







Evidence on: Premature Rupture of Membranes

When you think about labor and giving birth, the moment when your water breaks might come to mind. For most people, their water breaks after labor has already begun. Sometimes, however, your water might break before labor begins. This is called **the premature rupture of membranes** (sometimes also called the prelabor rupture of membranes), **or PROM**.

There are two different types of PROM. **Term PROM** is when your water breaks before labor at ≥37 weeks of pregnancy. **Preterm PROM** happens when your water breaks before 37 weeks.

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In this article, we focus on term PROM, because PROM at term indicates the beginning of the childbirth process, can impact your options in childbirth, and happens to a lot of people. Between 8–10%, or 1 in 10 people, will have their water break before labor begins (<u>Gunn et al. 1970</u>; <u>Mercer 2015</u>).

However, preterm PROM, or PPROM is also an important topic. So, towards the end of this article, we have included a section with a short overview of PPROM and links to information on treatment and other resources. Preterm PROM can happen any time before 37 weeks pregnancy, so there is a lot more variability in how it is treated and what you may experience if it occurs.

What are the membranes, and what does it mean that they've "ruptured?"

Throughout pregnancy, the *fetal membranes* make up the sac or "bag" inside the uterus that contains the fetus. The membranes also hold the waters (also known as the *amniotic fluid*) in which the fetus is floating.

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The fetal membranes consist of two layers, the amnion, and the chorion. The *amnion* layer interfaces with the amniotic fluid, while the *chorion* layer interfaces with the pregnant person's uterine tissue.

Rupture is the medical term for when something breaks open. So, when someone says, "your waters broke" or "your membranes ruptured," this means there is a tear or opening in the membranes through which the fluid can now leak.

The fetal membranes respond to various stimuli towards the end of pregnancy that can lead to natural rupture (Parry & Stauss III 1998). These stimuli can include:

- Physical stress from stretching of the membranes—due to the growing fetus.
- Disruption of the production of *collagen*, the most common protein in your body that serves as the primary building block of skin, muscle, bone, tendons, ligaments, and other tissues.
- An increase of concentrations of *prostaglandins* in the membranes (more information below).
- Apoptosis (also known as the natural, programmed destruction of cells).

When the membranes receive these stimuli, they make or release enzymes that further break down their cellular structure, eventually leading to membrane rupture (<u>Parry & Stauss III 1998</u>).

Membrane rupture can help prepare the body for the process of childbirth—but why?

The answer lies in the fact that amniotic fluid contains *prostaglandins* (https://cle.clinic/3rAwIPO), a type of lipid (fatty acid) that acts like a hormone, or chemical messenger. During childbirth, prostaglandins can help ripen (thin and soften) the cervix, alter the fetal membranes prior to their rupture, and eventually encourage contractions in the muscle of the uterus (<u>Gibb 1998</u>).

Once you reach term, prostaglandin levels gradually increase in the fetal membranes and in your amniotic fluid. Then, right before the start of labor, there is a very sharp increase in prostaglandin levels (<u>Gibb 1998</u>; <u>Lee et al. 2008</u>). When the membranes rupture, this allows the amniotic fluid containing prostaglandins to encounter the cervix—helping it ripen so that it can begin to dilate.

Membranes rupturing at term or during labor is a helpful process (most of the time), but if your membranes rupture without labor starting right away, then this can be frustrating or anxiety-provoking. Some midwives and birth workers believe that intact membranes, with a normal sac of fluid, can help provide lubrication and room for the baby get into a better position to move through the pelvis. In contrast, it is thought that ruptured membranes mean there is less fluid, and the baby might have more difficulty getting into the best position for birth.

Experiencing PROM without labor starting right away can also complicate your birth plans, especially if you're GBS positive or hoping to avoid a medical induction of labor. For more information about GBS, please see our signature article The Evidence on: Group B Strep (https://ebbirth.com/gbs).

For these reasons, some people wish to keep their membranes strong and intact until labor begins. Later in this article we will discuss some of the current research on nutrients researchers believe can keep membranes strong, until it is the right time for them to rupture.

In rare cases, an infant is born *en caul*, meaning that part or all the membranes are draped on their body at birth. Sometimes, an en caul baby is born inside a completely intact amniotic sac.

If this happens, the membranes can be removed after birth. In some European cultural traditions, being born 'in a hat' or 'in a shirt' (en caul) was seen as a sign of good fortune for the infant.

One reason that *en caul* births are so rare is that many providers believe in rupturing the membranes for you during labor. This is known as the *artificial rupture of membranes* and is also known as *amniotomy*

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or AROM (pronounced A-rom). AROM is one of the most common procedures in obstetrics and midwifery. It is typically performed using an amniotomy hook or amniotomy finger cot (small glove with a tiny hook on the finger) to rupture the amniotic sac.

AROM is commonly done with the intent of inducing labor, strengthening contractions, inserting an internal monitor, or checking the color of the amniotic fluid. To learn more about the evidence for AROM, you can listen to <u>EBB Podcast Episode 244: Evidence on AROM, AVD, and Internal Monitoring</u> (https://ebbirth.com/244). The EBB Pocket Guide on Interventions also covers AROM in addition to other common interventions in childbirth, and is available for purchase <u>here</u> (https://ebbirth.com/shop).

When the membranes rupture on their own, either before or during labor, this is known as *spontaneous rupture of the membranes*, or SROM. If someone refers to 'Spontaneous PROM,' that just means that the membranes ruptured on their own, prior to the onset of labor.

What is it like when your water breaks before labor?

Some people express fear or anxiety about their waters breaking before the start of labor (<u>Spiby, Borrelli, & Hughes 2017</u>)—a fear that may be related to how media shows this process, and childbirth itself, as a dramatic emergency (<u>Luce et al. 2016</u>). Many movies and television shows have iconic scenes showing waters breaking publicly in a huge burst of fluid—such as the Sex and the City movie, Modern Family, One Tree Hill, and many others.

However, most labors do not start with the waters breaking. And when labor does start with PROM, it might be a wetness between the legs or feeling a small trickle of fluid. A large burst of fluid is possible, but so is a small "pop."

The Association of Ontario Midwives has a guide to PROM with a helpful <u>checklist</u> (https://bit. ly/3PPcTO4) for those who are uncertain if their water has broken or not.

What are some risk factors that might increase the chances of your water breaking before labor?

Sometimes term PROM is a normal, physiological event!

There is no single thing that causes term PROM. There are some factors that may increase the likelihood that you may experience PROM, but many people who do not have any of the risk factors may still experience PROM.

In some cases, premature rupture of membranes at term is normal. As we mentioned earlier, fetal membranes are "programmed" to weaken toward the end of pregnancy and/or labor.

A combination of factors leads to the creation of a weak spot in the amniotic sac near the cervix. Most commonly, the pressure of contractions causes the membranes to finally give way at the weak spot, but occasionally this can happen before contractions begin (Moore et al. 2006).

Some of the factors that may increase the risk of term PROM include:

- Infection (<u>ACOG 2020</u>)
- Uterine stretching due to *polyhydramnios* (too much amniotic fluid) or pregnancy with more than one baby (Parry & Stauss 1998)
- Microbes
- Cervical exams
- Membrane sweeping
- · High doses of Vitamin C and E given together

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- Low levels of fatty acids
- Exposure to extreme weather temperatures and air pollution

We cover the evidence on microbes, cervical exams, membrane sweeping, vitamins C & E, fatty acids, and weather/pollution below.

Microbes (bacteria and yeast)

The microbiome is the ecosystem of trillions of microbes (bacteria, fungi, protozoa, and viruses) that live and co-exist with you in certain places in your body—such as your skin, gut (intestines, rectum), nose, mouth, and genital and urinary tracts.

In looking for causes of Term PROM some studies have looked at the vaginal microbiome. The question is—are there types of microbes in your vagina that could put you at higher risk for PROM?

The vaginal microbiome fluctuates throughout the lifespan (<u>Bennett, Brown, & MacIntyre 2020</u>). For those of us with vaginas, bacteria in the genus *Lactobacillus* normally dominate our vaginal microbiome (<u>Bennett, Brown, & MacIntyre 2020</u>). This is healthy because *Lactobacillus* are the 'good' bacteria of the vagina and might even play a protective role during pregnancy (<u>Bennett, Brown, & MacIntyre 2020</u>; <u>Kroon et al. 2018</u>). So, it's possible that having more "good bacteria" in the vagina may help protect someone from term PROM as well. On the other hand, a disruption in the microbiome can be a risk factor, especially for PPROM. We could not identify any research about the role specific bacteria play in term PROM; however, it would make sense that if bacterial infections can influence PPROM, they could also influence term PROM. We go into detail about the relationship between the microbiome and premature ruptures of membranes later in this article.

There have been some questions as to whether vaginal yeast infections can increase your risk of PROM. A yeast infection, or <u>Candidiasis</u> (https://bit.ly/3K8MQNU), is caused by a common type of fungus that normally lives on skin and inside the body, called *Candida*. However, in a new review of the research on yeast infections and pregnancy complications, researchers did not find strong evidence of increased risk for PROM among pregnant people with symptomatic or asymptomatic yeast infections (<u>Gigi et al. 2023</u>).

Cervical exams

As you get closer to your due date, many providers will check your cervix (called a "vaginal exam," "cervical exam," or "cervical check") starting at around 35-37 weeks. Some providers like to continue these checks weekly until birth. For more information about cervical exams, you can watch our video on the <u>Evidence on Prenatal Checks at the End of Pregnancy</u> (https://bit.ly/44LuTgu), or listen to <u>EBB</u> <u>Podcast Episode 5: Evidence on Prenatal Vaginal Exams</u> (https://ebbirth.com/5).

In 1984, a study by Lenihan clearly showed a relationship between weekly vaginal exams and PROM. In this study, 349 women were randomly assigned to weekly vaginal exams starting at 37 weeks, or no vaginal exams until after 40-41 weeks.

The group with weekly vaginal exams starting at 37 weeks had a three times higher chance of having PROM (18%) compared to those who had no weekly exams until 40 or 41 weeks (6%) (Lenihan 1984).

In another study that took place in 1992, 587 women were randomly assigned to weekly vaginal exams or no exams. They found no differences in the rates of PROM between the two groups. While they concluded there was no relationship between prenatal vaginal exams and term PROM, they also found no benefit to the weekly exams (McDuffie et al. 1992).

We recognize that cervical exams can be hard for individuals with a history of sexual or medical trauma. In early pregnancy you can talk to your provider about when to expect cervical checks over the course of your pregnancy. Talking to your provider at the beginning of an appointment about whether they plan to

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do a cervical exam, and why, can help protect your boundaries and bodily autonomy. You always have the right to decline a cervical exam. For more information about trauma-informed care and consent, listen to <u>EBB Podcast Episode 180: Trauma-Informed Care and Consent with Feminist Midwife, Stephanie</u> <u>Tillman</u> (https://ebbirth.com/180).

