ICEA
International Childbirth Education Association

ICEA Position Paper

Updated in July 2025 by Amy Nevland ICCE, ICBD, CLC, IAT

Induction

Position

The International Childbirth Education Association (ICEA) find that spontaneous, physiologic labor provides benefits to babies and mothers. Induction of labor is a process utilizing various chemical and mechanical methods to initiate uterine contractions before the onset of spontaneous labor with the goal of achieving vaginal delivery when risks on continued pregnancy outweigh the benefits. Augmentation of labor is initiated when spontaneous labor has either slowed, contractions are hypotonic, or labor progress has stopped. This position paper will focus solely on induction of labor.

Background

The use of labor induction in the U.S. has risen from less than 10% in 1989 to more than 22% between 1990 and 2006. Other studies show induction rates higher than 22%. An analysis of 230,000 medical records of U.S. women birthing from 2002-2008 in a 19 hospital consortium reported an induction rate of 44% among women planning vaginal birth (Goer and Romano, 2012). And finally, a more recent National Center for Health Statistics [NCHS] article stated that the induction rate rose sharply from 23.8% in 2015 to 31.37% in 2020 in the US (NCHS, 2022a, 2022b). Some reports have the number as high as 40% in 2024. Induction rates have also risen sharply in other developed nations in the last few decades. In 2020 and 2021 rates also soared abroad, in France, Finland, the UK, and Australia with frequencies as high as 26%, 30.3%, and 33%, and 46% respectively.

According to the American College of Obstetricians and Gynecologists (ACOG), induction of labor is indicated when the benefits to the mother and/or the fetus outweigh the risks of continuing the pregnancy (ACOG, 2009. Reaffirmed in 2020). Some examples in which labor induction is indicated include (but are not limited to) placental abruption, chorioamnionitis, , fetal demise, gestational or chronic hypertension, preeclampsia, eclampsia, diabetes, premature rupture of membranes with no onset of labor within 12 hours, severe fetal growth restriction, amniotic fluid level issues, placental issues, twins, and post-term pregnancy defined as reaching a full 42 weeks (ACOG FAQ 2023) Conflicting opinions among physicians regarding the exact definition of “full term” and “postdates pregnancy,” and inductions due to being “full term” or “post dates” loomed, so, recognizing that details are important, especially in regards to inductions and the health of the infant, ACOG reaffirmed the labels in their “Definition of Term Pregnancy” committee opinion #579, reaffirmed in 2025.

- Early term: 37 0/7 weeks through 38 6/7 weeks
- Full term: 39 0/7 weeks through 40 6/7 weeks
- Late term: 41 0/7 weeks through 41 6/7 weeks
- Postterm: 42 0/7 weeks and beyond

Evaluating Readiness for Induction: The Bishop Score

In 1964, Bishop developed a pelvic scoring system to predict inducibility by evaluating the position of the cervix as it relates to the vagina, the cervical *consistency*, *dilation*, *effacement* and *station* of the presenting part (Bishop, 1964).

The higher the score, the more favorable the cervix with a clinical trial showing a score of 6-7 or more associated with successful inductions. However, newer data suggests that if a mom has a score of 6 or less, the use of intravaginal misoprostol administration increases the success of an induction, regardless of her Bishop score (Wing 2002, (Wheeler 2022). Determining the "ripeness" of the cervix is usually step 1 in any induction, as this helps determine the next medical course of action.

Bishop Scoring System

Score	Dilation (cm)	Position of Cervix	Cervical Consist-ency	Effacement (%)	Station (-3 to +3)
0	Closed	Posterior	Firm	0-30	-3
1	1-2	Mid-position	Medium	40-50	-2
2	3-4	Anterior	Soft	60-70	-1, 0
3	5-6	Anterior	Soft	80 or higher	+1, +2

In primiparous women, between the gestational lengths of 37 to 40 weeks, most of their Bishop scores remained relatively low, between 4 to 6. Owing to its subjective assessment, there is a high chance of inter-observer variability with manual methods of checking the cervix. Therefore, radiological methods such as *Trans*-vaginal ultrasonogram (TVS) and *Trans*-abdominal ultrasonogram (TAS) are also feasible methods to assess cervical favorability before and induction of labor (Udhaya, 2024)

Indications for Induction

Again, there are clinical indications for an induction (ACOG, 2009, and ACOG, FAQ 2022). And they include:

- Abruptio placentae;
- Chorioamnionitis;
- Fetal demise;
- Gestational hypertension;
- Preeclampsia, eclampsia;
- Premature rupture of membranes;
- Postterm pregnancy (41 to 42 weeks);
- Maternal medical conditions (e.g., diabetes mellitus, renal disease, chronic pulmonary disease, chronic hypertension, antiphospholipid syndrome); and
- Fetal compromise (e.g., severe fetal growth
- restriction, isoimmunization, oligohydramnios).

Henci Goer, in her Oct 2023 analysis of the ARRIVE trial outlines the percentages of why **and** how often women were "medically indicated" to be induced in that particular study. It is interesting to note that "post dates" was the most frequent reason, but the definition of postdates for the doctors in this study was anywhere from 40 to 41 weeks.

- 48% postdates
- 13% prelabor release of membranes
- 16% hypertension
- 8% reduced amniotic fluid volume (*oligohydramnios*)
- 10% non-reassuring fetal status
- 9% other medical reason

These numbers also seemed to be echoed in others studies, with a marked increase in inductions for gestational diabetes and elective in the last few years, as well. According to CDC Natality data, diagnoses increased from **6.0% in 2016** to **8.3% by 2021** among pregnant women, with the highest rates observed in mothers aged 40 and over (≈15.6 %) (Martin, 2023). The increase reflects broader shifts in maternal health demographics, including rising pre-pregnancy BMI, and advanced maternal age. A serial cross-sectional analysis of 12.6 million first live births from 2011–2019 showed an annual rise of **3.7% per year**, with age-standardized rates climbing from **47.6 to 63.5 per 1,000 births** (Shah, 2021). Therefore, it's possible that part of the "9% other medical reasons" and the high number of "Post dates" inductions, could be in part due to a rise in inductions for gestational diabetes and elective reasons in the US.

