

Actionable Patient Safety Solutions™ (APSS™): Reducing Unnecessary Cesarean Deliveries

How to use this guide

This APSS provides evidence-based actions and resources for executives, leaders, clinicians, and performance improvement specialists. This document is intended to be used as a guide for healthcare organizations to examine their own workflows, identify practice gaps, and implement improvements. In it, you'll find:

Best Practice Summary: A high level summary of evidence-based, clinical best practices. (page 2)

Executive Summary: Executives should understand the breadth of the problem and its clinical and financial implications. (page 3)

Leadership Checklist: This section is for senior leaders to understand common patient safety problems and their implications related to reducing unnecessary cesarean deliveries. Most preventable medical harm occurs due to system defects rather than individual mistakes. Leaders can use this checklist to assess whether best practices are being followed and whether action is needed in their organization around reducing unnecessary cesarean deliveries. (page 3)

Clinical Workflow: This section includes more specific information about reducing unnecessary cesarean deliveries across the continuum of care. Leaders should include the people doing the work in improving the work. This section outlines what should be happening on the frontline. Clinicians can use this section to inform leaders whether there are gaps and variations in current processes. This is presented as an infographic that can be used for display in a clinical area. (page 5)

Education for Patients and Family Members: This section outlines what frontline healthcare professionals should be teaching patients and family members about reducing unnecessary cesarean deliveries. Clinicians can inform leaders whether there are gaps and variations in the current educational processes. (page 10)

Performance Improvement Plan: If it has been determined that there are gaps in current practice, this section can be used by organizational teams to guide them through an improvement project. (page 12)

What We Know about Reducing Unnecessary Cesarean Deliveries: This section provides additional detailed information about reducing unnecessary cesarean deliveries. (page 14)

Resources: This section includes helpful links to free resources from other groups working to improve patient safety. (page 23)

Endnotes: This section includes the conflict of interest statement, workgroup member list, and references. (page 23)

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Best Practice Summary

Antenatal Care:

- Ensure patients and family members are aware of the risks of a Cesarean delivery and what they can do to minimize the likelihood of a Cesarean delivery.
- Assess for fetal presentation. If the position of the fetus is not certain, utilize ultrasound to determine the position.
- Discuss all options with the patient and family members when malpresentation is discovered antenatally.
- Avoid admitting patients to the hospital until they are in active labor, unless medically appropriate.
- Identify specific problems, such as herpes, for patients who can benefit from proactive intervention before labor to reduce the risk for Cesarean delivery birth.

Labor:

- Ensure that the patient has continuous labor support during their labor and delivery process.
- Use standardized induction scheduling.
- Assist the patient to change their position if the baby needs to be rotated.
- Provide pain management as needed for the mother during her labor. Apply non-pharmacologic interventions and pharmacologic interventions as appropriate.
- Actively manage labor throughout all stages.
- Routinely assess labor by performing cervical check, evaluating patient's coping and comfort, examining contractions, and assessing the fetal tolerance of labor.
- Encourage laboring women to be upright and to move if appropriate.
- When considering if a scheduled Cesarean is indicated, consider all alternatives.
- Initiate intrauterine resuscitation measures if the fetal heart rate shows any unusual signs or symptoms.
- Ensure that an obstetric provider is notified if FHR tracing does not respond to interventions.
- Encourage pushing and open-glottis pushing to optimize fetal oxygenation.

Discharge:

- Educate the mother and family on incision care, restriction of exercise and heavy lifting, and implications for future pregnancies if the pregnancy resulted in a Cesarean delivery.
- If the patient notices any unusual signs or symptoms such as fever over 100.4°F (38°C) or higher, severe pain in the abdomen, or with urination, ensure that they know to contact the healthcare provider right away.
- Schedule a postpartum visit within six weeks after the delivery. If the patient had a high risk medical condition, make the postpartum visit 2 weeks.
- Offer honest feedback to set realistic expectations around emotional, physical, and social changes.

Executive Summary

The Problem

Despite the significant short-term complications associated with Cesarean deliveries, including, but not limited to, increased likelihood for blood transfusion, risk of complications from anesthesia, organ injury, nosocomial or non-hospital acquired infection post-discharge, thromboembolic complications, and neonatal respiratory complications, and the significant long term complications, including, but not limited to, increased risk of asthma and obesity in children, and complications in subsequent pregnancies, such as uterine rupture, placenta accreta, placenta praevia, ectopic pregnancy, infertility, hysterectomy and intra abdominal adhesions, the global rates of Cesarean deliveries have nearly tripled in the last three decades ([WHO, 2018](#); [Keag et al., 2018](#)). In the US, Cesarean is the most commonly performed procedure, with approximately 1.3 million performed annually ([HCUP, 2014](#)).

The Cost

Globally, the rate of Cesarean deliveries has doubled between 2000 to 2015 from 12% to 21% (Boerma et al., 2018). Annually, there is an imbalance between the need for Cesarean deliveries, typically in low income countries, and excess Cesarean deliveries, typically in high income countries. Compared to vaginal delivery, Cesarean deliveries are associated with a three- to six fold increased risk for complications, including, but not limited to, chronic pelvic pain, secondary infertility, or even death ([Tihonen and Nyberg, 2014](#)). Therefore, the increasing rate of Cesarean deliveries without medical indication is concerning.

The Solution

Many healthcare organizations have successfully implemented and sustained improvements and reduced death from unnecessary Cesarean deliveries. This document provides a blueprint that outlines the actionable steps organizations should take to successfully reduce unnecessary Cesarean deliveries and summarizes the available evidence-based practice protocols. This document is revised annually and is always available free of charge on our website.

Leadership Checklist

On a monthly basis, or more frequently if a problem exists, the executive team should review the outcomes of all women who have gone through labor. Use this checklist as a guide to determine whether current evidence-based guidelines are being followed in your organization:

Promote ongoing education.

- Ensure adequate training and documentation of fetal assessment and labor management competencies and skills.
- Train all staff to support physiologic, low intervention labor and birth.
- Educate providers in breech vaginal delivery.