Sweeping of the membranes

Membrane sweeping, also known as "membrane stripping" or "stretch and sweep," is a procedure where a care provider inserts 1-2 gloved fingers into the vagina and through the cervix, and then uses a circular sweeping motion to separate the bag of waters from the lower part of the uterus.

Membrane sweeping can enhance the release of prostaglandins and possibly oxytocin, helping ripen the cervix and even start labor in some cases. For more information about membrane sweeping, you can listen to <u>EBB Podcast Episode 151</u>: <u>Updated Evidence on the Pros and Cons of Membrane Sweeping</u> (https://ebbirth.com/151).

However, theoretically, membrane sweeping could lead to accidental rupture of the membranes. So far, there is one study that supports this theory:

In 2008, Hill et al. randomly assigned 300 pregnant participants to either receive a weekly cervical exam (control group) or a weekly membrane sweep starting at 38 weeks (<u>Hill et al. 2008</u>). If a finger could not be put through the cervix (because the cervix was not dilated enough), people in the membrane sweeping group were given cervical massage instead, to encourage dilation. So, people in the membrane sweeping group did not always receive membrane sweeping.

For both groups as a whole, there were no statistically significant differences in the rates of PROM (7% in the no-sweep group vs. 12% in the sweeping group). When we say that something is not "statistically significant," this means that the differences could have been due to chance.

A few participants went into labor or had PROM after they were randomized but before they received their assigned intervention at 38 weeks. When these individuals were kept out of the analysis, the rates of PROM were 10.3% in the sweep group and 5% in the non-sweep group. This was still not statistically significant.

However, for those who were more than 1 cm dilated at the time of the intervention, participants in the membrane sweeping group were significantly more likely to develop PROM (9.1% vs. 0%).

This is important because these are the people who actually received membrane sweeping, instead of cervical massage.

Rates of maternal infection (chorioamnionitis) were similar between the two groups, for both GBSnegative and GBS-positive participants.

Unfortunately, no studies have compared membrane sweeping to having no vaginal exams at all. Since there is some evidence that vaginal exams—by themselves—can increase the risk of PROM, it would be interesting to know the risk of membrane sweeping compared to no interventions at all.

Vitamin C

There is a theory that Vitamin C can strengthen the membranes and prevent them from breaking early. There are two systematic reviews on Vitamin C and PROM (<u>Mousa, Naqash, & Lim 2019</u>; <u>Rumbold et al.</u> <u>2015</u>), but they simply review three older studies that we describe below.

In our search, we found one study showing that low-dose Vitamin C may prevent PROM, while two studies found that high-dose Vitamin C may actually increase the risk of PROM.

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In a small but high-quality trial that took place in Mexico, 109 pregnant people were randomly assigned to receive a small dose of Vitamin C once per day (100 mg) or an identical-looking placebo pill, starting at 20 weeks. People could not be in the study if they were taking any other prenatal vitamins.

One in four people in the placebo group (25%) experienced PROM, compared to only 8% of the Vitamin C group (Casanueva et al. 2005).

It's important to note that the Vitamin C dose in this study (100 mg) was small—much lower than the highest recommended amount of 2,000 mg per day. The researchers warned that taking high doses of Vitamin C could possibly increase the risk of PROM.

In fact, in two other studies, researchers found a link between high doses of Vitamin C (when given with Vitamin E) and PROM (Spinnato et al. 2008; Xu et al. 2010).

The first of these studies randomly assigned 697 pregnant people at high risk for preeclampsia to take Vitamin C (1,000 mg) and Vitamin E (100 IU) once per day, or to take a placebo daily. Those assigned to the Vitamin C/E group had a two times higher risk of PROM (10.6% vs. 5.5%) compared to those who took a placebo (Spinnato et al. 2008).

In 2010, another group of researchers randomly assigned 2,647 low-risk and high-risk pregnant people to Vitamin C (1,000 mg) and Vitamin E (400 IU) twice per day, or to take a placebo. The trial was stopped early because they found that those who took Vitamin C and E were at increased risk of stillbirth or newborn death (1.69% vs. 0.78%), PROM (10.2% vs. 6.2%) and PPROM (6% vs. 3%) compared to participants who took a placebo (Xu et al. 2010).

Researchers aren't sure why one study found a beneficial effect of Vitamin C, and two studies on Vitamin C found harmful effects, but it could be that higher doses increase the risk of PROM, or maybe taking Vitamin C and E together increased the risk of harm.

FYI, a common prenatal vitamin may contain about 60 mg of Vitamin C and 30 IU of Vitamin E, much smaller doses than the vitamins tested in these 2 studies that found evidence of harm.

Fatty acid supplements

Omega-3 fatty acids, which are commonly found in fish oils, lower inflammation. This decrease in inflammation could help maintain strength of the membranes. We found two randomized controlled trials on this subject:

In 2014, researchers randomly assigned 129 participants to receive 200 mg of DHA (Omega-3 fatty acids) daily and 126 to receive a placebo with olive oil from the 8th week of pregnancy until birth (Pietrantoni et al. 2014).

The researchers found a link between DHA supplementation and a decrease in markers for inflammation—as well as fewer cases of PROM.

Participants who received the DHA supplements were less likely to experience term or preterm PROM. Preterm PROM was experienced by one person in the DHA group and four people in the placebo group. Term PROM was experienced by five in the DHA group and 12 in the placebo group.

In 2021, researchers randomly assigned 1,100 participants to receive either 200 mg of DHA or 1,000 mg of DHA. The purpose of this study was to test whether there are additional benefits to taking a higher dose of DHA than the 200 mg dose commonly found in prenatal supplements (Carlson et al. 2021). The researchers enrolled participants who were between 12 and 20 weeks of pregnancy, with 524 in the 200 mg/day group and 576 in the 1000 mg/day group.

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The researchers found that those who were taking 1,000 mg of DHA had a lower rate of early preterm birth (1.7%) compared to those who were taking 200 mg of DHA (2.4%), with extra benefits found among those who entered the study with low levels of DHA in their body (<u>Carlson et al. 2021</u>). The higher dose of DHA was also associated with fewer adverse events in pregnancy, including PROM, chorioamnionitis (which we discuss below), and pyelonephritis (also known as a kidney infection).

Weather and Environmental Factors

Very hot weather or very cold weather can be hard on anyone, pregnant or not. There can be significant health risks to those who are exposed to extended periods of hot weather with no access to air conditioning or green spaces (both of which are known to provide relief during hot weather events).

The stress that extreme weather puts on the body is well documented, and researchers have been studying how this stress may impact pregnant people, particularly those close to childbirth. There is also some evidence that exposure to air pollution can increase the risk of PROM. Exactly how this works is poorly understood, yet there is a growing scientific agreement that exposure to pollution can increase the risk of negative birth outcomes, including PROM.

In a 2018 study, researchers identified 15,381 people who were pregnant with a single baby and experienced PROM across the continental United States, from 2001 to 2008 (<u>Ha et al. 2018</u>). Those who had two or more pregnancies with PROM were only counted once, for the first pregnancy. Researchers then looked at the weather in the week immediately preceding birth. They found that during the warm season (May through September), a 1°C (or 1.8°F) increase in the average temperature during the week before birth was associated with a 5% increase in the risk of PPROM and 4% increase in the risk of term PROM. During the cold season (October through April), a 1°C increase in the average temperature was associated with a 2% risk reduction in both PPROM and term PROM.

In 2021, researchers looked at whether living close to petrochemical industrial parks (PIPs) can impact rates of PROM (<u>Huang et al. 2021</u>). *Petrochemical industrial products* include plastics, natural gas, and other consumables made from petroleum.

Using the Taiwanese Birth Certificate Database, the researchers reviewed over 1.8 million birth records, identifying 29,371 cases of PROM and a control group of 88,113 typical births. Huang et al. found that those living within a 3-km (1.86 mile) radius of a PIP had an increased risk of term PROM and PPROM compared to those who did not. Those with term PROM and PPROM were more likely to be exposed to petrochemicals during their pregnancy than those who were not. Both PPROM and term PROM risks were higher among those who lived near PIPs or were exposed to petrochemicals regularly (Huang et al. 2021).

This study's major limitation was that it is difficult to determine an amount of petrochemical pollution that pregnant people are exposed to on a day-by-day basis. Also, birth certificate data did not contain information about other lifestyle or social and economic factors that could also impact health outcomes in the study.

In 2023, researchers studied if hot weather events, air pollution, and access to green spaces or air conditioning can impact the risk of PROM (<u>Jiao et al. 2023</u>). The data for this study came from electronic health records from 190,767 people who gave birth in southern California, of whom 16,490 had experienced spontaneous PROM.

The researchers found an increase in the risk of PROM of 9 to 14% among those exposed to heatwaves of one to seven days during the last week of their pregnancy. Longer heatwaves were not as common in this study, so gathering results for the most extreme hot weather events was a challenge. The researchers also looked at the rates of term PROM and PPROM and found that during heatwaves, the risk of both forms of PROM during heatwaves were similar.

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Importantly, Jiao et al. found that the risks of heat events were not distributed equally. The risk of PROM was greatest for if you were exposed to higher levels of air pollution for your entire pregnancy, or if you are under age 25, have a lower educational level, have a lower household income, or smoke. They also found higher levels of risk if you lived in places that had less green space, as well as if you lived in places where air conditioners are less common. This information suggests that forms of oppression—including ageism, racism, and classism—can put people at higher risk for PROM due to environmental inequities.

These researchers all emphasize that global warming and exposure to airborne pollution is a cause for concern for pregnant people (<u>Ha et al. 2018; Huang et al. 2021; Jiao et al. 2023</u>).

Other dietary factors and term PROM

Most of the evidence on identifying risk factors for PROM focuses on PPROM (before 37 weeks). We did not find any other studies on dietary methods of preventing term PROM, such as eating eggs or high levels of protein during pregnancy. This is an area where more research is needed.

Summary of risk factors for term PROM

- There is limited evidence that microbes in your vagina can put you at a higher risk for PROM, but having a healthy microbiome may help keep membranes strong by lowering the risk of infection or inflammation.
- Some evidence exists that cervical exams can increase the risk of term PROM, and there is no evidence that routine cervical checks offer any benefits.
- The evidence on the relationship between membrane sweeping and term PROM is limited, so it is difficult to say right now whether membrane sweeping increases the risk of term PROM.
- Dietary supplements can have a variable effect on the risk of term PROM: fatty acid supplements may lower the risk, while taking Vitamin C at very high doses, or Vitamin C and E together, may increase the risk of PROM.
- There is evidence that being exposed to very hot weather, very cold weather, or air pollution, may increase the risk of both term PROM and PPROM.

What is the "24-hour clock for PROM," and where did it come from?