There are also contraindications for labor induction (ACOG, 2009, ACOG 2022). These include:

- Vasa previa or complete placenta previa;
- Transverse fetal lie;
- Umbilical cord prolapse;
- Previous classical cesarean delivery;
- Active genital herpes infection; and
- Previous myomectomy entering the endometrial cavity.

Elective Inductions

During the 1990s and 2000s, the U.S. saw a 30% increase in preterm births (before 37 completed weeks gestation, reaching an all-time high of 12.8% in 2006 (March of Dimes, 2006).

In 2012, the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) identified more pregnant women were electing to induce labor before term and thus putting their babies at risk for significant health issues (AWHONN, 2012).

The health risks for infants associated with an elective early term birth include:

- Greater chance of dying early;
- More likely to need care in the neonatal intensive care unit;
- Problems breathing, including needing a ventilator;
- Problems feeding, including coordinating sucking and swallowing; and
- Increased need for special educational interventions later in life.

AWHONN urged nurses to help improve health outcomes for mothers and babies through education and intervention:

- Asking hospital-based and other childbirth educators to include fetal development and early term birth health risk information in childbirth classes;
- Providing information about the risks of early term birth to the pregnant women for whom they provide care; and
- Educating women and healthcare providers alike about the health benefits of normal spontaneous birth and the prevention of unnecessary elective induction delivery.

While early term elective inductions have decreased over the last few decades, 39 week elective inductions have taken the limelight in recent years, and had an uptick in their numbers. Elective inductions at term in U.S. practice are increasing notably in nulliparous mothers: roughly **6–8%** of inductions were elective in 2021–2022, compared to under 1% in 2018–2020 (Nicholson, 2024). It's been historically widely agreed upon that elective inductions, especially before 39 weeks, generally do not lead to better outcomes for mom or baby. Since 1982, the American College of Obstetricians and Gynecologists (ACOG) have had specific guidelines in place that recommend against elective inductions in early term or before 39 weeks. ACOG issued a joint statement in 2013 and reaffirmed in 2021 with the Society for Maternal-Fetal Medicine titled "Early Deliveries Without Medical Indications: Just Say No" and "Avoidance of Non Medically Indicated Early Term Deliveries…" (ACOG, 2013 reaffirmed in 2019 and 2021). However, they do have a "Guideline Suggestions for Elective Labor Induction" on their website. AWHONN and the March of Dimes (AWHONN, 2012; March of Dimes, 2006) have made the public aware that babies should be growing inside the Mother's uterus for as long as possible through various initiatives, up to 41 to 42 and 0 weeks, and not electively induced before 39 weeks. In general, the American College of Nurse Midwives "discourage[s] induction of labor without medical indication," or elective inductions (Carlson et al. 2022). Similarly, the National Institute for Health and Care Excellence (NICE) advises that health care providers offer mothers with uncomplicated pregnancies every opportunity to enter spontaneous labor (NICE, 2021). Elective induction of labor is generally not recommended prior to 41 weeks' gestation. Election to induce includes but is not limited to request for induction because a woman is "tired of being pregnant", a family member will only be in town for a certain length of time, the family would like the baby born on a certain date, or the "favorite" physician is going out of town.

This cultural shift to a possible positive look at 39/40 week elective inductions began recently, after the 2018 ARRIVE Trial was published August 9th, in the New England Journal of Medicine. It studied elective inductions at 39 weeks vs expectant management. They concluded that out of 3062 women who were randomly assigned to induction at 39 weeks vs the 3044 women in the expectant management group, that the c-section rate was lower in the induction group (18.6% vs 22.2%), regardless of Bishop score. In this study, the labor induction group also had a lower frequency of hypertensive disorders (9.1% vs 14.1%) (Grobman, 2018). In response to the ARRIVE Trial, ACOG wrote in Aug. 2018, then reaffirmed in Oct. 2022 in a Clinical Guidance paper, that

> "…it is reasonable for obstetricians and health-care facilities to offer elective induction of labor to low-risk nulliparous women at 39 weeks gestation. However, consideration for enactment of this elective induction of labor intervention should not only take into account the trial findings, but that this recommendation

may be conditional upon the values and preferences of the pregnant woman, the resources available (including personnel), and the setting in which the intervention will be implemented. **A collaborative discussion with shared-decision** making should take place with the pregnant woman."

They go on to reaffirm the importance of trying to minimize the chance of primary cesarean birth. Recommendations to practice "nonintervention" in the latent or early phase of labor when appropriate remain. More specifically, they define this by allowing for longer durations of the latent phase before calling "failure to progress." The latent phase of labor is defined as the period of time a laboring mom is between 0-6cm dilated. This is updated from the previous definition of latent labor as 0-4cm. The physicians in the ARRIVE trial appeared to have followed this recommendation. A general guideline of oxytocin administered for at least 12 to 18 hours after rupture of membranes is also given (ACOG 2022).

Below is a summary of 3 of the most popular recent labor induction trials that seemed to suggest that elective inductions after 39 weeks did not necessarily increase c-sections, especially when a mother's Bishop Score was high.