Encourage frontline involvement.

- Ensure frontline involvement in Cesarean delivery improvement activities. Maintain their engagement and remove barriers to progress.
- Hold staff accountable for providing the standard of care and reward success.

Standardize expectations and align leadership initiatives with reality on the frontline.

- Ensure that evidence-based induction and labor management algorithms are embedded into clinical workflows, whether electronic or paper.
- Ensure there are enough staff to effectively manage necessary preventive care.
- Ensure that leaders have a simple process to oversee Cesarean delivery improvement work while also considering how it aligns with other initiatives across the organization.
- Adopt a collaborative midwifery-obstetrician model of care, devise clear criteria for escalation of care from midwives to obstetricians, and include midwives as equal partners in the clinical team and in all conversations related to Cesarean delivery decision making. Promote midwifery led care, whether in or out of hospital birth is intended.
- Develop clear guidelines for breech vaginal delivery. Assess organizational comfort with breech vaginal delivery and if comfort is low, consider coordinating this care with a nearby facility antenatally.
- Maintain a clear, standardized, organization-wide definition of labor dystocia.
- Consider a mandatory second opinion intervention, as even the most senior obstetricians must provide evidence for their decision.
- Develop healthcare provider expertise in approaches to labor that maximize the likelihood of vaginal birth ([Bisognano, 2014](#); [Hodnett Group, 2013](#)). These areas include:
 - Assessment of labor
 - Methods to promote labor progress
 - Labor support
 - Pharmacologic and nonpharmacologic pain management
 - Shared decision-making
- Standardize responses to abnormal fetal heart rate patterns and uterine activity.
- Define admission criteria based on consensus from all providers. Standardize admission criteria to prevent latent phase labor patients being admitted and requiring aggressive management to progress into active labor
- Implement a standardized algorithm for labor and tachysystole management.

Measure for meaningful improvement.

- Debrief on a regular basis to solicit team feedback about barriers to sustained compliance. Adjust the plan quickly and nimbly as needed.
- Measure and report Cesarean delivery rates monthly. Routinely reassess outcomes.
- If Cesarean delivery rates indicate room for improvement, initiate a PI (performance improvement) project. If a problem is not indicated, routinely reassess to identify gaps, and ensure integrity of the data collected.
- Expect that when the organization starts tracking safety events, there will be an initial increase in reported events before organizational improvement work begins to reduce error rates over time. Ensure that the frontline staff and leaders understand this so they do not become demotivated to improve.
- If a PI plan is put in place, measure the associated process outcomes.
- Conduct hospital- and system-wide review and transparently share with providers and patients.

Create the infrastructure needed to support.

- Modify reimbursement strategies where applicable that favor vaginal delivery and shared risk.
- Eliminate barriers to making rapid changes to documentation templates and order sets.
- Redesign facilities and restructure provider teams to support physiologic labor methods and ensure prompt intervention for abnormal labors.

Clinical Workflow

1. ANTENATAL CARE

- Provide antenatal care that includes education for patients to maintain healthier pregnancies. This may require longer visit times, or considering other models of education such as groups, virtual, etc.
- Encourage participation in childbirth education, nurse-led relaxation programs, psychosocial couple-based programs, and psychoeducation for women with fear of childbirth. See the “Education Throughout Pregnancy” section for more information.
- Discuss the importance of continuous support during labor and review the patient’s planned support person/people during labor ([Bohren et al., 2017](#)). Share local doula resources if appropriate.
- Emphasize shared decision making and informed consent where prenatal providers discuss and promote patient-centered labor support and management, and help interpret and explain factors for women and their families throughout care ([Noseworthy et al., 2013](#))
- Understand why the patient holds certain beliefs about Cesarean deliveries, if they are persistent in their preference for having a Cesarean delivery, to better understand their needs and how to deliver appropriate education and communication in a culturally appropriate and sensitive manner.
- Assess for fetal presentation starting to optimize offering an external cephalic version for fetal malpresentation ([Safe Prevention, 2016](#)). If position is not certain, and ultrasound is available, use ultrasound to verify position.
- Discuss all options with the patient, including external cephalic rotation, planned Cesarean delivery, and planned breech vaginal delivery when malpresentation is discovered antenatally ([Hill, 2019](#)).
- When medically appropriate, do not admit women to the hospital until they are in active labor (6 cm for both nulliparas and multiparas) ([Mikolajczyk et al., 2016](#)). Provide patients with recommendations for what to do in early labor at home. Make sure to tell the expecting mother that she should go to the hospital when the frequency of contractions is increasing and the intensity is getting stronger.
- Identify specific problems, such as herpes and breech presentation, for patients who can benefit from proactive intervention before labor to reduce the risk for Cesarean delivery birth (Hollier, 2008; Hofmeyr, 2015)



2. LABOR

- Apply standardized induction scheduling to ensure correct selection and preparation of women undergoing induction of labor. See the What We Know section for more information.
- Consider patient factors in induction of labor. See the What We Know section for more information
- Ensure the woman has continuous labor support. See the What We Know section for more information
- Assist the patient into positions to help rotate the baby in an occiput anterior position and encourage the partner to help. The following may be used:
 - o Hands and knees
 - o Lunging
 - o Birthing ball
 - o Rebozo
- Apply non-pharmacologic interventions and pharmacologic interventions for pain management based on the patient's needs and desires.
 - o Non-pharmacologic interventions include movement (rocking, walking, hands and knees, position changes), peanut ball, birthing ball, sterile water injections for lower back pain, breathing techniques, dim lighting, hydrotherapy, tub, jacuzzi or shower, aromatherapy, heat/ice , focal points, or music.
 - o Pharmacologic interventions include IV pain medication, nitrous oxide, or an epidural.
- Actively manage labor:
 - o First Stage of Labor
 - ◇ Do not use prolonged latent phase (>20 hours for nulliparous, >14 hours for multiparous women) as an indication for Cesarean delivery.
 - ◇ Use oxytocin for at least 12-18 hours after membrane rupture before performing a Cesarean delivery for failed induction of labor within the latent phase.
 - ◇ Consider 6cm as the threshold for active phase of labor.
 - ◇ Cesarean delivery indication for active phase arrest: a woman at or beyond 6cm dilated with ruptured membranes who fails to progress despite 4 hours of adequate uterine activity, or at least 6 hours of oxytocin with inadequate uterine activity and no cervical change
 - o Second Stage of Labor
 - ◇ No specific absolute maximum length of time in the second stage has been identified.
 - ◇ Allow for at least 2 hours of pushing for multiparous and 3 hours for nulliparous women, according to arrest of descent definition.
 - Allow for longer durations if there is fetal malposition or epidural analgesia as long as progress is documented.