Some people are under the impression that once your water breaks at term, you only have 24 hours to give birth, and if you don't—then you automatically need a Cesarean. Other people are told that birthing people only have 24 hours to go into labor before they must be induced. Where did these opinions come from? Are they evidence-based?

The concept of the 24-hour clock for Term PROM started in the 1950s and 1960s. Back then, babies were more likely to be stillborn or die with longer time periods between PROM and delivery (<u>Burchell</u> 1964; <u>Calkins 1952</u>; <u>Lanier et al. 1965</u>; <u>Taylor et al. 1961</u>).

Many doctors at this time believed that everyone should give birth within 24 hours after their water broke, even if it required a Cesarean.

In 1966, Shubeck et al wrote, "With rupture of membranes, the clock of infection starts to tick; from this point on isolation and protection of the fetus from external microorganisms virtually ceases...Fetal mortality [death], largely due to infection, increases with the time from rupture of membranes to the onset of labor" (Shubeck et al. 1966).

When we looked at articles from the 1960s, we too were struck by the large increase in the risk of stillbirth and newborn death the longer someone's water was broken after PROM. One study found that as many as 50% of babies were stillborn or died after birth if their mother developed a fever or had other signs of infection with PROM (Lanier et al. 1965).

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No wonder doctors were so afraid of long periods between the water breaking and birth! In some studies, taking more than 24 hours for the baby to be born led to death rates that were 2 or 3 times higher than babies who were born within 24 hours after PROM!

However, it is important to understand the differences between how care was provided in the 1950s and 1960s and how care is provided today—many decades later.

First of all, nearly all of the studies back then had overall death rates that would be considered completely unacceptable today. Whether or not someone experienced PROM, the overall stillbirth and newborn death rates in these studies were as high as 4% for hospital births.

The researchers did not usually report the number of breech births, Cesareans, and use of forceps during birth. Babies sometimes died from botched forceps deliveries. Because Cesareans were still relatively uncommon, Cesareans were sometimes not provided to save a baby's life.

One study mentioned that more than half of the participants were African American. At that time, most white doctors and white hospitals did not provide Black women with any prenatal care. And there were massive "public health" campaigns to make it illegal for Black midwives to practice—even though they were the main health care providers for their communities (<u>Goode & Rothman 2017</u>). Black women who did not have access to a Black midwife were sometimes not given any medical help by white providers until many, many hours after their water had broken. Tragically, their chance of infection was five times greater than white patients who were provided with timely health care (<u>Lanier et al. 1965</u>).

In many of these papers, the authors mentioned that antibiotic treatment was not popular during this time. This means that those patients who were at risk for infections or had early symptoms of infection were not treated until their infections were quite severe. The maternal infections could then be passed on to the babies in utero. If doctors did use antibiotics, they were usually limited to only penicillin, which is not effective against some types of bacteria.

Also, Group B strep—a major risk factor for newborn infections—was not understood or treated at that time (see <u>ebbirth.com/groupbstrep</u> for more information).

Another reason reported death rates were high was because some researchers did not separate term PROM from PPROM. In other words, they put all babies who were born after PROM in the same group—whether or not they were born prematurely. However, when they separated the normal-birth-weight babies from the low-birth-weight babies (a sign of being born at term versus being born preterm), they still found that normal-birth-weight babies had higher death rates after 24 hours of PROM than normal-birth-weight babies who were born within 24 hours of PROM.

Finally, most of the studies from the 1950s-1960s were based on retrospective (looking back in time) chart reviews. This type of study can have problems with accuracy. Also, none of the researchers looked at how many vaginal exams were performed during labor—one of the most important risk factors for infection with PROM (as we will discuss later).

Today, we have access to better quality research about what happens when people wait for labor to start on its own or induce labor after term PROM.

The research we will discuss shows that with proper care, waiting for up to 48-72 hours after the water breaks does not increase the risk of infection or death to babies who are born to those birthing people who meet certain criteria.* However, waiting up to 48 to 72 hours for labor to start means that birthing person may have a higher chance of experiencing infection themselves (Hannah et al. 1996; Pintucci et al. 2014).

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So the "24-hour clock" rule is no longer valid today.

*These criteria are important, and we will talk more about them further on.

If you have PROM, how long does it take for labor to start on its own?

If people with PROM are not induced, around 45% will go into labor within 12 hours (<u>Shalev et al. 1995;</u> <u>Zlatnik 1992</u>).

Between 77% and 95% will go into labor within 24 hours of their water breaking (<u>Conway et al. 1984;</u> <u>Pintucci et al. 2014; Zlatnik 1992</u>).

In one large study, 76.5% of people with term PROM went into labor within 24 hours, and 90% were in labor within 48 hours (<u>Pintucci et al. 2014</u>). Although some of these people (16%) were induced, most (84%) went into labor on their own.

In another large study, researchers assigned some women to wait for up to 72 hours for labor to begin after their water broke. Out of these women, 83% went into labor on their own and had a normal vaginal birth (Shalev et al. 1995).

Some researchers have found that it may take longer for people giving birth for the first time to go into labor after their water breaks. One study found that 20% of people giving birth for the first time waited longer than 48 hours for contractions to begin after PROM, while only 7% of those who had given birth before took longer than 48 hours after PROM (Morales & Lazar 1986).

Induction versus Waiting for Labor

When someone's water breaks before labor at term, one of the most important questions they will face is whether to induce labor or wait for labor to start on its own.

- Waiting for labor to start on its own is called *expectant management*.
- Starting labor artificially with induction is called *active management*.

Many researchers have tried to compare the risks and benefits of induction versus expectant management.

In almost all the studies on this issue, researchers only looked at people with PROM who had a single baby in head-first position. And they usually did not allow people with other pregnancy complications, such as infection, high blood pressure, or gestational diabetes, in their studies.

So, the results that we will talk about in this article apply mainly to low-risk people giving birth.

When researchers compare induction versus expectant management, they usually look at these health results:

- How long did it take for the baby to be born after PROM?
- How often did chorioamnionitis (infection of the membranes, or amniotic sac) occur?
- · How many had Cesareans?
- How many newborns had infections (either actual infections or suspected infections)?

Group B Strep and PROM

The evidence on induction versus waiting for labor with term PROM is hard to interpret. This is because each research study set its own standards for how labor was induced, how long people waited for labor to begin before being induced, and what conditions required a Cesarean. These differences can lead to very different findings among studies that are supposed to be answering the same question.

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One of the most important problems with the evidence on term PROM is related to Group B Strep. Most of the studies that we will talk about, including the famous "Term PROM" study (<u>Hannah et al. 1996</u>), were carried out before people in the U.S. were screened and treated for Group B Strep.

It is very common for pregnant people to carry Group B Strep bacteria in their digestive systems. The CDC reports that 25% of pregnant people will carry the Group B Strep bacteria in their vaginas or rectums. Carrying this type of bacteria puts you at higher risk for chorioamnionitis and puts newborns at higher risk for Group B Strep infection.

Currently, most pregnant people in the U.S. and some other countries are screened for GBS in the third trimester, and if they are positive for GBS, most receive IV antibiotics when labor begins.

Screening and treatment for GBS did not happen in most all the studies that looked at induction versus waiting for labor with term PROM. So, the results from these studies probably inflate the risk of infection that a birthing person or newborn might experience if they had term PROM today.

You can read more about GBS here: ebbirth.com/groupbstrep

Ultimately, the question "With term PROM, is induction or waiting for labor the better choice?" will remain controversial until another large-scale study is carried out using modern methods of screening and treating for Group B Strep bacteria.

Reviews of the Research

Researchers have combined all the results from randomized trials on this topic into one large study, called a *meta-analysis*.

Content note: In this review of the research, we will be discussing newborn illness and rare cases of newborn death.

Cochrane Review

In 2017, an updated Cochrane meta-analysis replaced the prior version that was published in 2009. The new review contained 23 randomized trials with a total of 8,615 people giving birth. Ten studies compared expectant management to induction with IV oxytocin, and 12 studies compared expectant management to induction or vaginal prostaglandin E2 (Middleton et al. 2017).

One problem that we noted with this review is that only two of the studies (contributing 320 participants out of the 8,615 total) screened and treated for Group B Strep. Five studies gave antibiotics to everyone, regardless of whether participants had Group B Strep.

Based on their assessment of each study's design, the reviewers stated that the overall quality of the evidence was low, meaning that their confidence in the results is limited. If the reviewers specified the exact level of evidence for each finding, we have noted that in parentheses below.

The researchers found that overall, there may be more pros than cons to induction with term PROM. Participants who were immediately induced after term PROM had shorter length of time from PROM until birth, were less likely to experience maternal infections (low-quality evidence), and appeared to have no increase in the risk of Cesarean (low-quality evidence). Their babies were less likely to need antibiotics after birth and less likely to be admitted to the NICU, and both birthing people and babies had shorter hospital stays.

There were no differences between induction and expectant management groups in the risk of serious maternal infection (very-low quality evidence), definite newborn infection (very-low quality evidence), or perinatal death, a combined measure of stillbirth or newborn death (moderate-quality evidence).

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Two possible side effects of medical induction are uterine hyperstimulation and uterine tachysystole. In 2010, the American College of Obstetricians and Gynecologists recommended abandoning the term hyperstimulation because it is vague and not defined. Instead, the term uterine tachysystole should be used.

Uterine tachysystole is defined as the uterus contracting too frequently (more than 5 contractions in 10 minutes, averaged over a 30-minute window), and can lead to a possible decrease in oxygen to the baby as well as fetal heart rate changes during labor.

Four studies in the Cochrane review reported higher rates of hyperstimulation or tachysystole in the induction groups. The largest study that reported this side effect was carried out by Krupa et al. in 2005. In this study, there were 150 participants, and half of whom were induced with misoprostol [Cytotec]. The researchers found that 10.7% of the induction with misoprostol group experienced tachysystole, compared to 2.7% in the expectant management group.

On the other hand, they found more fetal heart rate decelerations in the expectant management group (13.3% vs. 5.3%).

Labor Induction

Since the most recent Cochrane review was published in 2017, other researchers have conducted their own reviews of the research on PROM. Two recent reviews have focused on when to induce labor after PROM. Both reviews include the data from the Term PROM study.

Bellussi et al. (2021) reviewed 9 randomized control trials with a total of 3,759 participants. These researchers suggest that the data supports inducing labor within 6 to 12 hours of PROM to reduce the risk of complications due to infection in the birthing person and in the baby.

However, Delorme et al. (2021) were less certain that their data support this conclusion. While induction can shorten the length of labor, they do not find induction will reduce the risk of infection. These authors point out that so much of the available data even today come from the Term PROM study (when GBS screening and antibiotic treatment were not part of regular prenatal care) that it is hard to say what the risk of infection is 3 decades after that study was published.