Landmark Induction Trials: Side-by-Side Comparison

Category	ARRIVE Trial (2018)	INDEX Trial (2019)	Term-PROM Trial (1996)
Authors / Journal	Grobman et al. / *NEJM*	Keulen et al. / *BMJ*	Hannah et al. / *NEJM*
Location	United States (multi-center)	Netherlands (90 midwife-led & OB-led hospitals)	Canada and Europe (multi-center)
Study Design	RCT (randomized controlled trial), open-label	RCT, open-label, non-inferiority design	RCT comparing induction vs expectant in PROM at term
Sample Size	6,106 nulliparous women	1,801 low-risk women	5,041 women with PROM at ≥ 37 weeks
Eligibility Criteria	Singleton, cephalic, low-risk, **39 weeks**, nulliparous	Singleton, low-risk, **41 weeks**, any parity	Singleton, cephalic, **term PROM**, any parity
Intervention	Elective induction at 39w	Elective induction at 41w	Immediate induction with oxytocin or prostaglandin
Control Group	Expectant management up to 41+0 or beyond	Expectant management until 42w	Expectant management (up to 96 hours)
Primary Outcome	Cesarean delivery rate	Composite of perinatal morbidity and mortality	Neonatal infection and cesarean rate
Key Findings	↓ Cesarean rate: **18.6% vs 22.2%** (ARR –3.6%)	↓ Adverse neonatal outcome: **1.7% vs 3.1%** (ARR –1.4%)	↓ Infection in induced group, no ↑ in cesarean
Stillbirth / Neonatal Death	0.1% (1 death) in each group	0.1% (induction) vs 0.2% (expectant)	Rare, no major difference reported
Cesarean Rate	↓ in induction group	Same: **10.8%** in both groups	No difference
Subgroup Insight	Most benefit seen in women with favorable cervix (Bishop >6)	Real-world cohort: ↑ **cesarean in nulliparas** (21% vs 15%)	Benefit greatest when induction done early after rupture
Conclusion	Elective induction at 39w **may reduce cesarean and preeclampsia**	Induction at 41w **reduces adverse neonatal outcomes** w/o ↑ cesarean	Induction for PROM **reduces infection** without raising cesarean

The rise of inductions and its impact upon cesarean rates is a complicated relationship and not a straightforward thing to answer when looking at all hospital births, specifically. Meaning that it's important to keep in mind that low risk, first time mom's that go into labor on their own in homebirths or free standing birth centers have a c-section rate of 5 to 13%, a number much lower than the lowest statistics in most hospitals, let alone these studies; so, when a study says that hospital inductions at 39 weeks or 41 weeks led to better outcomes or reduced c-sections from a to b, they are comparing hospital stats to hospital stats (Bovbjerg 2017, Hutton, 2015, Johnson 2005, Nethery 2021), and not including low risk mothers in free standing midwifery care facilities.

In a BMC article published in March of 2025, a retrospective study was done looking at births at one hospital system in France from 2014 to 2021. They did indeed find an increase in inductions over the years, especially after the ARRIVE study, but a slight decrease in c-sections in their hospital. Of note, they actually didn't increase the amount of elective inductions all that much, as per their policy (unlike some American hospitals). They did, however, increase the amount of inductions for twins, breech and fetal anomalies, thus decreasing their overall c-section rate (Attali, 2025). Even an American article out of JAMA in August of 2023 stated that, yes, while low risk mom inductions at 39 weeks have gone up slightly, (from 13.8% to 15%) in the last few years, (probably due in part to the ARRIVE trial), the c-section rate hasn't necessarily gone up, too. In fact, according to the retrospective low risk population that was looked at, this article found a very slight decrease in CD (from 25.1% to 24.7%)). One could conclude, along with these authors, that a rise in inductions in certain hospitals doesn't always include a rise in C-section deliveries for all moms. These studies are something that childbirth educators need to be aware of, especially when teaching to clients who are birthing in hospitals who have higher induction and c-section rates. At best, it does seem to indicate that some practitioners and hospitals are getting better at inductions, using cervical softening agents when necessary, and taking more time to allow mothers to reach active labor. There also seem to be increased health risk factors in America that necessitate these interventions, since it appears to be more of an all cause induction rate increase, and not just in elective 39 week healthy moms, especially when looking at hypertensive disorders, diabetes, and fetal indications (Martin, 2023) (Aziz, 2025).

On the other end of the elective induction spectrum, In 2020, a study published in the *American Journal of*

Perinatology presented findings that challenged the conclusions of the ARRIVE trial. This statewide retrospective study, conducted in Michigan and based on over 14,135 deliveries, suggested that elective induction at 39 weeks in low-risk pregnancies does not necessarily lead to lower cesarean rates. In fact, the researchers found that women "who underwent elective induction were more likely to have a cesarean birth compared with those who underwent expectant management (30% versus 24%)." Even after controlling for patient characteristics, the data showed no significant difference in cesarean rates between the induction and expectant management groups.

The study also reported additional differences in maternal outcomes: "expectantly managed women were also less likely to have a postpartum hemorrhage (8% versus 10%) or operative vaginal delivery (9% versus 11%), whereas women who underwent induction were less likely to have a hypertensive disorder of pregnancy (6% versus 9%). There were no other differences in neonatal outcomes." Interestingly, those who were induced were more likely to be at least 35 years old, identify as white non-Hispanic, and have private insurance. These findings underscored the importance of comprehensive informed consent and shared decision-making when considering elective induction around 39 weeks.

A separate 2020 study published in *BioMedCentral*, which analyzed data from the 2016 Listening to Mothers survey in California, found similar concerns. According to the survey, 19% of women who underwent induction ended up requiring a cesarean section, compared to just 10% of those who went into labor spontaneously. Furthermore, there was "a strong association between failed induction and cesarean delivery (aOR = 4.37)" (Declercq et al., 2020).