- Routinely assess labor. Assessment criteria include:
 - Cervical checks
 - ◇ Consider assessing cervical change every 4 hours unless there is an indication to do so earlier (concerns about fetal heart rate, patient request etc.)
 - ◇ Too many cervical exams increase the risk for infection and unnecessary interventions.
 - Patient's coping mechanisms with labor.
 - Palpation of contractions, strength & frequency that lead to cervical dilation
 - ◇ Active labor consists of regular, moderate to strong contractions by palpation that can be timed.
 - Fetal intolerance of labor (persistent concerning FHR pattern despite intrauterine resuscitative measures)
- Allow and encourage laboring women to be upright and to move. If continuous monitoring is needed, use a wireless system (when available). Train staff or providers in intermittent auscultation if continuous monitoring is not required ([Lawrence et al., 2013](#)).
- Allow women to eat and drink during labor, and maintain hydration. IV fluid is useful if the patient does not want to or cannot drink ([Singata et al., 2013](#)).
- Offer standardized techniques for pain management and comfort measures that promote labor progress and decrease the incidence of dysfunctional labor ([Hodnett, 2013](#)).
- Offer a multitude of pharmacologic choices and physiologic methods for pain management to ensure patient comfort and that promote labor progress and decrease the incidence of dysfunctional labor ([Hodnett, 2013](#)).
- Standardize intervention plans based upon defined fetal heart rate characteristics which lead to prompt, appropriate intervention. Adhere to evidence-based algorithms for failure-to-progress interventions that increase the chance of labor progress.
- Establish the well-being of the fetus at regular intervals, either through intermittent auscultation of the fetal heart rate or use of an electronic fetal monitor. Distinguish maternal from fetal heart rate at regular intervals.
- Assess the fetal heart rate at the same intervals as the uterine activity and resting tone. The frequency of assessment of the fetal heart rate is based on patients' risk levels, induction agents, anesthesia status, and stage of labor.
- Initiate intrauterine resuscitation measures when fetal heart rate characteristics such as absent or minimal variability, late or variable decelerations, bradycardia or prolonged decelerations, tachycardia, or sinusoidal FHR pattern are identified. Consider maternal repositioning, IV fluid bolus, reduction or discontinuation of labor stimulating agents, correction of maternal hypotension, pushing techniques, and/or oxygen administration via face mask.
- Notify an obstetric provider if FHR tracing does not respond to interventions.
- If concerning FHR patterns persist despite intrauterine resuscitative measures,

obstacles to delivery should be cleared. Notify the obstetrician and initiate proactive team communication with anesthesia and neonatology providers.

- Encourage every woman to use the pushing technique that she prefers and to push spontaneously when she has the urge to bear down.
- Encourage open-glottis pushing to optimize fetal oxygenation. Encourage frequent position changes and upright positions when possible to assist in bringing the baby down and out.
- When considering if a scheduled Cesarean is indicated, consider all alternatives (See also “[Alternatives to a Cesarean delivery](#)” and “[Safe Prevention of the Primary Cesarean Delivery](#)”). Consider:
 - Twins with malpresentation of the presenting twin
 - Macrosomia (Estimated fetal weight >5000g in women without diabetes and >4500g in women with diabetes)
 - Multiple gestation (triplets and up)
 - Malpresentation if not candidate for ECV or failed ECV
 - Placenta previa
 - History of Cesarean deliveries if not a candidate for Trial of Labor After Cesarean (TOLAC)
 - History of a classical or inverted T uterine incision
 - History of a shoulder dystocia (after counseling of options)
 - History of a 4th degree perineal laceration (after counseling of options)
 - Active genital herpetic infection
 - Offer Trial of Labor After Cesarean (TOLAC) to women who meet the criteria to safely do so. Be aware that midwives managing the labors of TOLAC patients have a higher Vaginal Birth After Cesarean (VBAC) success rate.



3. DISCHARGE

- Ensure that women are educated about the following before they leave the hospital (see “[Cesarean delivery recovery: What to expect](#)” for more information):
 - Incision care
 - Restriction of exercise and heavy lifting
 - Implications for future pregnancies (risk of abnormal placentation, option for a TOLAC)
- When should women call their provider? See “[Education for Patients and Family Members](#)” section for more information.
 - Call your healthcare provider right away if you have any of the following (See “[Post-Birth Warning Signs](#)” for more information):