The Famous Term PROM Study

The most important study that has ever been done on term PROM is the "Term PROM" study. This highquality study was published in the New England Journal of Medicine (<u>Hannah et al. 1996</u>).

Because it was such a large study, the Term PROM study results drive most of the findings in any metaanalysis, including the Cochrane review on this topic (<u>Dare et al. 2006</u>), and the two reviews listed above.

Therefore, we will focus on the findings of the Term PROM study in this article, while occasionally mentioning results from other studies.

Between the years of 1992 and 1995, a group of researchers from 72 hospitals enrolled 5,041 low-risk women from six different countries (Australia, Canada, Denmark, Israel, Sweden, and United Kingdom) into the Term PROM study.

Women were invited to be in the study if they came to the hospital with PROM. Everyone had a nonstress test before entering the study, and they were not included in the study if they had meconium staining of the amniotic fluid or any signs of infection when they arrived at the hospital.

Everyone was swabbed to check for Group B strep when they entered the study, but in most cases, nobody knew the results of the GBS test until after the baby was born.











People with term PROM were randomly assigned to one of four groups:

- 1. Immediate induction of labor with oxytocin
- 2. Immediate induction of labor with prostaglandin gel (PGE2)
- 3. Waiting for labor to start for up to four days, followed by induction with oxytocin if needed
- 4. Waiting for labor to start for up to four days, followed by induction with prostaglandin gel if needed

Those people who were assigned to the waiting groups could wait for labor to begin either at home or in the hospital. They were told to check their temperatures twice per day and were told to report any fever, change in the color or smell of the amniotic fluid, or other problems.

People in the waiting (also called "expectant management") groups were induced if they developed complications (such as signs of infection), if the laboring person requested an induction (which ended up being the most common reason for induction in the expectant management groups), or if labor did not start after four days.

Decisions about antibiotics were made by each person's own healthcare provider.

What did researchers find in the Term PROM study and in other studies?

Cesarean Rates

In the Term PROM study, there were no differences in Cesarean rates between the induction groups and the waiting for labor groups. Cesarean rates were low in all four groups (13.7-15.2%).

When the researchers separated out those people who had given birth before, versus those who were giving birth for the first time, they still found no differences between groups.

Among people giving birth for the first time, Cesarean rates were:

- 14.1% in the induction with oxytocin group
- 13.7% in the expectant management oxytocin group
- 13.7% in the induction with prostaglandin group
- 15.2% in the expectant management with prostaglandin group

Among people who had given birth before, Cesarean rates were:

- 4.3% in the induction with oxytocin group
- 3.9% in the expectant management oxytocin group
- 3.5% in the induction with prostaglandin group
- 4.6% in the expectant management with prostaglandin group

About 25% of people giving birth for the first time had forceps or vacuums used during their births. Among people who had given birth before, only 3.4–4.6% had forceps or vacuums used. There were no differences between induction and expectant management groups in rates of forceps or vacuum deliveries.

Infection in the Birthing Person

The *chorioamnion* (or membrane) is a physical barrier to bacterial invasion during pregnancy, so when the water or membranes break, this means the birthing person is at higher risk for infection.

Chorioamnionitis means inflammation of the membranes due to infection.

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In the Term PROM study, the researchers defined chorioamnionitis as:

- Laboring person's temperature >37.5°C (99.5°F) on at least two time points more than one hour apart OR
- Any single temperature >38°C (100.4°F) OR
- A white blood cell count of >20,000 per mm3 (normal = 4,500-10,000) OR
- Foul smelling amniotic fluid

Researchers today frequently criticize the Term PROM definition of chorioamnionitis for being "too loose." This means that the Term PROM researchers probably over-diagnosed chorioamnionitis.

According to the American College of Obstetricians and Gynecologists, chorioamnionitis can be diagnosed if a birthing person has a temperature >38°C (100.4°F) AND usually at least one other indicator: fast fetal heart rate, fast maternal heart rate, abdominal pain, high white blood cell count, or foul-smelling fluid.

The American Academy of Pediatrics has even stricter standards for diagnosing chorioamnionitis: a temperature of >38°C (100.4°F) AND at least TWO other indicators: fast fetal heart rate, fast maternal heart rate, abdominal pain, high white blood cell count, or foul-smelling fluid.

Using their looser definition of chorioamnionitis, the Term PROM researchers found that chorioamnionitis was less common in the immediate induction with oxytocin group (4%) compared to the group that waited for up to four days until induction with oxytocin (8.6%).

There were no differences in rates of chorioamnionitis between people in the immediate induction with prostaglandins group compared to people in the waiting for labor for up to four days until induction with prostaglandins group.

The overall rate of chorioamnionitis in the Term PROM study was 6.7% (<u>Seaward et al. 1997</u>). This is a pretty high rate and could be partially explained by the fact that few people in the study had antibiotics for Group B Strep—a known risk factor for chorioamnionitis.

In 2014, researchers published a large study of people with term PROM, and they found that with screening and treatment for GBS, the overall rate of chorioamnionitis was 1.2% in a sample that included many women who waited for labor to begin on its own (<u>Pintucci et al. 2014</u>).

When we look at the Term PROM study, there are several potential reasons—other than the induction itself—that could help explain why those in the immediate induction with oxytocin group had lower rates of chorioamnionitis. These reasons include the fact that people in the immediate induction group had fewer vaginal exams, shorter labors, and spent less time in the hospital compared to women in the waiting group.

Similarly, the 2017 Cochrane review found that induction is associated with a lower risk of infection in the mother.

However, it is very important to note that most of the studies in the Cochrane review did not take into account the number of vaginal exams, nor they do not follow current GBS infection protocols.

Vaginal Exams

The number of vaginal exams that someone with PROM has after their water breaks is possibly the most important factor that increases the risk of whether someone with term PROM will develop chorioamnionitis.

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In the Term PROM study, a higher percentage of people in the waiting for labor groups (56%) had four or more vaginal exams compared to people in the immediate induction groups (49%).

Seaward and colleagues found that in the Term PROM study, a person's risk of chorioamnionitis increased as the number of vaginal exams that they received increased (<u>Seaward et al. 1997</u>).

Compared to those who had fewer than three vaginal exams:

- 3-4 vaginal exams lead to 2 times the odds of having chorioamnionitis
- 5-6 vaginal exams lead to 2.6 times the odds of having chorioamnionitis
- 7-8 vaginal exams lead to 3.8 times the odds of having chorioamnionitis
- >8 vaginal exams lead to 5 times the odds of having chorioamnionitis

The strong link between the number of vaginal exams and the risk of chorioamnionitis has been confirmed in many other studies. For example, in 2004, Ezra et al. found that seven or more vaginal exams were an important risk factor for infection in women whose water had broken (Ezra et al. 2004).

The reason vaginal exams can lead to infection is because even though care providers use sterile gloves, their fingers are pushing bacteria from the outside of the vagina up to the cervix as they conduct the exam. In fact, vaginal exams have been shown to nearly double the number of types of bacteria at the cervix (Imseis et al. 1999).

There is some evidence that a "sterile speculum exam" does not introduce extra bacteria to the cervix. In one small research study, five women had two sterile speculum exams, and their cervixes were swabbed to check for bacteria after each exam. There was no increase in bacteria on the cervix after the second speculum exam (Imseis et al. 1999).

In the Term PROM study, about two in five people (40%) received a vaginal exam (with sterile gloved hands) when they entered into the study. This is important because those people who were in the waiting groups took longer to give birth than those people who were induced with oxytocin. In other words, those in the waiting groups likely had an increased risk of infection due to the initial vaginal exam (Seaward et al. 1997).

Time to Give Birth

Not surprisingly, the Term PROM study found that people who are induced give birth more quickly than people who wait for labor to start on its own.

Participants in the immediate induction with oxytocin group gave birth an average of 17 hours after their water broke, and those in the immediate induction with prostaglandins group gave birth an average of 23 hours after their water broke—compared to an average of 33 hours among those in the waiting groups.

Among those in the expectant management groups in the Term PROM study, 45% gave birth in the first 24 hours, and 83% gave birth within the first 48 after PROM (<u>Melamed et al. 2023</u>).

Cord Prolapse

There was no evidence that term PROM increases the risk of cord prolapse.

Cord prolapse only occurred two times out of more than 5,000 people with PROM who were enrolled in the study—once in the induction group and once in the waiting group.

To read more about cord prolapse and whether bed rest is required with term PROM, <u>read this article</u> (http://bit.ly/2tm7K7d) from Evidence Based Birth[®].

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Newborn Infection

In the Term PROM study, blood samples were taken from most of the babies. There were no differences in newborn infection rates between any of the groups. Infection rates ranged from 2–3%.

The Term PROM researchers carefully defined what an infection would be and even had separate doctors evaluate for newborn infection. Definite infection was defined as the presence of signs and symptoms of infection, plus one or more of the following: positive culture of blood, cerebrospinal fluid, urine, tracheal aspirate, or lung tissue; a positive Gram's stain of cerebrospinal fluid; a positive antigendetection test with blood, cerebrospinal fluid, or urine; a chest x-ray consistent with pneumonia or a tissue sample diagnosis of pneumonia. Blood samples were taken for culture in 80% of the babies in all four groups.

Several other studies have looked at risk factors for newborn infection. These risk factors included:

- A higher number of vaginal exams (Pintucci et al. 2014; Seaward et al. 1998)
- Being a carrier of Group B Strep (Hannah et al. 1997; Pintucci et al. 2014), (although the Hannah study did not use modern GBS screening and treatment)
- Developing chorioamnionitis during labor (<u>Pintucci et al. 2014; Seaward et al. 1998</u>).
- Labor takes longer than 48 hours to start (Seaward et al. 1998).

In some studies, if labor took longer to start after term PROM, then newborns were more likely to be admitted to the NICU or have a longer stay in the NICU (Akyol et al. 1999; Hallak & Bottoms 1999; Hannah et al. 1996). It was not clear if this was because care providers were being more cautious with these infants.

Newborn Death

In the Term PROM study, there were no statistical differences in stillbirths or newborn deaths between the groups.

Even though the study included more than 5,000 participants, it was still not a large enough study to tell a statistical difference in deaths.

Because stillbirths and newborn deaths are so rare, you would need more than 28,000 people in a randomized trial to tell a difference in death rates between groups.

However, there were four deaths not related to congenital conditions in the Term PROM study. There were two deaths in the expectant management oxytocin group, two deaths in the expectant management prostaglandins group, and zero deaths in the induction groups.

The fact that all four of the deaths occurred in the two waiting groups could have been due to chance, or it could have been related to the waiting for labor to begin, in a population that was not screened or treated for Group B Strep. Because the study was not large enough to tell differences in death rates, we will never know the answer to that question.