Finally, another **population-based retrospective cohort study** came out in 2024, conducted in Victoria, Australia. It examined over **200,000 singleton births** to evaluate the real-world impact of elective labor induction between **38–41 weeks** gestation. Unlike randomized controlled trials such as ARRIVE, this study reflected actual clinical practice across a wide range of public hospitals. Researchers found that **elective induction of labor was associated with a 23–43% increased odds of cesarean delivery** compared to expectant management (aOR 1.23–1.43) (International Doula Institute).

This risk persisted even after adjusting for confounding factors such as **maternal age, BMI, parity, socioeconomic status, and pregnancy complications**. The study authors noted that "in practice, elective induction of labor is associated with an increased risk of cesarean delivery, especially among nulliparous women," emphasizing that benefits seen in clinical trials like ARRIVE may not fully apply in broader healthcare settings. Importantly, they concluded that "**induction of labor should not be considered universally protective** against cesarean section and should be weighed carefully within the clinical and institutional context" (International Doula Institute).

See the 3 retrospective studies below in chart format:

Study/Source	Design/Population	Key Findings	C-Section Rate	Conclusion
Victoria Cohort (2024)	Real-world, population-based cohort study, >200,000 births in Australia, elective induction at 38–41w	↑ **Cesarean odds by 23–43%** with elective induction compared to spontaneous labor	↑ **aOR 1.23–1.43**	**In practice**, induction increases cesarean risk—especially outside trial environments
Michigan Study (2023)	Retrospective cohort analysis across Michigan hospitals comparing elective induction vs expectant management at 39–40w	Elective induction **did not reduce cesarean rates** and **increased them at some hospitals**; outcomes varied widely by protocol	Varies by hospital, but c-section rate went up, esp. for 1st time moms in the elective induction group	Induction effects are **institution-dependent**—policy and staffing greatly affect outcomes
Listening to Mothers Survey (2018)	National U.S. survey of women's birth experiences (California cohort), focused on autonomy, communication, informed consent	Many women reported **feeling pressure** to induce; some cited lack of informed decision-making; strong desire for **more say** in labor process	c-section rate was higher in the induced group. (19% vs 10%)	Emphasizes need for **patient-centered care**, informed consent, and reducing coercive practices

Key Takeaways

- **RCTs like ARRIVE and INDEX** suggest safety and benefit of induction—but only under **ideal conditions with physicians adhering to strict protocols**.
- **Real-world data (Victoria, Michigan)** show cesarean rates can actually increase with elective induction, especially for nulliparous women.
- **Survey results** stress the need for **better communication**, autonomy, and shared decision-making.

Methods of Induction

The non-pharmacologic alternative approaches for cervical ripening and inducing labor can be safe, less-invasive, and more cost-effective than their pharmacological counterparts. Non pharmacological methods may include eating daily dates, acupuncture, sexual intercourse, nipple stimulation, herbal preparations, evening primrose oil, or castor oil. These methods require less clinical supervision; however, their effectiveness is less-documented in scientific literature.

These alternative methods may require a longer period to ripen the cervix and initiate labor; therefore, time may be the determining factor in deciding which method to choose. The most important criteria for ripening the cervix and inducing labor is safety, for both the woman and her fetus. Some Nonpharmacological alternative methods are shown to be safe and somewhat effective, especially when used in conjunction with clinical supervision. When doing quick google searches of scholarly articles and midwifery journal entries, consuming dates, nipple stimulation, red raspberry leaf tea, and membrane sweeping are among the "safe" list. Sex, spicy foods, acupressure, acupuncture are in a lot of the "may help, may not, but won't hurt and more studies are needed" lists. The use of herbs and castor oil are in the "effective, but could carry side effects for mom or baby so use with caution" lists. (Goer and Romano, 2012; NHS/NICE, 2008).

See the nifty chart below for a quick summary of a few nonpharmacological options and their effects:

Study (Author, Year)	Date Fruit	Raspberry Leaf Tea	Nipple Stimulation	Castor Oil	Evening Primrose Oil (EPO)	Notes / Outcomes
Socha et al., 2023 (Nutrients)	May promote oxytocin-like effects; low human data	Weak effect; inconclusive	Not studied	Not studied	Not studied	Review article; mostly theoretical, calls for more trials
Socha et al., 2024 (BMC Complement Med Ther)	↑ Bishop score; fewer interventions; shorter labor	↓ oxytocin use; ↓ cesareans	Not studied	Not studied	Mixed outcomes; ↑ ripening but unclear labor benefit	Narrative review; encourages future RCTs
Stark et al., 2022 (AJOG MFM)	Not studied	Not studied	↓ latent labor duration (3.2 h vs 4.8 h); ↓ oxytocin use	Not studied	Not studied	Randomized pilot trial on nipple stimulation effectiveness
Kordi et al., 2020 (J Midwifery Reprod Health)	**↑ cervical dilation; ↓ oxytocin need; ↓ labor duration**	Not studied	Not studied	Not studied	Not studied	RCT shows statistically significant benefits of date consumption
Moradi et al., 2022 (J Pharmacopuncture)	Not studied	Not studied	Not studied	**↑ induction success; ↑ vaginal births (81% vs 69%)**	Not studied	Meta-analysis shows castor oil is effective with mild GI effects
Najafi et al., 2021 (BMC Pregnancy Childbirth)	Not studied	Not studied	Not studied	Not studied	**↑ Bishop score; earlier labor onset; no major adverse effects**	RCT shows some promise for EPO in ripening
Azhari et al., 2022 (Iran Red Crescent Med J)	Not studied	Not studied	Not studied	Not studied	Mixed; small ↑ in Bishop score; no labor	Review suggests more standardized trials are needed
Abedi et al., 2022 (Worldviews Evid Based Nurs)	Not studied	Not studied	↓ labor duration; ↓ cesarean rate	Not studied	Not studied	Strong historical evidence for nipple stimulation; pilot cohort

Pharmacologic or mechanical induction of labor include:

- Membrane stripping,
- Foley Balloon or Cook Catheter,
- Laminaria tents, Dilapan rods,
- Cervical ripening agents like Cervidil and Cytotec/Misoprostol,
- Pitocin/Syntocinon, and
- Artificial Rupture of Membranes (AROM) via an amnihook (amniotomy).