- ◇ Fever of 100.4°F (38°C) or higher
 - ◇ Redness, pain, or drainage at your incision site
 - ◇ Bleeding that requires a new sanitary pad every hour
 - ◇ Severe pain in the abdomen
 - ◇ Pain or urgency with urination
 - ◇ Reduced urinary output
 - ◇ Foul odor from vaginal discharge
 - ◇ Trouble urinating or emptying your bladder
 - ◇ No bowel movement within 1 week after the birth of your baby
 - ◇ Swollen, red, painful area in the leg
 - ◇ Appearance of rash or hives
 - ◇ Sore, red, painful area on the breasts that may come with flu-like symptoms
 - ◇ Feelings of anxiety, panic, and/or depression
 - ◇ Altered mental state (as a sign of potential sepsis)
- Explain what family members can do to support and enhance the woman's postpartum recovery. See "[Cesarean-Sections: How to Support Your Wife and Partner](#)" for more information.
 - Provide community-based maternal mental health resources to help the woman and family with their mental health recovery process if the Cesarean delivery was unplanned or emergent and the woman expresses it as a traumatic event. See "[Help for Moms](#)" for more information.
 - Schedule a postpartum visit within six weeks after delivery (within two weeks if you had a high risk medical condition during your pregnancy).
 - Recommended interpregnancy spacing of at least six months, but ideally 18 months (from delivery to the start of the next pregnancy) ([Interpregnancy Care, 2019](#)). After a Cesarean delivery, a short interpregnancy interval can increase the risk for uterine rupture and decrease the chance of a successful vaginal birth after Cesarean (VBAC).
 - Consider [Long Acting Reversible Contraception options](#) for family planning according to the women's needs and desires.
 - Offer honest feedback to set realistic expectations around emotional, physical, and social changes that may be expected and prepare new moms for challenges they may face beyond the physical. See [4th Trimester Project](#) for more information.

Education for Patients and Family Members

Education for expecting mothers, from the first antenatal visit, all the way through to the birth of her child and beyond, is imperative for ensuring her safety and equipping her and her family with the tools necessary to set realistic expectations, be active in their own care, and manage the unexpected.

Above all, through the entirety of pregnancy, acknowledge any biases you have towards the woman and family and actively challenge those biases so you are able to deliver fair and quality care to all patients.

It is important for every woman to communicate with her provider and determine a plan of care together. It is important to have a comprehensive education plan for the woman that includes all aspects of care for the woman and her baby across the continuum ([From Birth, 2018](#)).

Education Throughout Pregnancy

Health education for women is an essential component of antenatal care. Providers should first understand the expecting mother's situation, fears, concerns, and background. This will help tailor recommendations, interventions, and communication style. Antenatal specialists should transparently communicate with the patient at each visit, especially if the provider becomes aware of a potential complication.

It is important that the patient and family understand the risks and benefits of Cesarean deliveries as it relates to the individual's specific risk factors.

Encourage the patient to consider a doula or a childbirth coach. Additionally, the following educational interventions and support programmes are recommended to reduce cesarean births with targeted monitoring and evaluation:

- **Childbirth training workshops:** This training includes sessions about childbirth fear and pain, pharmacological pain-relief techniques and their effects, non-pharmacological pain-relief methods, advantages and disadvantages of cesarean delivery and vaginal delivery, indications and contraindications of cesarean sections.
- **Relaxation training program:** This program includes group discussion of anxiety and stress-related issues in pregnancy, the purpose of applied relaxation, and how to properly perform deep breathing techniques.
- **Psychosocial couple-based program:** This program includes emotional self-management, conflict management, problem solving, communication and mutual support strategies that foster positive joint parenting of an infant. "Couple" in this recommendation includes couples, people in a primary relationship or other close people.

The family is likely going to encounter various faces within the healthcare team. Ensure early on that the expecting mother and her family and loved ones understand the difference between, for example, a midwife and an obstetrician.

Education For Discharge After Cesarean Delivery

After a Cesarean delivery, providers need to help the woman understand expectations for a realistic recovery, but it is equally important to understand what interventions may be necessary, based on her living situation and resource availability, post-discharge. Providers should ensure that she understands:

- It is important to keep the incision clean and dry. Report any signs of infection such as

warmth, redness, or discharge at the incision site.

- It is important to get some physical activity, like walking. This can help alleviate gas pain. Sexual intercourse should be avoided until six weeks after surgery, or as directed by her physician. Sleep is important and the new mother should nap when the baby naps, to ensure that she gets enough sleep.
- Bleeding or vaginal discharge can occur from 4-6 weeks after surgery. The bleeding should turn from bright red, to dark, brownish, to white discharge. Cramping may also occur during this time, especially with breastfeeding ([ACOG, 2018](#)).
- The importance of requesting a second opinion if a Cesarean delivery is recommended and the reason for the Cesarean delivery is not clearly understood.
- There may be implications for future pregnancies after a Cesarean delivery.
- It can be difficult to adjust to life after giving birth, regardless of whether the delivery was a Cesarean delivery or a vaginal delivery. Most women will go through postpartum blues right after birth. This may be a feeling of sadness or emptiness, but should go away after 3-5 days. If this feeling lasts longer than 2 weeks, the woman may be experiencing postpartum depression ([Postpartum Depression, 2019](#)). Postpartum depression is common and may affect as many as 1 in 9 women who give birth. Some signs of postpartum depression are:
 - Sadness and/or crying
 - Thoughts of harming self or the baby
 - Feeling moody or restless
 - No energy
 - Eating too much or too little
 - Sleeping too much or too little
 - Feeling worthless
 - Withdrawing or losing interest in life

Postpartum psychosis is a rare disorder, but it is an emergency and requires immediate medical attention. This may involve paranoia, hallucinations, and rapid mood swings. Women may feel ashamed or embarrassed and be afraid to ask for help. This is why it is important to educate every woman about it before it occurs ([Postpartum Depression, 2019](#)). Women should be assessed for postpartum depression before discharge from the hospital and again after discharge by their provider. All women should be given resources in case they develop postpartum depression. Treatment for postpartum depression may include therapy and/or medication. In extreme cases, electroconvulsive therapy (ECT) may be used.

Difficulties, physically, mentally, and emotionally are very normal after giving birth. However, providers should educate women about potential complications before they happen and make self-monitoring recommendations to the mother with suggestions for what signs warrant that she should seek help

It is absolutely essential to continuously reinforce that difficulties after having a child are normal but to set the expectation for when she should seek help.

Performance Improvement Plan

Follow this checklist to improve performance and move your organization toward eliminating the harm and death associated with unplanned extubation:

- Gather the right project team.** Be sure to involve the right people on the team. You'll want two teams: an oversight team that is broad in scope, has 10-15 members, and includes the executive sponsor to validate outcomes, remove barriers, and facilitate spread. The actual project team consists of 5-7 representatives who are most impacted by the process. Whether a discipline should be on the advisory team or the project team depends upon the needs of the organization. Patients and family members should be involved in all improvement projects, as there are many ways they can contribute to safer care.