- A 41-week baby was stillborn after 14 hours of waiting for labor in the hospital. Labor was induced after fetal heart tones disappeared. Death was caused by asphyxia (lack of oxygen to the baby).
- A 39-week baby was stillborn after 19 hours of waiting for labor in the hospital. The fetal heart tones disappeared shortly before labor began on its own. Death was due to Group B Strep infection.
- A 37-week baby died after birth following three days of waiting for labor at home. Labor was induced electively, and after showing signs of fetal distress, the baby was born by a difficult Cesarean that included the use of forceps. The baby died from birth trauma.

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• A 40-week baby died after birth following 28 hours of waiting for labor at home. Labor began spontaneously, but the baby was born by Cesarean five hours later due to fetal distress. The cause of death was asphyxia.

Other Newborn Outcomes

In the Term PROM study, there were no differences between groups in the following newborn health issues:

- Apgar scores
- Need for resuscitation
- · Seizures due to low oxygen levels
- Decreased level of consciousness
- Abnormal feeding at 48 hours

Fewer babies in the oxytocin induction group (7.5%) had to take antibiotics compared to the waiting for labor group (13.7%), even though there was no difference in infections. This may be because those in the waiting group were more likely to have chorioamnionitis, and it is quite common for babies to receive antibiotics if their birth parent experienced chorioamnionitis.

Babies in the oxytocin induction group were also less likely to have a >24 hour stay in the NICU (6.6%) compared to the expectant management oxytocin group (11.6%).

The researchers suggested that these longer NICU stays might have happened because care providers are more worried about infants born to those with prolonged rupture of membranes and want to provide more monitoring for them.

Satisfaction

In the Term PROM study, those in the oxytocin induction group were less likely to say that there was nothing they liked about their treatment (5.9% vs. 13.7%) compared to the expectant management oxytocin group.

Likewise, fewer participants in the induction with prostaglandin group said there was "nothing they liked about their treatment" (5.1% vs. 11.7%) compared to those in the expectant management prostaglandin group.

In other words, rates of satisfaction were high in both groups, but higher in the induction groups.

If someone chooses to wait for labor to start on its own, is there any evidence that it is safe to wait at home?

The only evidence that we have on waiting at home comes from the Term PROM study. People who were randomly assigned to the expectant management groups were given the choice of waiting in the hospital or returning home to wait for labor to begin there. Recently, researchers have begun new research on those who choose to wait at home (<u>Chacón et al. 2019</u>). However, more work is needed to learn if new GBS screening and treatment practices are having an impact on the outcome. These researchers anticipate that they will need around five years to gather the data they need.

Out of the entire Term PROM study, 653 participants decided to go home, and 1,017 decided to stay in the hospital. Before anybody went home, they were evaluated, had a non-stress test, and roughly a third had a baseline vaginal exam, which could increase their risk of infection.

The researchers found that there was an increase in some risks among people who waited for labor to start at home.

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Compared to those who stayed in the hospital, people who waited at home were:

- More likely to have chorioamnionitis (10.1% vs. 6.4%)
- More likely to receive antibiotics (28.2% vs. 17.5%)
- More likely to give birth by Cesarean (13.0% vs. 8.9%)

More babies born to those who waited at home received antibiotics (15.3% vs. 11.5%) and had a NICU stay greater than 24 hours (13.0% vs. 9.1%).

Certain factors increased some of these risks. Those giving birth for the first time who waited at home were even more likely to need antibiotics before delivery. Those who tested negative for GBS were more likely to need a Cesarean if they waited at home. Despite these increased risks, more people reported being satisfied with their care when they waited for labor at home (Hannah et al. 2000).

Because the evidence we have is limited, the benefits and risks of waiting at home are not clear. In the next section, we will look at two non-randomized studies that were carried out in times and places where GBS screening and treatment are common.

Observational Studies on Expectant Management

Study shows that it is possible for expectant management to have positive health outcomes

In 2014, Pintucci and colleagues published a prospective research study in which they followed 1,315 people with term PROM (<u>Pintucci et al. 2014</u>). The results from this study are important, because this was the first large study to look at those with term PROM who had modern testing and treatment for Group B Strep. Basically, the results showed this group of people was able to wait for labor to begin on its own, with positive outcomes for both birthing people and babies.

The people in this study waited for labor to begin for up to 48 hours unless there was a medical reason for induction.

People were not allowed to be in the study if they were already in active labor, had a baby in breech position, or a high-risk condition such as diabetes or high blood pressure. A vaginal exam was done on entry into the study to confirm that the water had broken, to make sure there wasn't a cord prolapse, and to check the cervix. Every six hours, the laboring person's temperature was taken, a non-stress test was done to check the baby, and amniotic fluid was examined. The fetal heart rate was monitored every two hours.

Antibiotics were started after 24 hours of ruptured membranes, immediately if the woman was GBS positive, or if she developed any signs and symptoms of chorioamnionitis (fever, meconium staining, or fast heart rate in the laboring person or baby). Labor was induced at 48 hours (using oxytocin, prostaglandin gel, or both depending on cervical score) if it had not begun on its own.

The people whose labors began on their own had a 2.5% Cesarean rate, and the people who were induced had a 15.5% Cesarean rate (overall rate 4.5%).

The authors conclude that people who were induced at any time point had 6.8 times the odds of having a Cesarean compared to people who had expectant management.

However, these results should be interpreted carefully—participants were only induced if they had medical reasons for an induction (such as infection), so this may explain why the Cesarean rate was higher in that group. The length of time from rupture of membranes to birth was not related to Cesarean section in this study.

If you recall, the overall rate of chorioamnionitis in the Term PROM study was 6.7% (<u>Seaward et al.</u> <u>1997</u>). In the Pintucci et al. study that included screening and treatment for GBS, the overall rate of

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chorioamnionitis was 1.2%- in a sample that included many people who waited for labor to begin on its own (Pintucci et al. 2014).

The newborn infection rate was 2.5%. Newborn infection was defined as having at least one of the following: a low blood leukocyte count, high or low neutrophil count, elevated C-reactive protein (a measure of inflammation), or two or more symptoms such as vomiting, low temperature, fever, blue color, not breathing, fast breathing, trouble breathing, or high blood sugar.

When they only looked at babies born more than 24 hours after PROM, the rate of infection increased slightly to 2.8%.

Those who developed chorioamnionitis or had more than 8 vaginal exams during labor had an increased risk of having a newborn with an infection.

An ongoing project released initial results from a small number of participants who chose expectant management at home.

In 2021, Chacón et al. published a study comparing medical records of pregnant people in the Northeastern U.S. with term PROM who chose outpatient expectant management versus pregnant people who chose an immediate induction. The researchers were interested in finding the impact on hospital resource use (time length from admission to birth) and patient experience (time from PROM to birth).

Of the 166 participants in this study, 105 chose to be admitted for an induction after they arrived at the hospital, while 61 chose to be discharged to wait for labor to start on its own at home, for up to 24 hours.

The participants who chose to wait for labor at home were more likely to be pregnant for the first time, privately insured, non-Hispanic white, and to have been examined by a midwife instead of a doctor at time they arrived at the hospital.

The researchers found that those who waited for labor to start on its own at home tended to have a longer length of time between PROM and birth, about 29.2 hours compared to 17 hours. However, the waiting at home group had a shorter length of time between hospital admission and birth, 5.3 hours shorter than those who were admitted right away. Only 30% of those who chose to wait at home gave birth within 24 hours of PROM, and 85% of the waiting at home group required some form of labor induction.

Overall, 7.2% of the participants in this study had chorioamnionitis, with no differences between groups in rates of infection. The researchers proposed that rates of chorioamnionitis in this study were lower than rates in the TERM PROM study because of the current use of GBS screening and treatment.

What does the Research say about PROM and Vaginal Birth after Cesarean (VBAC)?

A vaginal birth after cesarean (VBAC) is a vaginal birth in anyone who has had a previous cesarean birth. To learn more about the evidence on VBAC, listen to EBB Podcast Episode 113: The Evidence on VBAC (https://ebbirth.com/113) and EBB Podcast Episode 209: Providing Unbiased VBAC Access and Support with VBAC Facts Founder, Jen Kamel (https://ebbirth.com/209). To learn more about how and why some people choose VBAC (and some do not), the Association of Ontario Midwives has published a helpful guide to thinking through your options in childbirth, available here (https://bit.ly/43naOXI).

Term PROM might pose a challenge for those seeking a VBAC, also called those who desire a trial of labor after Cesarean (TOLAC). Why? Because induction is a commonly recommended course of treatment for pregnant people with term PROM, and because induction can increase the risk of uterine rupture in a TOLAC.

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A *uterine rupture* is defined as a tear of the uterine muscle. The overall rate of uterine rupture with a TOLAC is 0.47%—however, this rate goes up with certain risk factors (<u>NIH 2010</u>). Additional risk factors for uterine rupture include a history of previous uterine rupture, a cesarean scar type other than low-transverse, induction of labor, and augmentation of labor (<u>Landon et al. 2004</u>).

There needs to be more research into the safety of VBAC for people with term PROM. We have identified two small recent studies that are helping to shrink the knowledge gap.

A study examining medical records found that people with PROM can safely try for a VBAC.

In 2020, Fishel Bartal and colleagues carried out a study in Israel about TOLAC among those with PROM. The goal of this study was to evaluate the rate of VBAC after PROM and to compare the outcomes of expectant management/spontaneous labor with induced labor.

In this study, researchers looked back in time at medical records of 830 pregnant people with PROM who were pregnant with a single baby, at or beyond 34 weeks, and planning a TOLAC.

Most (87.1%) of study participants had spontaneous onset of labor following PROM, and 12.9% were induced. Both those who had spontaneous onset of labor and those who were induced had similar rates of vaginal birth after cesarean (VBAC), 75.7% and 81.6% respectively. However, there were two cases of uterine rupture in the induction group out of 107 people (1.87%) vs. seven cases of uterine rupture in the spontaneous group out of 723 people (0.96%).

Although this finding was statistically significant, it needs to be interpreted with caution because past researchers have proposed that TOLAC studies need thousands of participants to accurately determine uterine rupture rates. Also, the overall uterine rupture rate in this study (1.08%) was also higher than what other researchers have reported.

Looking at other results from this study, the induction group had higher rates of complications from surgery (6.7% vs. 2.3%) and maternal postpartum complications (21.4% vs. 10.7%). There were no differences in newborn health outcomes between the two groups, and the researchers did not report whether there were any newborn deaths.

As far as we know, this is the largest study of birthing people who underwent TOLAC after PROM. The researchers concluded that TOLAC is an option for those with PROM, and that there was a high rate of vaginal birth whether labor was induced. However, these findings also suggest that there could be a higher rate of uterine rupture and other complications with inducing a TOLAC after PROM.

A small study of medical records found that people with PROM can have a VBAC and do not face higher rates of infection.

