until active labor.

In the end, if more care providers begin using evidence-based definitions of labor arrest and failed induction, we will begin to see fewer of these diagnoses, and a simultaneous, safe lowering of the Cesarean rate.

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**Table 1: Failure to Progress: Old and New Definitions**

Diagnosis	Old Definitions	New Evidence-Based Definitions
<b>Labor Dystocia</b>	Slow, abnormal progression of labor <sup>1</sup>	This term is not used in the new guidelines <sup>2,3</sup>
<b>Failure to Progress</b>	A vague term that can mean the lack of progressive cervical dilation, the lack of descent of the baby’s head, or both <sup>1</sup>	This term is not used in the new guidelines. <sup>2,3</sup> The guidelines state, “A prolonged latent (early) phase... should not be an indication for cesarean delivery” and “Slow but progressive labor in the first stage of labor should not be an indication for cesarean delivery.” <sup>3</sup>
<b>Active labor</b>	When the cervix is between 3 cm and 4 cm dilated; this is when you should see the beginning of a rapid acceleration in cervical dilation <sup>1</sup>	“Cervical dilation of 6 cm should be considered threshold for active phase of most women in labor. Thus, before 6 cm of dilation is achieved, standards of active-phase progress should not be applied.” <sup>3</sup> and “In both spontaneous as well as induced labor, the diagnosis of an arrest disorder should not be made before the patient has entered into the active phase.” <sup>3</sup>
<b>First stage labor arrest</b>	Diagnosed when a woman is in active labor (at least 3 cm to 4 cm) and has contractions with no change in dilation for more than 2 hours <sup>1</sup>	Can be diagnosed ONLY if a woman has reached 6 cm and her water has broken, plus one of the following: 1) there has been no cervical change for 4 or more hours of adequate contractions, or 2) no cervical change with at least 6 or more hours of inadequate contractions with oxytocin augmentation. <sup>3</sup> If the mother is <6 cm dilated, then she needs additional time and/or interventions before an arrest of labor can be diagnosed, because she is still in early labor <sup>2</sup>





# Evidence On: Failure to Progress

<p><b>Second stage labor arrest</b></p>	<p>Can be diagnosed when pushing takes: &gt;3 hours in first-time moms with an epidural, &gt;2 hours in first-time moms without an epidural, &gt;2 hours in experienced moms with an epidural, &gt; 1 hour in experienced moms without an epidural<sup>1</sup></p>	<p>There is no specific maximum length of pushing time that can be spent pushing.<sup>3</sup> Labor arrest in the second stage can be diagnosed if there has been no improvement in descent OR rotation of the baby after: ≥4 hours in first- time moms with an epidural, ≥3 hours in first- time moms without an epidural, ≥3 hours in experienced moms with an epidural, ≥2 hours in experienced moms without an epidural<sup>2</sup> Trained physicians can consider manual rotation of the baby’s head prior to moving on to the use of vacuum, forceps, or Cesarean.<sup>3</sup></p>
<p><b>Failed induction of labor</b></p>	<p>“Labor progression differs significantly for women with an elective induction of labor compared with women who have spontaneous onset of labor. Allowing at least 12–18 hours of latent (early) labor before diagnosing a failed induction may reduce the risk of cesarean delivery.”<sup>4</sup></p>	<p>Failure to have regular contractions (every 3 minutes) and failure of the cervix to change after at least 24 hours of oxytocin (and if the water has been broken, if possible). This time length does not include cervical ripening which may precede the 24 hours of oxytocin<sup>2,3</sup></p>

Definitions from:

1. ACOG Committee on Practice (2003). ACOG Practice Bulletin Number 49, December 2003: Dystocia and augmentation of labor. *Obstet Gynecol* 102(6): 1445-1454.
2. Spong et al (2012). Preventing the first cesarean delivery: summary of a joint Eunice Kennedy Shriver National Institute of Child Health and Human Development, Society for Maternal-Fetal Medicine, and American College of Obstetricians and Gynecologists Workshop.” *Obstet Gynecol* 120(5): 1181-1193.
3. ACOG, SMFM, Caughey, A. B., et al. (2014). “Safe prevention of the primary cesarean delivery.” *Am J Obstet Gynecol* 210:179-193.
4. ACOG Committee on Practice (2009). ACOG Practice Bulletin No. 107: Induction of labor. *Obstet Gynecol* 114(2 Pt 1): 386-397.