Complete this Lean Improvement Activity:



Conduct a [SIPOC](#) analysis to understand the current state and scope of the problem. A SIPOC is a lean improvement tool that helps leaders to carefully consider everyone who may be touched by a process, and therefore, should have input on future process design.

RECOMMENDED CESAREAN DELIVERY IMPROVEMENT TEAM

- | | |
|--|---|
| <ul style="list-style-type: none">• Obstetricians• Obstetrical anesthesiologists• Neonatologists• Admitting and registration staff• Quality and safety specialists• Midwives• Nurses• Antenatal specialists | <ul style="list-style-type: none">• Blood bank specialists• Students• Doulas• Childbirth educators• Information technology specialists• Pharmacists• Patient representative |
|--|---|

Table 1: Understanding the necessary disciplines for a Cesarean delivery improvement team

- Understand what is currently happening and why.** Reviewing objective data and trends is a good place to start to understand the current state, and teams should spend a good amount of time analyzing data (and validating the sources), but the most important action here is to go to the point of care and observe. Even if team members work in the area daily, examining existing processes from every angle is generally an eye-opening experience. The team should ask questions of the frontline during the observations that allow them to understand each step in the process and identify the people, supplies, or other resources needed to improve patient outcomes. Be sure to talk to front line staff.

Create a [process map](#) once the workflows are well understood that illustrates each step and the best practice gaps the team has identified ([IHI, 2015](#)). Brainstorm with the advisory team to understand why the gaps exist, using whichever [root cause analysis tool](#) your organization is accustomed to ([IHI, 2019](#)). Review the map with the advisory team and invite the frontline to validate accuracy.



CESAREAN DELIVERY PROCESSES TO CONSIDER ASSESSING

- Use of indicators for delivery
- How risk factors such as parity, maternal age, and concurrent medical diagnoses, are assessed and communicated
- Techniques used for labor inductions
- Anesthesia techniques and availability of anesthesia expertise and equipment
- Scheduling protocols
- Consenting procedure for the option of TOLAC
- Consenting procedures for elective Cesareans
- Compliance with standard labor support techniques
- Compliance with standard intervention for failure to progress
- How data is collected, analyzed, presented, and with whom it is discussed

Table 2: Consider assessing these processes to understand where the barriers contributing to unnecessary Cesarean deliveries may be in your organization

- **Prioritize the gaps to be addressed and develop an action plan.** Consider the cost effectiveness, time, potential outcomes, and realistic possibilities of each gap identified. Determine which are priorities of focus for the organization. Be sure that the advisory team supports moving forward with the project plan so they can continue to remove barriers. Design an experiment to be trialed in one small area for a short period of time and create an action plan for implementation.

The action plan should include the following:



- Assess the ability of the culture to change and adopt appropriate strategies
- Revise policies and procedures
- Redesign forms and electronic record pages
- Clarify patient and family education sources and content
- Create a plan for changing documentation forms and systems
- Develop the communication plan
- Design the education plan
- Clarify how and when people will be held accountable

TYPICAL GAPS IDENTIFIED IN CESAREAN DELIVERY SAFETY

- Inconsistent definition of difficult pregnancy
- Inconsistent consent process in offering a TOLAC
- Missed opportunity for external cephalic version with fetal malpresentation
- Performance metrics are not tracked routinely
- Lack of patient awareness of the risks of Cesarean deliveries
- Unstandardized admission criteria and triage management for women presenting in spontaneous labor
- Lack of a mechanism to identify specific problems (e.g., herpes) for patients that could benefit from earlier intervention before labor

Table 3: By identifying the gaps in Cesarean delivery processes, organizations can tailor their project improvement efforts more effectively

- **Evaluate outcomes, celebrate wins, and adjust the plan when necessary.** Measure both process and outcome metrics. Outcome metrics include the rates outlined in the leadership checklist. Process metrics will depend upon the workflow you are trying to improve and are generally expressed in terms of compliance with workflow changes. Compare your outcomes against other related metrics your organization is tracking.

Routinely review all metrics and trends with both the advisory and project teams and discuss what is going well and what is not. Identify barriers to completion of action plans, and adjust the plan if necessary. Once you have the desired outcomes in the trial area, consider spreading to other areas ([IHI, 2006](#)).

It is important to be nimble and move quickly to keep team momentum going, and so that people can see the results of their labor. At the same time, don't move so quickly that you don't consider the larger, organizational ramifications of a change in your plan. Be sure to have a good understanding of the other, similar improvement projects that are taking place so that your efforts are not duplicated or inefficient.

[Read this paper](#) from the Institute for Healthcare Improvement to understand how small local steps



CONSIDER EVALUATING RELATED METRICS TO BETTER UNDERSTAND PROCESS AND OUTCOME METRICS RELATED TO CESAREAN DELIVERIES

- | | |
|--|--|
| <ul style="list-style-type: none"> • Overall Cesarean delivery rates • NTSV rate • Maternal and perinatal morbidity • Hospitalization duration following Cesarean deliveries • Elective versus required cesarean deliveries • The overall induction rate • The rate of active labor patients admitted prior to 6 cm | <ul style="list-style-type: none"> • Maternal and neonatal infection rates • Neonatal respiratory complications • NICU length of stay • Use of transfusions • Specific rates of total, primary, repeat, NTSV Cesarean deliveries for the institution and individual providers |
|--|--|

Table 4: Consider evaluating related metrics to better understand UE presence and contributing factors

What We Know About Reducing Unnecessary Cesarean Deliveries

An unnecessary Cesarean delivery is when the decision to deliver a baby via Cesarean delivery is driven by factors other than medical necessity. Unnecessary Cesarean deliveries lead to short- and long-term complications and increased maternal and neonatal morbidity and mortality (Bauserman, 2015). Short-term complications include blood loss, infection, and venous thrombosis. Long-term complications include an increased risk of abnormal placentation and uterine rupture in subsequent pregnancies.