Zipori et al. published their study of VBAC with PROM in 2022. These researchers wanted to determine whether PROM makes it less likely that you can have a VBAC. Over the course of five years (2013-2018), they looked at the medical records of 302 pregnant people who gave birth at a large hospital in Israel. The people with PROM included in this study had a single baby, at or beyond 37 weeks' gestation, a history of prior Cesarean delivery, and were planning a TOLAC.

Of the 302 participants, 74.8% (226) birthed vaginally and 25.2% (76) had a Cesarean. The majority of all the participants had expectant management. Only 9.3% of the VBAC group had oxytocin, while 14.5% of those who had a Cesarean had oxytocin.

Most of those who gave birth vaginally did so within 24 hours of PROM (78%), and 93.3% did so within 36 hours. No other factors like age, BMI, birth weight, etc. were associated with a VBAC outcome. All patients were given antibiotics starting at 18 hours following PROM. The rates of maternal fever of greater than 38°C were 0.9% in the VBAC group, and 2.1% in the group that birthed by Cesarean. There were no cases of newborn sepsis, and no newborn deaths.

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The researchers concluded that even with PROM you can still have a high chance of VBAC, and that expectant management for TOLAC resulted in very low rates of maternal fever. Therefore, the combination of PROM and prior Cesarean should not be a reason to deny someone the chance to attempt a VBAC.

Can you be induced with a Foley catheter if you have PROM?

There is debate among researchers around the use of a *Foley catheter induction* (https://cle. clinic/305HaGV) for those with PROM. A *Foley catheter*, also sometimes described as a balloon catheter or Foley bulb, is a flexible tube with a balloon at the tip—the balloon is inflated after the tube is inserted. Typically, Foley catheters are used to catheterize the bladder. However, they are also sometimes used during inductions of labor.

Before you can initiate contractions in a labor induction, the cervix needs to be soft and thin (effaced) and ready to dilate—this is known as a *ripened cervix*. With an unripe cervix, medications or mechanical methods may be needed to ripen the cervix before contractions can be induced.

Some people prefer to use mechanical methods over medication methods—and the Foley catheter is an evidence-based mechanical option for ripening the cervix (<u>ACOG 2009</u>).

When Foley catheters are used to mechanically ripen the cervix, the tube is inserted into the cervix and then the balloon is inflated, usually with about 20-30 mL of saline solution. The balloon sits on top of the cervix, at the bottom of the uterus, underneath the head of the fetus. The inflated balloon puts pressure on the cervix, much like a baby's head would during birth, encouraging the cervix to thin and dilate. Once the cervix dilates to about 4 cm, the balloon at the end of the catheter will drop out.

The Foley does not usually start contractions on its own but it can help you get a ripened cervix that is about 4 cm dilated and ready for other medications (Liu et al. 2019).

Some parents prefer the Foley catheter for cervical ripening because they can avoid medications (such as misoprostol and dinoprostone) that affect the whole body during the ripening process.

However, some providers will not offer a Foley catheter if there is PROM—there is concern that the catheter might increase rates of infection, particularly the rate of chorioamnionitis. Another concern researchers have is whether this is as effective as other methods of inducing labor among those with PROM.

But what does the evidence say on this topic?

In a systematic review of the literature, Mackeen et al. (2021) suggest that intracervical balloon catheters for labor induction can increase the risk of infection among those with PROM. However, this systematic review could only identify four studies, each of which defined infection differently and used different types of interventions with the Foley catheter. The quality of this evidence is unclear.

We have summarized the latest research (which is a bit conflicting) on Foley catheter inductions and PROM below.

A small randomized, controlled trial found Foley + oxytocin may not be as effective with PROM

In 2017, Amorosa et al. compared Foley catheter plus synthetic oxytocin versus synthetic oxytocin alone to see which option leads to a shorter induction process. This randomized control trial included 128 first-time birthing people with PROM who were 34 weeks gestation or greater. All the participants were less than 3 cm dilated when they entered the study. About half of the participants had a Foley catheter plus oxytocin, and half were treated with oxytocin alone.

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The researchers found that the length of the induction was about 13 hours in the Foley group and 11 hours in the oxytocin group. There were no differences in overall time to birth, infection, Cesarean rates, postpartum hemorrhage, use of epidural, or newborn Apgar scores. The researchers suggested that the Foley catheter may not be as effective for those with PROM because PROM releases prostaglandins and the Foley bulb may not make an impact if the optimal physiological amount of prostaglandins are already present.

A small randomized, controlled trial showed that Foley catheter may increase infection rates with PROM

In 2018, Mackeen et al. carried out a study to compare the use of Foley catheters plus oxytocin versus oxytocin alone for labor induction and cervical ripening among pregnant people \geq 34 weeks with PROM, who came to the hospital < 2 cm dilated. This randomized trial included 201 participants. 93 were treated with the Foley catheter and oxytocin, while 108 were given oxytocin alone. Of the 201 participants, 155 birthed vaginally.

The researchers found that there was no difference in time to birth between those treated with the Foley catheter and those with oxytocin alone. They also found more cases of chorioamnionitis among the Foley catheter group (8%) versus the oxytocin group (0%). In this study the researchers used both very strict and broad definitions of chorioamnionitis to conduct their analyses. Both the strict and broad definitions of chorioamnionitis led to differences in outcomes for those treated with the Foley catheter versus those who were not.

These researchers concluded that the Foley catheter does pose a risk of infection compared to induction with oxytocin alone, and that it did not shorten the length of the induction. The authors also noted that that they could not tell if there was any part of the Foley catheter insertion that could have led to increased infection rates, or if there was anything they could have done to reduce that risk.

A small study examining medical records found no increase in infection rates with Foley and PROM

Athiel et al. (2020) examined medical records to determine the Cesarean rate among people with term PROM induced with either dinoprostone (a prostaglandin medication) or a Foley catheter. Records from 238 patients were studied, with the first group of 131 receiving dinoprostone to induce labor, and the second group of 107 being treated with a Foley catheter.

The researchers found that the Cesarean rates were not different between the two groups. There were also no differences in rates of postpartum hemorrhage, maternal fever, endometriosis, or poor newborn outcomes. The time between induction to birth was shorter for the dinoprostone group (20.3 hours vs. 26 hours for those treated with the Foley catheter).

The researchers in this study point out that there is not an accepted consensus among researchers regarding the risk of infection with use of Foley catheters among those with PROM. However, they suggest that if health care providers provide antibiotics as appropriate, that the risk may be induced. Based on the results of their study, Athiel et al. concluded that Foley catheters are safe to use for induction of labor for those with term PROM.

A study examining medical records found lower infection rates with Foley and PROM

Kruit et al. (2020) carried out a 5-year study of the medical records of 1,923 pregnant people who were treated with a Foley catheter to dilate their cervix. Of this group, 641 had term PROM and 1,282 arrived at the hospital with intact membranes. The researchers wanted to compare the rate of maternal and newborn infections between those with term PROM and those whose water had not broken when they were treated with a catheter. All study participants with GBS received antibiotics, and all participants with PROM received antibiotics to prevent infection during treatment with the balloon catheter.

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These researchers found that the rate of infection during labor and newborn infection was lower in those with PROM compared to those who were induced for other reasons as part of this study. Those with PROM had a 3.7% rate of infection during labor, and babies born to those with PROM had a 1.7% rate of infection, compared to a 7.7% maternal and 3.8% newborn infection rate among those who came to the hospital before their water broke.

Participants with PROM had a shorter time between induction to birth compared to those whose water hadn't broken at the time of induction. Kruit et al. think that those participants who were induced for reasons other than PROM had higher risk factors like diabetes (gestational, type 2), were more often smokers, and presented with later term or post-term pregnancies. These researchers concluded that Foley catheters were a safe to use method of induction for pregnant people with PROM.

A small, randomized trial found no increase in infection or Cesarean with Foley and PROM

Mokhtarpour et al. (2023) is the most recent research into the safety of a Foley catheter among those with PROM. In this randomized, controlled trial, 104 pregnant people with PROM at \geq 34 weeks of gestation were separated into two groups. Half of them received misoprostol to ripen their cervix, and half received a Foley catheter to ripen their cervix for an induction of labor. Both groups also received oxytocin to induce labor contractions after the cervix had ripened. This study took place in Iran, where GBS testing is not regularly done, but everyone in both groups received antibiotic treatment to prevent Group B strep infections in newborns.

The average time between the induction of labor and birth was 11.6 hours for the Foley catheter group (±1.98) and 10.16 hours for the misoprostol group (±2.35). There was no difference in Cesarean rates. They also found no cases of chorioamnionitis, only two cases of wound infection, and only one case of episiotomy infection. There were two cases of newborn sepsis in the misoprostol group, and one case in the Foley catheter group. The researchers concluded that in this study, both misoprostol and Foley catheter inductions were safe and effective methods of cervical ripening for those with PROM.

Why are most people in the U.S. induced when their water breaks at term?

Professional associations like the American College of Obstetricians and Gynecologists (ACOG) regularly update their recommendations. We have summarized the past 25 years of the ACOG's guidelines about when to induce when someone's water has broken below:

In 1998, ACOG recommended that if term PROM occurs, you should be offered the option of inducing labor OR waiting 24 to 72 hours for labor to start on its own. ACOG stated that there was "Level A evidence" (highest level of evidence) for this recommendation.

But in 2007, ACOG reversed this opinion and recommended that if you have PROM at term, you should be induced immediately. Again, they said there was Level A evidence, or the highest level of evidence, for this new recommendation.

But the same evidence (from the exact same research studies) was used to support both the 1998 and the 2007 statements.

The consequences of the new guideline were strong. Many people in the U.S. who experienced term PROM went from being offered the option of waiting for labor or inducing labor immediately, to now being told they "must" be induced. To learn more about what happened during this time point, you can read this article on Science and Sensibility (https://bit.ly/44BAS7o).

In 2013, ACOG replaced bulletin number 80 with bulletin number 139. In this newest practice guideline, ACOG continued to recommend induction of labor for term PROM– but this time the rating changed from Level A evidence, down to Level B evidence (based on limited or inconsistent scientific evidence.)

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And then in 2016, ACOG changed its recommendation again. Although they still recommended induction of labor at term for people who experience PROM (Level B evidence), they also stated "However, a course of expectant management may be acceptable for a patient who declines induction... as long as clinical and fetal conditions are reassuring and she is adequately counseled regarding the risks of prolonged PROM."

The most recent ACOG guidelines published in 2020, replace bulletin number 188 with bulletin number 217. These guidelines, like those published in 2016, recommend induction of labor with term PROM, yet also include that expectant management is an option with proper patient counseling.

Their recommendations for length of time for expectant management state "In the cases in which expectant management is chosen... a period of 12–24 hours of expectant management is reasonable as long as the clinical and fetal conditions are reassuring, and the patient is adequately counseled regarding the risks of prolonged PROM and the limitations of available data."