Sweeping the membranes: This intervention involves a provider inserting 1 to 2 gloved fingers into the opening of the cervix in order to sweep around or separate the amniotic membrane from the lower uterine wall. This results in an increase in natural prostaglandins, which in turn can cause the cervix to efface. In several Cochrane reviews in 2019 and 2020, membrane sweeping actually increased the odds of spontaneous labor and reduced the need for an induction after 42 weeks gestation compared to doing nothing. (Finucane, 2020.) Interestingly enough, membrane sweeping can even be used during the induction process. When a sweep is done during the first cervical exam, this has been shown to shorten the time to birth (Liu et al. 2018). There is no increase in maternal or fetal morbidity. This technique can be offered to mothers with uncomplicated pregnancies starting at 39 weeks gestation. While it may cause discomfort or light bleeding, it does not appear to increase infection risk or neonatal morbidity, and it offers a valuable option for mothers wishing to avoid pharmacologic induction.

Mechanical Cervical Ripening with Balloons (Foley and Cook Catheters) and Dilapan rods: This is a mechanical method of effacement and dilation wherein a catheter is placed just inside of the cervical opening. Then, in the case of the Foley Catheters, one or two balloons (depending on the type of catheter) are inflated with a saline solution. Or, in the case of the Dilapan rods, they expand gently and gradually by absorbing fluid from the cervical tissue. These balloons or rods apply pressure to the cervical opening, thus stimulating a release of natural prostaglandins. This, in turn, results in some cervical ripening, dilation and possible contractions.

Because this is mechanical and can be discontinued easily, it is considered one of the safest ways to induce labor, with very few systemic side effects. They are especially useful in settings where pharmacologic agents may be contraindicated, like with VBAC moms. Because the mechanical action of dilation is a little more gradual with the Dilapan rods then when compared to the balloons, studies indicate that patients seem to prefer this method of induction (Saad, March 2019, AJOG). In a randomized controlled trial of 123 healthy women and babies undergoing induction of labor with an unfavorable cervix (Bishop score 6 or lower), Wang found that a combination of the Foley Balloon Catheter bulb and vaginal misoprostol resulted in shorter induction-to-delivery time when compared with vaginal misoprostol alone without increasing labor complications (Wang, et al, 2014). Of note, tachysystole, non-reassuring fetal heart patterns and cases of newborn umbilical cord arterial blood ph <7.1 were significantly lower when a transvaginal balloon catheter was used vs when using the dinoprostone vaginal insert (Glantz, 2010; Goer and Romano, 2012). Another study found that, for first time parents, using the Foley in conjunction with/simultaneously with IV oxytocin increased the rate of birth within 24 hours without increasing the c-section rate. One could use the balloon first, and even as an outpatient procedure, and not in conjunction with other meds. According to a retrospective study this yielded similar outcomes in c-section rates, nicu admissions, 5 min apgar scores, or maternal adverse events after labor onset when compared to using other, more pharmacologic induction methods. However, in the Foley outpatient group, the inductions typically lasted much longer…sometimes up to 13 hours longer (Dong 2023). But, a recent randomized controlled trial found that combining mechanical methods with misoprostol significantly reduced time to delivery without increasing the risk of adverse maternal or neonatal outcomes. The researchers concluded that "a combined misoprostol–Foley catheter protocol shortened labor duration by nearly five hours compared to misoprostol alone" (Valente et al., 2023). In summary, mechanical methods are less likely to cause uterine hyperstimulation and are associated with a lower need for continuous fetal monitoring, making them an appealing option in low-resource or outpatient settings.

(AROM): Artificial Rupture of Membranes is when a care provider uses an amnihook or his/her fingers to break the bag of waters or membranes instead of waiting for it to rupture naturally. This is a relatively simple procedure that is drug free and not usually painful, and may actually shorten the duration of labor, especially when used in combination with IV oxytocin. A 2013 review of the Cochrane Database for efficacy of AROM for shortening spontaneous labor showed that there is a lack of evidence for amniotomy being introduced routinely as a part of standard labor management and care (Smyth, 2013). However, early AROM after vaginal misoprostol for labor induction is associated with higher successful vaginal delivery, shorter labor and better neonatal outcome.

Amniotomy is another ritualistic practice that has come under scrutiny. Several older studies have demonstrated the lack of efficacy of breaking the amniotic sac and have indicated that the increased pain of labor interfered with the onset of maternal affection immediately after birth as many women felt the birthing process had been interrupted (Bricker and Luckas, 2000; Robson and Kumar, 1980). However, The American College of Obstetricians and Gynecologists (ACOG) recommends artificial rupture of membranes (AROM), or amniotomy, as an effective method to support labor progression during augmentation or induction in its 2024 *First and Second Stage Labor Management* Clinical Practice Guideline update. AROM is particularly beneficial when used alongside oxytocin to decrease the total duration of labor and facilitate cervical dilation. ACOG explicitly advises: "amniotomy for patients undergoing augmentation or induction of labor [is recommended] to reduce the duration of labor" (ACOG, 2024). Recent guidelines also emphasize that active labor is best defined as beginning at 6 cm dilation, and they offer protocols for evaluating labor arrest and dystocia. The integration of AROM at this stage, particularly when cervical change stalls, has been shown to reduce the need for cesarean delivery and is supported by moderate to high-level clinical evidence (ACOG, 2024). It also appears to increase successful vaginal deliveries in VBAC patients (81% vs 74%) and decrease labor duration & chorioamnionitis when timed properly (Dick A., 2022). That being said, ACOG also confirms that for "women with normally progressing labor and no evidence of fetal compromise, routine amniotomy need not be undertaken unless required to facilitate monitoring." (ACOG 2017, reaffirmed 2021).