The Cesarean delivery is the most commonly performed surgery in the U.S.:

- Between 1970 and 2009, the total Cesarean rate rose from 5.5% to a high of 32.9%
- Current data show that it remains plateaued at 31.9% ([Martin et al., 2011](#); [Martin et al., 2017](#))

Among the population of first-time mothers with low-risk births (also called Nulliparous, Term, Singleton, Vertex (NTSV)), 25.7% give birth by Cesarean, which is a 40% increase since 1997 ([Martin et al., 2017](#)). Cesarean delivery rates have also increased globally ([Betran et al., 2016](#)), primarily in developed countries.

Evidence shows the rise in utilization of the Cesarean has not been accompanied by a reduction in cases of perinatal morbidity and mortality ([Gregory et al., 2011](#)), nor can it be explained solely by patient characteristics, demographics, or comorbidities ([Li, 2003](#)).

Cesarean delivery rates vary by hospitals and providers

A 2013 study identified a 10-fold variation in Cesarean rates across the U.S. ([Kozhimannil et al., 2013](#)). The overall trend of rising Cesarean rates is attributed to a complex, multifactorial set of issues including:

- Payment incentives or disincentives ([Main et al., 2012](#))
- Liability fears
- Cultural acceptance and resource management ([Plough et al., 2017](#))

Nevertheless, evidence shows that unwarranted variation in rates between hospitals and providers is largely due to subjectivity in clinical decision-making. Over 60% of hospital variation in NTSV patients can be attributed to first birth labor induction rates and first birth early labor admission rates ([Main et al., 2006](#)).

The NTSV Cesarean Birth measure – endorsed by the National Quality Forum in 2008 – was designed to identify variations between hospitals, and is used for hospital data reporting by The Joint Commission and the Leapfrog Group. It shows that outcomes for NTSV patients are largely influenced by physician factors, rather than patient characteristics or obstetric diagnosis, and specifically identifies variations between birthing facilities (Joint Commission, 2017).

Cesarean delivery in low-income countries

Women in lower-income regions of the world do not have appropriate access to obstetric care, including Cesarean births. This leads to high rates of perinatal morbidity and mortality ([Thomas et al., 2016](#)).

Increased incidence of Cesarean births in countries that lack infrastructure to safely manage the downstream consequences of a primary Cesarean has resulted in an increased incidence of complications ([Beltman et al., 2011](#)), including:

- Postpartum hemorrhage
- Abnormal placentation
- Infection

Risks of Cesarean delivery compared to vaginal birth

The risk of severe maternal morbidity is higher as a result of a Cesarean birth compared with vaginal birth. The risk of maternal death is 4 times higher in Cesarean births, while amniotic fluid embolism is 2-3 times more likely.

Other serious complications occur in Cesarean birth at an overall rate that is 3 times higher than vaginal birth (2.7% vs. 0.9%) ([Liu et al., 2007](#)):

- Obstetric hemorrhage requiring hysterectomy

- Complications from anesthesia
- Venous thromboembolism (VTE)
- Maternal cardiac arrest
- Major infection

Compared to vaginal births, Cesarean births are also associated with:

- More neonatal intensive care unit stays
- Delays in establishment of breastfeeding
- Longer average length-of-stay
- Longer recovery times

Vaginal births carry an increased risk of 3rd- and 4th-degree perineal lacerations (tear or laceration through the perineal muscles and the muscle layer that surrounds the anal canal) ([Caughey et al., 2014](#)).

Risks of repeat Cesarean Deliveries

A repeat Cesarean increases a patient's risk of placental abnormalities, such as placenta accreta (a condition in which some or all of the placenta attaches abnormally to the wall of the uterus). The complications associated with placenta accreta include:

- Nearly 90% of patients require a blood transfusion
- Need for a hysterectomy at time of delivery
- Bladder and bowel damage
- Amniotic fluid embolism
- Venous thromboembolism
- Infection
- An estimated maternal mortality rate of 6-7%

The increase in incidence of placenta accreta parallels the rise in the Cesarean rate, and the estimated ratio of deliveries affected by placenta accreta in the last decade is 1:333 ([Belfort et al., 2010](#)).

Women who want vaginal birth after Cesarean can't obtain it

Nearly 88% of the approximate 604,000 women with a history of a prior Cesarean who gave birth in the U.S. in 2016 did so by Cesarean delivery (Driscoll, 2017).

This drop is commonly attributed to fear of liability or a hospital's inability to meet the previously published safety recommendations for VBAC, such as having a physician "immediately available."

These limited options for patients result in an unknown proportion of patients in the U.S. who may prefer the option of VBAC, yet must consent to repeat Cesarean birth or attempt an out-of-hospital trial of labor if they are unable or unwilling to travel to the nearest hospital that will offer a trial of labor after Cesarean (TOLAC). A 2018 report from Listening to Mothers California found that almost half of individuals surveyed were interested in planning a VBAC. However, half reported not being given the option due to the restrictions of VBAC in hospitals.

In an effort to increase access to VBAC, ACOG published updated recommendations in November 2017 which removed the "immediately available" language and now state that any Level I (Basic Care) facility per ACOG's Levels of Maternal Care standards can offer TOLAC

([Grobman et al., 2017](#)).

Preventing unnecessary Cesarean deliveries

The World Health Organization (WHO) stated in 2015 that “Every effort should be made to provide cesarean sections to women in need, rather than striving to achieve a specific rate.” Regional optimization of Cesarean delivery utilization saves lives and prevents maternal and perinatal morbidity ([WHO, 2015](#)).

In 2014, SMFM and ACOG published a consensus statement on the evidence behind safely reducing primary Cesarean rates ([Caughey et al., 2014](#)). Other women’s health and obstetric safety organizations, such as the California Maternal Quality Care Collaborative (CMQCC) and the Council of Patient Safety on Women’s Health (CPSWH) have since published comprehensive toolkits to implement recommendations ([CMQCC, 2016](#); CPSWH, 2016).