ACOG does not recommend expectant management as an option for people who are GBS positive. Instead, they recommend immediate induction with GBS and PROM.

Other Professional Guidelines for term PROM

The American College of Nurse Midwives (<u>ACNM 2021</u>) states that if you have term PROM you should be informed about the risks and benefits of expectant management versus induction, and that if you meet certain criteria, you should be supported in choosing expectant management as a safe option.

These criteria for safe expectant management include:

- Term, uncomplicated pregnancy with a single baby
- Clear amniotic fluid
- No infections
- No fever
- No vaginal exam at baseline; keep vaginal exams to a minimum

They acknowledge that people with GBS need to be informed about the increased risk of infection with expectant management, and that there is no scientific agreement about the optimal amount of time for expectant management for people with GBS. They then recommend that GBS-positive people be given preventative antibiotic treatment.

The National Institute for Health and Care Excellence (<u>NICE 2021</u>) guidelines from the United Kingdom state that you should be offered a choice between induction or expectant management, and that induction is appropriate at 24 hours after PROM. In 2021, they updated their guidelines to include a recommendation for providers to respect the client's choice to continue expectant management after 24 hours, after discussing the benefits and risks, and to discuss options for birth from this point onwards with them. For those with GBS, they recommend immediate induction. To learn more, visit <u>here</u> (https://bit.ly/3DcGGsd).

The Association of Ontario Midwives (AOM 2019) states that if you have term PROM, then you should be offered induction or expectant management. In the absence of Group B Strep, complications, or signs of infection, expectant management for up to 96 hours is a reasonable option. The AOM also provide guidelines for monitoring should you choose expectant management, including recommending against vaginal exams to prevent infection. The AOM recommends that expectant management can be an option for people who test positive for GBS for up to 18 hours after their water breaks and who have no other complications. However, beyond this time frame, they recommend induction to reduce the risk of infection. They also note that there is not enough evidence available about the risks of expectant

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management for people with GBS because so much research was done before early GBS testing and treatment became common.

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (<u>RANZCOG 2022</u>) states, "Women with PROM at term should be informed of the risks and benefits of the options of active and expectant management." They recommend induction within 24 hours of PROM and recommend immediate induction for people with GBS.

To review what each of the professional guidelines say about PROM, and to compare their conclusions, please refer to the table below.

Professional Guidelines Recommendations for PROM, at a glance				
Professional Organization	Year of Publication	Recommendation on: Expectant management with PROM	Recommendation on: Length of time for expectant management	Recommendation on: Induction and Expectant Management with GBS
American College of Obstetricians and Gynecologists (USA)	2020	Recommends induction, expectant management is listed as an 'option.'	Recommends 12-24 hours of expectant management following PROM.	Recommends induction for PROM with GBS.
American College of Nurse- Midwives (USA)	2021	Expectant management is an option for low-risk pregnancy.	No explicit time recommended, 24 hours following PROM given as 'typical' length of time for expectant management.	GBS-positive pregnant people can be given an option for expectant management if advised of risk of infection.
Association of Ontario Midwives (Canada)	2019	Expectant management is an option for low-risk pregnancy, including those with GBS.	Expectant management up to 96 hours after PROM in the absence of GBS, complications, or infection.	Expectant management for GBS-positive pregnant people up to 18 hours after PROM in the absence of other complications.
National Institute for Health and Care Excellence (UK)	2021	Expectant management is an option for low-risk pregnancy.	Expectant management up to 24 hours recommended, additional guidelines suggest patient education if they wish for more than 24 hours of expectant management.	Recommends induction for PROM with GBS.
The Royal Australian and New Zealand College of Obstetricians and Gynaecologists	2021	Expectant management is an option where 'practical.'	Recommends induction 24 hours following PROM if labor has not started on its own.	Recommends induction for PROM with GBS.

What should I know about Preterm PROM?

Content note: In this section we will discuss fetal death, viability, newborn death, and racism.

Preterm PROM (PPROM) happens when your water breaks before 37 weeks. PPROM occurs in about 3% of pregnancies and causes about 1/3 of preterm births (<u>Mercer 2003</u>).

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It can be frightening to have your water break before your pregnancy reaches term. Whether PPROM will result in preterm labor depends on a variety of factors specific to your unique situation. Your medical provider can help you understand the specifics of your circumstances and what options you have with PPROM.

What causes PPROM?

PPROM is associated with a variety of factors (<u>El-Achi, Aggarwal, & Hyett 2022</u>; <u>Mercer 2003</u>) including:

- Inflammation from an infection
- History of preterm labor or PPROM
- Smoking
- Vascular disease
- Uterine distension from a multiple pregnancy
- Uterine distention from polyhydramnios, a condition where there is too much amniotic fluid
- Decreased collagen
- · Cervical cerclage

There is some evidence that a disruption to the microbiome can increase the risk of PPROM. A decrease in *Lactobacillus* is associated with a higher risk of having PPROM (<u>Bennett, Brown, & MacIntyre 2020</u>; <u>Kroon et al. 2018</u>). *Bacterial vaginosis*, a bacterial infection of the vagina, is associated with miscarriage and PPROM (<u>Kroon et al. 2018</u>).

Similarly, Group B Strep, or GBS, can cause preterm birth and PPROM (<u>Regan, Chao, & James 1981</u>). Other types of bacteria that can lead to PPROM include *Gardnerella vaginalis*, *Mycoplasma*, and *Ureaplasma* (<u>Kroon et al. 2018</u>).

It can be very difficult to predict PPROM, and in most cases the ultimate cause is never fully understood. It is most likely that multiple factors interacting with one another are the reason fetal membranes weaken prematurely (<u>El-Achi, Aggarwal, & Hyett 2022</u>). PPROM can also occur when **none** of these risk factors are present.

It is not likely that we can prevent or treat all potential risk factors for PPROM, so it is recommended to focus on treatment of each case on an individual basis (ACOG 2020; Waters & Mercer 2009).

When can PPROM occur?

PPROM is generally divided into three main categories:

- Previable PPROM, which occurs before the limit of *viability* (the gestational age when a fetus can survive outside the womb, about 23 weeks gestation)
- PPROM remote from term (viability to about 32 weeks gestation)
- PPROM near term (between 32-36 weeks gestation)

In the 1970s and 1980s, PPROM that occurred at or before 26 weeks was called [']midtrimester PROM,' though the term has fallen out of general use (<u>Mercer 2003</u>).

Medical care for PPROM depends on when it occurs during the pregnancy, the presence of complicating factors like infection, whether labor has begun or not, whether the placenta has separated from the uterine wall (a condition called placental abruption), and the condition of the fetus (ACOG 2020). About 38% of people with PROM around the limit of viability will give birth within 1 week, and 69% will give birth within 5 weeks of the onset of PPROM (Muris et al. 2007).

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What treatment options are available to me if I have PPROM?

Treatment options can include:

- Waiting to give the fetus time to develop further inside the womb, when possible.
- Induction of labor in cases when: 1) the fetus is viable, 2) there are other medical complications, or 3) situations where the fetus will not survive (ACOG 2020; Mercer 2003).

In some rare cases, the membranes 're-seal' themselves, and the pregnancy can continue as expected (Mercer 2015).

Your medical team will assess your health status, the health status of the fetus, and talk with you to make the best decision regarding induction. Hospitalization is a common treatment so that the medical team can monitor you and your baby's status and provide treatment as needed.

One of the major problems with PPROM is that the fetus will be underdeveloped, especially their lungs (<u>Waters & Mercer 2009</u>). *Corticosteroids* are an evidence-based medication to help mature the baby's lungs before birth. Magnesium sulfate may be administered to protect the baby's neurological system, and antibiotics may be given to prevent or treat infection (<u>ACOG 2020</u>; <u>Mercer 2003</u>).

Other risks associated with PPROM include cord compression, cord prolapse, chorioamnionitis, endometritis, and very rarely maternal sepsis (<u>Mercer 2015</u>). Even in cases of PPROM remote from term, most infants born at 24-26 weeks' gestation will survive with aggressive medical care (<u>Waters & Mercer 2009</u>).

Note from EBB: We acknowledge that with the overturning of Roe v. Wade in the U.S., it may be difficult for some families to receive appropriate and timely care if an induction becomes medically necessary with pre-viable PPROM. You can learn more about the evidence on abortion (including resources) at <u>ebbirth.com/birthjustice</u>.

Is there something I can do to lower my risk of PPROM?

In a systematic review of the research on medical interventions to prevent PPROM, researchers reviewed 29 studies that investigated the effectiveness of 10 different therapies in preventing PPROM (<u>El-Achi, Aggarwal, & Hyett 2022</u>). These therapies included: DHA (Omega-3 fatty acids), aspirin, rofecoxib (an NSAID marketed to treat arthritis), vitamin C alone and with vitamin E, folic acid (alone, with iron, with iron and zinc, and within a multiple micronutrient supplement), zinc, calcium, copper, and a treatment for bacterial vaginosis.

The researchers only identified a single study where researchers lowered the risk of PPROM. In this study, participants who received a folic acid-iron-zinc and 11 other micronutrients supplement had a reduced risk of PPROM compared to those who did not receive a supplement, received a folic acid supplement, a folic acid-iron supplement, or a folic acid-iron-zinc supplement (<u>Christian et al. 2009</u>). The reviewers of the research on preventing PPROM were skeptical about this study, labeling it as low-quality (<u>El-Achi, Aggarwal, & Hyett 2022</u>). The main issue is that the study took place in rural Nepal, and it is unclear whether a nutrient supplement would have the same positive impact in places with fewer dietary deficiencies (<u>El-Achi, Aggarwal, & Hyett 2022</u>).

Because PPROM is a major cause of preterm birth, we also looked at the research on lowering the risk of preterm birth in general. There is evidence that midwifery care lowers rates of preterm birth (<u>Medley et al. 2018; Sandall et al. 2016</u>). In a 2016 Cochrane Review of midwife-led care compared to physician-led care or mixed physician/midwife care, researchers found high quality evidence that being cared for by a midwife or a team of midwives leads to a lower risk of both preterm birth and fetal death before 24 weeks (<u>Sandall et al. 2016</u>).

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In another Cochrane Review of interventions to prevent preterm birth, researchers found clear benefits from screening pregnant people for lower genital tract infections (i.e., UTIs), taking zinc supplements, and having a midwife as their care provider (Medley et al. 2018).

A supportive care provider, nutritious food, prenatal dietary supplements, and stress reduction practices can be beneficial for all pregnant people. We hope that future research will give pregnant people more tools to reduce their risk of PPROM.

How does PPROM affect communities differently?