Synthetic Prostaglandins: Misoprostol (Cytotec) or Dinoprostone (Cervidil): Synthetic Prostaglandins are generally used first to soften or efface a cervix before synthetic Oxytocin is then used to increase contraction strength and dilation, especially for a mom with a low Bishop score. In fact, The California Maternal Quality Collaborative suggests that cervical ripening agents be used first during an induction of labor until the mother's Bishop score is 8 or higher for first time

mother's, or 6 or higher for multiparous people (Carlson et. al 2021). This reduces cesarean rates when compared to using pitocin alone during inductions on someone with a low Bishop score of 6 or less. Misoprostol is given in tablet form, usually broken into 4th's and administered vaginally or orally every 2 to 4 hours. Cervidil is a cream on a tampon-like insert, inserted overnight. They both can cause cervical effacement, and even, for some parents, contractions that cause dilation.

According to most studies, Misoprostol (Cytotec) appeared to be more effective in inductions when compared to Cervidil, much cheaper and shelf stable, and can be used in several repeated doses, vs one dose. When administered vaginally or orally, misoprostol can successfully initiate labor within 24 hours in a majority of patients. A 2023 systematic review found that "50 µg vaginal misoprostol achieves higher rates of vaginal delivery within 24 hours, though with a notable incidence of tachysystole" (American Journal of Obstetrics and Gynecology, 2023). However, it (miso) also appeared to carry a higher risk of uterine hyperstimulation, especially when used in higher doses or vaginally (vs orally), compared to cervidil or pitocin. Whereas Cervidil can be taken out immediately after uterine hyperstimulation or decreased fetal heart tones, miso will continue to be absorbed. Therefore, a medication to slow contractions (tocolytic meds…ie terbutaline) needs to be on hand and given if fetal heart rate concerns or tachysystole occur.

Clinicians must balance these risks by individualizing dosage and route of administration. Newer protocols often favor low-dose oral misoprostol due to a more favorable safety profile and similar effectiveness compared to the vaginal route.

Pitocin or Artificial Oxytocin: Pitocin is the synthetic form of oxytocin—a hormone a woman's body naturally releases to trigger uterine contractions during labor. Synthetic oxytocin remains a central agent in labor induction due to its efficacy, short half-life, and ease of titration. Oxytocin's half-life ranges from five to twelve minutes, requiring approximately 40 minutes to achieve steady-state plasma concentration, with a corresponding uterine response stabilizing around 30 minutes thereafter (Dawood).

Synthesized in the early 1950s and available by 1955 by Vincent du Vigneaud, Pitocin quickly became widely used for inducing or augmenting labor, though experts note this practice should only be when medically necessary. Today, it's common in about 40–50% of U.S. births—some studies cite around 25% for induction only, while roughly half of all labors (induced or augmented) involve Pitocin in the dilation phase, and, in the US, the majority of mothers receive prophylactic pitocin to reduce the risk of hemorrhage immediately after delivery. Its benefits include reducing postpartum hemorrhage and avoiding cesarean sections (especially when the mom's cervix was ripe and her Bishop Score was greater than 6, or when used in conjunction with other cervical ripening agents.) However, it carries notable physiological considerations. It carries risks such as stronger contractions, increased perception of pain compared to laboring naturally, increased pain medication usage, increased likelihood of C-section, fetal distress, and potential interference with breastfeeding and bonding and depressive disorders in the laboring mothers. (BJOG, 2017) (Kroll-Desrosiers, et al. Pubmed 2017). Although generally safe when used in low to moderate doses, higher infusion rates exceeding 40 milliunits per minute can produce antidiuretic effects, increasing the risk of water intoxication during prolonged inductions. Therefore, close monitoring of mom and baby, careful dosing, and timely discontinuation when the active labor phase begins are essential strategies to maximize benefits and minimize harm.

The medical community is still trying to come to a consensus on whether high dose or low dose oxytocin induction and augmentation seem to lead to better results…ie reduced c-sections and faster deliveries with safer outcomes for mom and baby. For example, recent evidence in some studies suggest that high-dose oxytocin regimens are more effective than low-dose strategies in reducing postpartum hemorrhage without significantly increasing cesarean delivery rates. One study noted that "patients who received high-dose oxytocin after mechanical ripening had higher rates of vaginal delivery and shorter labor durations" (PLoS ONE, 2022). Most studies, however, tend to trend towards less is more. Meaning, a low dose regime leads to similar results with less incidents of uterine hyperstimulation and fetal heart rate issues. Some even suggest better results when pitocin is stopped altogether once active labor is achieved

(AJOG Aug. 2020). Also, ACOG's Clinical Practice Guideline of First and Second Stage Labor Management in 2024 referenced discontinuation after active labor onset further reduced cesarean (9.3% vs. 14.7%) and tachysystole (6% vs. 13%).