Global attention has been focused on both the overuse and underuse of Cesarean births, with increasing emphasis on optimizing the rate of Cesarean births ([WHO, 2017](#); [CDC, 2017](#); [WHO, n.d.](#); [Haelle, 2017](#)) through:

- Regionalization of risk-appropriate care
- Access to trained birth attendants
- Quality improvement projects
- Payment reform and public-facing awareness
- Educational campaigns

The evidence for programs that seek to increase appropriate use of Cesarean delivery

A pilot program, with a goal of scaling back Cesarean birth over-utilization while maintaining safety for mothers and infants, rapidly lowered NTSV Cesarean rates in several California hospitals and established 2 separate baselines for infants and mothers.

Coordinated by the CMQCC, three hospitals seeking to lower their NTSV rates collected data on balancing measures, including the National Quality Forum’s Unexpected Newborn Complications measure and 3rd- and 4th-degree perineal lacerations occurring in vaginal births ([Lagrew et al., 2017](#)). The hospitals averaged reductions of:

- 18.6% in their NTSV rates in 2015
- 24.5% in newborn complications
- 4.7% in 3rd- and 4th-degree perineal lacerations

Other recent success stories include quality improvement projects to reduce unnecessary Cesarean deliveries at:

- Beth Israel Deaconess Medical Center in Boston, MA ([Vadnais et al., 2017](#))
- Carolinas Health System, headquartered in North Carolina ([Bell et al., 2017](#))
- Brazil’s Hospital Israelita Albert Einstein (HIAE) ([IHI, 2017](#))

While Cesarean deliveries are a medical procedure that can prevent maternal and neonatal mortality when used as clinically indicated, studies have shown that the rates of Cesarean deliveries have increased markedly over the past number of years. While there remains speculation for the cause, use of Cesarean deliveries as not clinically indicated is associated with severe short and long term risks for the mother. Additionally, the use of Cesarean

deliveries is often associated with a significant increase in cost.

Cause for the Increase in Cesarean deliveries

The cause for this recent increase in Cesarean deliveries is multifaceted and may include, but is not limited to,:

- Increasing rates of comorbidities and chronic conditions in mothers
- Desire to control how, when, and where the child is born
- Increasing responsibilities of the mother to both parent and work
- Changing beliefs in the physician
- Fear of legal conflict
- Economic incentives
- Lack of attention to the mother's needs and education throughout pregnancy

Alternatives to Cesarean deliveries

- **Trial of labor after Cesarean** - supported by American College of Obstetricians and Gynecologists (ACOG). Has been shown to decrease maternal morbidity and decrease complications in future pregnancies ([ACOG, 2019](#))
- **External Cephalic Version** - the obstetrician will use external maneuvers (on the woman's abdomen) to rotate the fetus to a cephalic presentation. The risks of complications are low and less than a Cesarean delivery. Some factors may affect the success of this procedure such as the provider, obesity, and amniotic fluid volume ([ACOG, 2020](#)).
- **Forceps** - instruments used to help deliver the fetal head when a woman is exhausted or to expedite delivery (non-reassuring fetal heart tracing, prolonged second stage of labor). The fetal head must be low enough in the pelvis to apply. There is a risk of a larger vaginal or perineal tear for the woman. The risks to the fetus are bruising, swelling, and nerve damage. ([Assisted Delivery, 2021](#))
- **Vacuum** - another instrument that can be used to deliver the fetal head when expediting delivery. This is used more often than forceps in certain areas of the world. There is less maternal trauma (larger perineal tears) and fetal trauma from a vacuum as compared to the use of forceps ([ACOG, 2020](#)).
- **Scalp stimulation for indeterminate or abnormal fetal heart rate tracings** - Scalp stimulation is an easy tool that can be used to elicit a fetal heart rate acceleration, offering reassurance that the fetus is not acidotic. Spontaneous or elicited heart rate accelerations are associated with a normal umbilical cord arterial pH ([ACOG, 2016](#)). If the cervix is dilated, the provider can do a vaginal exam and stimulate the fetal scalp.
- **Manual rotation of the fetal occiput**

Considerations for Labor Induction

There are many considerations to factor in while considering induction of labor. It is important to know the age of the woman, how many pregnancies she has had, the history of her prior deliveries, her starting dilation/effacement/station, BMI, past medical/surgical history, as well as the reason why an induction may be indicated and the severity of the illness requiring induction. The benefits of induction must be weighed against the potential maternal and fetal risks.

- Pregnancy at an advanced maternal age, defined at 35 years or older puts the patient at risk for labor complications and Cesarean section.
- Labor is likely to be quicker with second or subsequent deliveries compared to first delivery
- It is important to know if the patient has had previous Cesarean deliveries or vaginal deliveries.
 - If previous Cesarean delivery, have they had a successful vaginal delivery after Cesarean?
 - A patient with a previous successful vaginal delivery may go into labor quicker during induction than a patient with a previous Cesarean.
- It is helpful to know if the cervix is favorable and ready for labor
- Do the benefits of induction outweigh the potential maternal and fetal risks?

Proper Induction Scheduling

The Bishop score is calculated by cervical dilation in centimeters, cervical effacement as a percentage, cervical consistency by provider assessment/judgment, position of the cervix, and fetal station. For patients with Bishop score < 8, cervical ripening is recommended, using agents such as dinoprostone, misoprostol, or a cervical catheter balloon. Once the cervix is more favorable, methods such as oxytocin, artificial rupture of membranes, and/or misoprostol can be used to induce or augment labor. When induction is indicated, you want to make sure you are giving your patient a fair chance at a vaginal delivery, knowing that it takes some women longer to go into labor and reach full dilation. Current evidence suggests that, in the absence of fetal or maternal safety concerns, Cesarean delivery is not indicated until at least 24 hours of oxytocin and 12-18 hours after membrane rupture without cervical change within the latent phase of labor. If an induction fails (meaning, lack of cervical dilation) and the patient and baby are stable, it is important to consider sending the patient home and having them return later for induction, depending heavily on patient status and health.