Some communities are more impacted by PPROM and preterm birth than others. In 2021, 10.5% of all babies in the U.S. were born preterm. However, the rate of preterm birth among Black birthing people was 14.8%, compared to 9.5% of white and 10.5% of Hispanic birthing people (<u>CDC 2023</u>). Researchers have found that recent African immigrants to the U.S. have preterm birth rates that are comparable to white U.S.-born women. But within two generations, the rates of preterm birth among the descendants of recent African immigrants to the U.S. are like those of U.S.-born Black birthing people (<u>Collins, Wu, & David 2002</u>). This indicates that there is something harmful about the environment in the U.S. for the health of Black people—and that something is racism.

Experts in racial health disparities such as Dr. Joia Crear-Perry, OB-GYN, and Founder of the <u>National</u> <u>Black Equity Collaborative</u> (https://birthequity.org/) often clarify with the explanation:

"Race isn't the risk factor – racism is."

You can learn more about the impact of racism on pregnancy and childbirth care by visiting our Signature Article, <u>Evidence on: Antiracism in Health Care and Birth Work</u> (https://ebbirth.com/ antiracism).

Racism as a form of chronic stress, and its physiological "racial weathering" effects on the body, are well-documented causes of poor birth outcomes among Black women and birthing people, as well as other people of color (<u>Balascio et al. 2023; Geronimus et al. 2006</u>). This stress can wear down the body over time, increasing rates of illness and poor health (<u>Geronimus et al. 2006</u>).

In one study of 644,462 birth records collected by the Missouri Department of Health between 1989 and 1997, researchers found that Black birthing people were more than twice as likely to experience PPROM at or before 35 weeks than white birthing people (Shen et al. 2008). The study showed that Black mothers with a history of prior PPROM had a 12.9% chance of experiencing PPROM in a subsequent pregnancy, compared to 4.5% of white mothers who had experienced PPROM before (Shen et al. 2008).

Although these disparities exist, looking for a genetic basis for race or looking to a genetic explanation for racial differences in health outcomes is a form of *scientific racism*. This approach attempts to blame Black parents and inaccurately label their bodies and even their DNA as deficient. There is no evidence of a link between racial identity, genetics, and PPROM... and no evidence that this is a useful avenue of exploration (Kramer & Hogue 2009).

Further, we know from the Human Genome Project that humans are 99.9% genetically similar, that most of us are "mixed" in terms of ancestry, and that there is no research supporting the myth that being of African descent leads to a higher risk of pre-term birth.

In terms of how racism might specifically lead to a higher risk of PPROM—researchers have identified that inequality and racism (experienced throughout the life course as well as during pregnancy) can lead to high levels of stress (Geronimus et al. 2006; Kramer & Hogue 2009). Stress can increase levels of stress hormones like corticotropin-releasing hormone (CRH) and cortisol, resulting in premature

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weakening of membranes, premature softening of the cervix, and a diminished immune system. These factors can also increase the risk of infections and inflammation (Kramer & Hogue 2009).

Other researchers have proposed that a lack of anti-racist, adequate prenatal care from providers contributes to poorer maternal health outcomes among Black birthing people. This can include the impact of medical apartheid (Washington 2008) in the U.S., higher rates of chronic illness, and a lack of adequate health care prior to conception (Kramer & Hogue 2009).

Structural and interpersonal racism results in unequal treatment of people of color in U.S. healthcare settings across the board, from care providers spending less time with Black patients in appointments, to white health care providers paying less attention to patients of color (IOM 2003). Scholars like Dr. Karen A. Scott (https://bit.ly/3rJoUub) advocate for increased research to better understand the scope of preterm birth, as well as to explore chronic inflammation or vascular dysfunction in response to chronic life stressors (Scott et al. 2020).

Importantly, Black researchers have called for us to expand and invest in solutions that are shown to make a positive impact on health outcomes and experiences of care for pregnant people who are Black, Indigenous, or people of color. Solutions include evidence-based interventions like community informed, midwifery-led, racially concordant care, group prenatal and postpartum care, and wrap around doula support services (Scott et al. 2020). We discuss moving from statistics to solutions and how to protect Black birthing people in Part 3 of our Signature Article on Anti-Racism in Health Care and Birth Work, which you can access <u>here</u> (https://ebbirth.com/antiracism).

So, what can Black and birthing people of color do if they are concerned about PPROM? How can they protect their health and find the support and care they need? A few evidence-based suggestions include:

- Seek out midwifery care
 - Listen to EBB Podcast 175: Evidence on Midwives (https://ebbirth.com/175) and check out the resources to find more information about midwifery care and links to Black midwifery care providers.
 - You may particularly benefit from Afrocentric group prenatal care, such as the Village Circle Approach™ that is offered at the Ida Mae Patterson Center for Maternal Health and Infant Wellness in Kansas City, Missouri. Listen to EBB Podcast 278 (https://ebbirth.com/278) for more details.
- Seek out doula support
 - Doula care, especially from full-spectrum, community-based doulas who are Black, Indigenous, or people of color, can provide pregnant families with additional emotional and social support in both a typical pregnancy as well as in the event of complications like PPROM.
 - SistaMidwifeDirectory.com is a great search directory for Black midwives and doulas.
- Speak to your care provider about your concerns, and switch health care providers if yours does not listen to you, if they do not take your concerns seriously, or if they commit microaggressions against you
 - You may also want to bring a trusted partner, family member, doula, or friend to prenatal appointments to provide you with support or to help you share your concerns with your provider.

If you have experienced PPROM in a previous pregnancy, or if PPROM runs in your family, you can speak to your care provider about your concerns and develop a care plan if PPROM does happen to you.

And finally, remember that if PPROM happens, it is not your fault.

Resources for PPROM

- <u>The PPROM Foundation: PPROM Facts</u> (https://bit.ly/44R8dvh)
- Nationwide Children's Hospital: PPROM Facts (https://bit.ly/3DkP1ue)

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- <u>Cleveland Clinic: Term PROM and PPROM Facts</u> (https://cle.clinic/46WnVXT)
- · Continuing Education for Medical Practitioners: Premature Rupture of Membranes (https://bit. ly/3Q4R0dC)
- EBB Signature Article: Anti-Racism in Health Care and Birth Work (https://ebbirth.com/antiracism)
- The March of Dimes: PPROM (https://bit.ly/3Q7b2UJ)

Guidelines for PPROM

- American College of Obstetricians and Gynecologists 2020 (https://bit.ly/3rvS6oq) (addresses both PROM and PPROM, free text not available)
- National Institute for Health and Care Excellence (UK) 2022 (https://bit.ly/3rB5uYG)
- Queensland Health Clinical Guidelines 2018 (Australia) (https://bit.ly/44yHvrH)
- Royal College of Obstetricians and Gynaecologists 2022 (UK) (https://bit.ly/305qQF5)
- Society of Obstetricians and Gynaecologists of Canada 2022 (https://bit.ly/3Y00mre) (free text not available)

Term PROM: What is the bottom line?

The rupture of membranes at term is a normal part of labor and childbirth. It helps prepare your body for labor. About 1 in 10 pregnant people will experience term PROM. An even smaller number of people may experience an infection in themselves or their baby with term PROM.

The research on PROM often excludes pregnant people with gestational diabetes, hypertension, or other complications or health conditions. Certain health conditions or pregnancy complications may impact your experience with term PROM and the choices available to you.

There is a debate among researchers about what the exact risk of infection is for those with term PROM, particularly for people who do not want to be immediately induced. Some of the most widely cited research on infection and term PROM was carried out before regular Group B Strep infection prevention methods were used.

Current evidence suggests that people who experience term PROM should be counseled about the potential benefits and harms of both induction and expectant management, so that they can make the choice that is best for their unique situation.

Inducing labor for term PROM is a valid, evidence-based option for most people. It the approach most frequently recommended by professional guidelines written by physicians. At the same time, waiting for labor to start is also a valid, evidence-based option for people who meet certain criteria. This approach is also endorsed by professional guidelines and most frequently in guidelines written by midwives.

The authors of the Term PROM study concluded, "Induction of labor with intravenous oxytocin, induction of labor with vaginal prostaglandin E2 gel, and expectant management are all reasonable options for women and their babies if membranes rupture before the start of labor at term, since they result in similar rates of neonatal [newborn] infection and cesarean section. [italics ours]"

What we know:

- Having labor induced with oxytocin for term PROM may lower the chance of experiencing an infection yourself, but does not influence the Cesarean rate or newborn infections.
- One of the most important ways to prevent infection after your water breaks is to avoid vaginal/ cervical exams as much as possible during labor.
- As long as both pregnant person and baby are doing well and meet certain criteria, waiting for up to 2 to 3 days for labor to begin on its own is an evidence-based option. This option can also include people who have had Cesareans who desire a VBAC.

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- At the same time, induction is also an evidence-based option.
- In today's era with access to antibiotics if needed, the "24-hour clock" for giving birth after term PROM is not based on evidence.

Most importantly, the birthing person's values, preferences, goals, and unique health situation should always be considered when discussing treatment options with term PROM.

We encourage parents who face decisions around term PROM to have open conversations with their providers about the benefits and risks of their options. With evidence-based information, a trusting, collaborative relationship with their care provider, and access to resources, we believe each family has the power to make the decision that is best for their unique situation.

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Other Resources

- Resources for term PROM
 - Association of Ontario Midwives: PROM information guide (https://bit.ly/3PPcTO4)
 - Many parents have concerns about whether their newborn will need testing or antibiotics after PROM, or after chorioamnionitis. To read the American Academy of Pediatrics paper about this issue, click <u>here</u> (http://bit.ly/2v9bUfQ).
 - The best review article that we found on PROM actually came from this textbook, called "Best Practices in Midwifery," written by CNM faculty at Frontier Nursing University.
 - To read an interview with Dr. Dekker (author) about the topic of Term PROM, click <u>here</u> (https:// bit.ly/3PRI6jB).
 - To read a blog post by Dr. Dekker about her experiences with bed rest after term PROM, click <u>here</u> (http://bit.ly/2tm7K7d).
- Professional Organization Guidelines for term PROM
 - Association of Ontario Midwives 2019 (Canada) (https://bit.ly/3Q7bgv3)
 - <u>American College of Obstetricians and Gynecologists 2020</u> (https://bit.ly/3rvS6oq) (free text not available)
 - American College of Nurse Midwives 2021 (https://bit.ly/3Dp25Pi)
 - National Institute for Health and Care Excellence (UK) 2021 (https://bit.ly/30yqSH7)
 - The Royal Australian and New Zealand College of Obstetricians and Gynaecologists 2022 (https://bit.ly/44URtDu)
- More about: Rupture of Membranes (ROM)
 - EBB Podcast on Artificial Rupture of Membranes (https://ebbirth.com/244)
- More about: Collagen, Vitamin C, and Fatty Acid Supplements
 - <u>Cleveland Clinic: Collagen</u> (https://cle.clinic/43xxKsh)





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