See the chart below for a list of pitocin studies:

Comparison of Oxytocin Use in Labor and Postpartum Care

Study (Year)	Design & Dosing	Primary Outcome(s)	Benefits	Risks / Notes
PubMed 33957657 (2021) – PLOS One	RCT: Contrasting oxytocin use for induction	Labor duration, cesarean rate, NICU admissions	High Dose approach shortened labor	No significant rise in adverse outcomes
AAFP (2000)	Guideline Review: Gradual oxytocin increases	Protocol safety and efficacy	Supports cautious use to minimize risks	Warns of uterine overactivity with rapid increases
PLOS One 0267400 (2022)	Modeling Study: Individualized oxytocin for PPH	Uterine response simulations	Individualized regimens may improve safety	Requires clinical validation
PMC7175564 (2016)	Protocol Change: Oxytocin regimen	PPH reduction	Reduction in hemorrhage treatment	Retrospective, single site
SciDirect S2589933 (2025)	Expert Review: Different oxytocin approaches	Labor length, infection risk	High Dose Oxytocin reduced chorioamnionitis risk	Monitored fetal safety emphasized
BMC s12884-020-02938-4 (2020)	Stratified analysis: Delivery type & oxytocin	slightly shorter delivery time in HDG.	Reduced PPH even in cesareans. Decrease in C-section for low dose group compared to High dose group.	Less impact on operative vaginal births. More NRFHR in HDG vs the LDG.
PMC8932234 (2022)	Protocol: Oxytocin post-cesarean	Use of secondary uterotonics	Fewer uterotonics needed	Before/after study design
AJOG MFM S2589 (2025)	Consensus Review	Updated protocols	Advocates individualized approaches based on Bishop score, parity and mother's wishes	Not fully accessible
ResearchGate (2024)	Meta-analysis: Different oxytocin approaches for augmentation	Cesarean rate, labor time, adverse events	Low Dose Augmentation is as affective as HDA, but with less uterine tachysystole events	No rise in adverse fetal outcomes with low dose.

In summary, while high-dose oxytocin may offer a slightly shorter induction to delivery time, low-dose oxytocin appears to be as effective and potentially safer, due to a reduced risk of uterine tachysystole. The ultimate decision on the ideal oxytocin dosage should be individualized and carefully considered in conjunction with a healthcare professional, based on the specific circumstances of each pregnancy. More specifically, synthetic oxytocin's effectiveness depends greatly on proper timing and dosing, particularly in patients with previous uterine surgery or heightened sensitivity to uterine tachysystole. Continuous monitoring and individualized protocols remain essential, as per the insert's instructions.

See summary chart below for Induction Methods:

Intervention	2020–2025 Key Findings
Mechanical + Misoprostol	↓ Time to delivery by ~4–5 h; ↑ vaginal birth rates; no ↑ complications—strong RCT & cohort support
Misoprostol alone (vaginal/oral)	Effective for cervical ripening; risk of uterine hyperstimulation, especially vaginal route
Foley catheter alone	Comparable efficacy to misoprostol with fewer adverse effects
AROM	In VBAC patients: ↑ VBAC success (81% vs 74%), ↓ labor duration & chorioamnionitis when timed properly; ongoing trial on timing
Membrane Sweep	Reduces need for formal induction; safe—with no increased maternal or neonatal risk
Oxytocin (Pitocin)	High-dose reduces hemorrhage risk without increasing cesarean rates; improved vaginal birth after balloon

Complications of Induction

Labor induction carries several documented risks, which have been quantified in recent studies:

- **Uterine tachysystole**, defined as an excessive frequency of contractions (>5 in 10 minutes), occurred in approximately **31.4%** of women induced with misoprostol vaginal inserts in one cohort study (Dick et al., 2020). Importantly, this did **not** increase cesarean rates or neonatal/maternal adverse outcomes (adjusted RR = 1.0; 95% CI 0.7–1.4) (Dick et al., 2020). Careful titration of oxytocin is necessary to avoid uterine tachysystole (Kunz, et al, 2013). A common complication, tachysystole,

may be reduced by removal or stoppage of an induction agent.

- **Postpartum hemorrhage** (blood loss ≥1,000 ml) and uterine atony were found to be significantly more common in women receiving higher-dose dinoprostone (25 µg), compared to lower-dose regimens, in a randomized controlled trial published in *PMC12051426* (2023). While exact percentages were not provided, the finding was statistically significant ($p < 0.05$). Foley catheters can cause significant vaginal bleeding in women with a low-lying placenta (ACOG, 2013).

  Multiple recent studies have demonstrated that induction of labor (IOL), regardless of the method used, is associated with a significantly higher risk of postpartum hemorrhage (PPH). In a large international multicenter cohort (n = 9,209), women who experienced induced labor had a **56% increased odds** of PPH ≥ 500 mL (adjusted odds ratio 1.56, 95% CI 1.42–1.70) and **51% greater odds** of PPH ≥ 1,000 mL (aOR 1.51, 95% CI 1.16–1.96), compared to spontaneous labor (Braund et al., 2024). Oxytocin use during induction explained roughly **one-third (34%)** of this association (Braund et al., 2024). These findings are consistent across methods—including prostaglandins and oxytocin. Similarly, a French case-control study corroborated increased hemorrhage risk—even in low-risk women—with standard induction protocols (Khireddine et al., 2023).

In women with moderate to severe anemia, elective induction was associated with more than **three-fold increased risk of PPH** (adjusted risk ratio 3.44, 95% CI 1.29–9.18), while medically indicated inductions were not significantly associated with elevated PPH risk (aRR 1.22, 95% CI 0.42–3.55) (Indian multicenter cohort, 2024).

- **Uterine hyperstimulation syndrome**, a severe form of tachysystole, was reported in about **4–7%** of participants in a 2025 cervical-ripening study using oral misoprostol (2025 study, Ross et al.).

- **Infection risks**, including chorioamnionitis, remain a concern—though less frequently quantified. One VBAC-focused cohort study indicated that AROM alone was associated with lower chorioamnionitis rates (7.3%) compared to combined AROM + oxytocin (18.4%) (Dick et al., 2022). An increase in maternal/neonatal infections has been reported with laminaria and other hygroscopic dilators. (ACOG, 2013).

- **Cesarean delivery** rates after induction vary: while tachysystole itself did not predict cesarean in the misoprostol cohort (25.0% with tachysystole vs. 19.6% without), discontinuing oxytocin in active labor significantly reduced cesarean by **20%** in another protocol-driven study (2025 publication). In some recent elective induction at 39 week studies, there was a correlation between inductions leading to more c-sections, especially in women with low Bishop scores.

- **Oxytocin-related risks**—uterine hyperstimulation, elevated resting uterine tone above 20 mmHg, and even uterine rupture have been reported. These conditions can compromise uteroplacental perfusion, potentially leading to fetal hypoxia. Other risks that include water intoxication, and postpartum hemorrhage—are noted but uncommon when administered per protocol with modern monitoring systems.
- **VBAC RISKS:** Induction of labor with medication like cytotec or high dose pitocin in women attempting a vaginal birth after cesarean (VBAC) is associated with an increased risk of uterine rupture, particularly in those with a history of two prior cesarean deliveries. However, recent evidence suggests that the overall risk may be lower than previously reported. A large population-based retrospective cohort study of women undergoing trial of labor after cesarean (TOLAC) in the United States between 2016 and 2018 found that the uterine rupture rate was 0.18% among those not induced, 0.34% in those whose labor was augmented, and 0.45% in those who were induced, indicating a statistically significant increase in risk with labor intervention (Muller et al.). Comparatively, earlier reports from developed countries estimated rupture rates ranging from 0.22% to 0.5% after one prior cesarean (Bujold et al.). These findings underscore the need for individualized counseling and risk assessment when considering induction for VBAC candidates.

Implications for Practice

There are numerous choices of induction methods that range from alternative to conventional; from noninvasive to invasive; and from non-pharmacologic to pharmacologic. ICEA takes the position that obstetrical intervention and technology should only be used in the presence of medically valid criteria and early induction methods should only be performed when a thorough medical assessment has been documented. This conclusion especially holds true in light of the fact that there are

1. Wide variations in hospital rates of cesarean births following IOL, ranging from 17% to 32% to 60%,
2. compounded with the evidence that suggests that one of the largest variables in c-section rates is due to "failure to progress," or "labor arrest" (a subjective, physician-based variable), and
3. Induction methods vary widely by provider, hospital setting, and region. (Main, et al. 2020) (J Midwifery, 2022)
4. Also, when compared to ALL births in ALL birth settings with Midwifery care and OBGYN care, home birth and free standing birth centers that practice expectant management for low risk first time moms until 42 weeks gestation, still have a lower c-section rate than hospitals who offer early inductions. (8-10% compared to 18-27%).

Labor inductions should, therefore, be performed for specific indications and women should be fully informed of the possible risks, including failed induction leading to cesarean delivery (Glantz, 2010).

ICEA supports the focus on uncomplicated vaginal births and recommends that childbirth classes emphasize self help strategies, as well as using the BRAIN/BRAID model not just as a communication tool for parents to use to segue into birth preferences, but also for them to attain more information and true informed consent.

Since the pattern of labor is unpredictable and is subject to change, it would be desirable for every pregnant couple to participate in an education program where the many options and alternatives for all medical procedures are discussed.

Due to the fact that a family's perceived satisfaction of a labor experience is also an important determinant to said family's postpartum well-being, it is important to note that according to several recent studies, some women were actually not happy with the induction experience. *"The women who underwent labor induction were less satisfied with their birth experience compared to women with spontaneous onset of labor."* (Adler et al 2020). And Dupont et al said, *"Overall, 30% of the nulliparous women were dissatisfied (n=231/770) and 19.7% (n=130/659) of the parous women."* Lack of knowledge of what to expect during the process, inductions lasting longer than 24 hours, and "*unbearable vaginal discomfort, inadequate pain relief, lack of attention to requests, cesarean delivery and severe maternal complications"* were all determining factors of what constituted a satisfying birth experience or not. Dupont et al (2020). Therefore, it is vital that, when an induction, elective or otherwise, is brought up, longer term patient satisfaction be taken into consideration when compared to short-term perceived gains and communication to manage expectations be prioritized.

Along with ICEA recommending childbirth educators teach from a Risk/Benefit position, they also endorse childbirth education curricula consisting of the following information concerning the induction of labor:

- Information is presented in an unbiased format.
- Information presented should reflect the common practices in their communities and prepare the learner accordingly.
- Participants are educated on the rights of expectant parents and informed consent.
- Learners are provided with the tools to obtain information to help in their decision-making process.
- Printed materials reflect a risk/benefit approach that is well referenced.
- Information is provided for each procedure.
- Expected restrictions that might be imposed by various induction methods are discussed.
- Expectant parents are informed that inductions can take longer typically from start to delivery than a mother who goes into labor on her own (ARRIVE Trial), and to manage expectations accordingly.
- Pregnant couples are also informed of other medical interventions that might be involved in the induction process, such as intravenous infusion, blood pressure monitoring, rupture

of membranes, and the risk for a possible cesarean delivery.

In conclusion, ICEA understands that there is a time and a place for inductions of labor. As educators, it is important to present the information as such. However, we also still echo Grantly Dick-Read's quote from *Childbirth Without Fear* (1942)

"The uterus is a profoundly intelligent organ, governed by rhythms far older than medicine. To intervene unnecessarily in its workings is to risk disrupting the harmony nature has long refined for safe birth."

More recently, in a qualitative study, Vedam et al., wrote

> "When the physiologic process of labor is respected, women's bodies often perform optimally; interference, even when well-intentioned, may lead to a cascade of interventions and unintended harm."
> — Vedam et al., "Respectful Maternity Care and Physiologic Birth," *Birth*, 2021

ICEA couldn't agree more.

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International Childbirth Education Association

183 Wind Chime Court. Ste 203, Raleigh, NC, 27615
Phone 919.674.4183
www.icea.org