Appropriate Labor Support

Labor support is crucial in preventing unnecessary Cesareans. Labor nurses should stay in the room with their patients as much as they can, even if the patient has an epidural. Frequent position changes should be encouraged, with consideration to use of labor tools such as birthing ball, shower, jet tub, resting, rocking, or standing against a support person. If the patient has an epidural, a peanut ball or pillows can be used to assist patients into various positions. If a patient does not have epidural or can move safely with epidural, hands and knees in bed or the throne position can be used to optimize fetal rotation and descent. Pay attention to hydration status if the patient needs more fluids. Encourage light snacks if laboring without an epidural. If the nurse is in the room more, it calms the patient. Encourage use of music the patient enjoys. Turn down the lights to encourage oxytocin. Assess your patient's contractions strength by palpation as well as frequency, as the patient may not need augmentation. If the RN is in the room, they can assess change in the patient's comfort. The RN can also assist in counter pressure for back pain, rebozo and encourage partners to get involved. If the baby is in an occiput posterior position, it may cause increased back pain and cause slow dilation. The RN could assist the patient into positions to help rotate the baby (hands and knees, lunging, birthing ball, walking etc.) and help make delivery easier. Rather than referring to pain or discomfort, instead patients can be encouraged to think about pain in a different way. In life, when pain is thought about it is often something we shy away from

or fear. In labor, we want to embrace the contractions as they are bringing mom one step closer to meeting her baby and focus more on coping and support. Encourage low deep sounds, focused breathing and relaxation of the forehead, shoulders, and hips.

Fetal Monitoring During Induction and Labor

Birth facilities should have standardized protocols for fetal monitoring during induction and labor. The well-being of the fetus needs to be established at regular intervals, either through intermittent auscultation of the fetal heart rate or use of an electronic fetal monitor. Patients who are deemed low risk may receive intermittent auscultation for labor and delivery, while patients with risk factors should receive continuous electronic fetal monitoring or more frequent auscultation. Maternal heart rate should be distinguished from fetal heart rate upon initiation of monitoring then via fetal monitor/SpO₂ or with each auscultation. Uterine activity (frequency, duration and intensity of uterine contractions) and resting tone should be assessed at the same time intervals as fetal heart rate assessment. The frequency of assessment of the fetal heart rate is based on the patient's risk levels, induction agents, anesthesia status, and stage of labor.

When assessing and documenting electronic fetal monitoring interpretation, NICHD terminology and criteria should be used. Fetal heart rate (FHR) education and ongoing strip reviews for providers and nursing are critical to maintaining competency and ensuring patient safety, with FHR certification strongly encouraged. Regular huddles with all care team members, especially during the second stage, to review the FHR tracing and discuss plans of care can help maintain situational awareness and prevent poor outcomes.

Responses to abnormal fetal heart rate patterns must be standardized and evidence based. Nurses should be empowered to initiate intrauterine resuscitation measures when fetal heart rate characteristics such as absent or minimal variability, late or variable decelerations, bradycardia or prolonged decelerations, tachycardia, or sinusoidal FHR pattern are identified. These interventions include maternal repositioning, IV fluid bolus, reduction or discontinuation of labor stimulating agents, correction of maternal hypotension, pushing techniques, and/or oxygen administration via face mask. If the FHR tracing does not respond to interventions, an obstetric provider should be notified and come to the bedside to evaluate. Implementation of a standardized algorithm for labor and tachysystole management is recommended. If concerning FHR patterns persist despite intrauterine resuscitative measures, obstacles to delivery should be cleared which includes notifying the obstetrician and proactive communication with anesthesia and pediatric providers.

Each woman should be encouraged to use the pushing technique that she prefers and to push spontaneously when she has the urge to bear down. To optimize fetal oxygenation, open-glottis pushing should be encouraged and prolonged breath-holding discouraged if coaching is needed. Frequent position changes and upright positions should be encouraged when possible to assist in bringing the baby down and out. In situations of persistent Category II tracing, there should be consideration for pushing every other or every other contraction.

Midwifery-Led Care

Approaches involving labor companionship and midwife-led care have shown improved outcomes and lower healthcare cost ([Carlson et al., 2019](#)). More tangibly, universal midwifery coverage is associated with an 82% reduction in maternal mortality ([WHO, 2021](#)). Studies have shown that in low-risk pregnancies, midwife-led care in labor was related to decreased

Cesarean and operative vaginal births ([Souter et al., 2019](#)). Recommendations to incorporate midwives into the clinical workflow include:

Employ midwives for full scope gynecology to maximize preconception counseling and improve female health through the childbearing years, leading to healthier and lower risk pregnancies ([Elsinga et al., 2008](#)).

Provide one to one continuous, hands on, labor support by a midwife, nurse, or doula ([Bohren et al., 2017](#)).

Employ midwives trained to recognize when to consult, collaborate, or transfer to physician care, and have a system in place for such team oriented care ([Joint Statement, 2018](#))

Measurement

Healthcare organizations must prioritize the Pareto Principle to identify the primary drivers behind their Cesarean delivery rate. These drivers are typically assumptions and clarifying these primary drivers using objective data is key to creating meaningful and impactful process improvements.

To ensure sustainable quality, safety, and performance improvement in reducing Cesarean deliveries, it is important to first review the baseline data regarding the target population. Typically, a baseline is at least 2 years of data. Analyzing this baseline data will provide clinically meaningful insights to guide next steps and clarify what the primary drivers (i.e. reasons for Cesarean delivery) contribute to the facility's Cesarean delivery rate. It is vital that the maternity care team leadership collaborate with the facility's hospital based quality professional and data analyst/consultant who monitor the TJC PC-02 (3) to not only understand facility level PC-02: Nulliparous, Term, Singleton, Vertex (NTSV) Cesarean delivery rate, but to also create a facility specific data report mapped to the facility's EMR that captures all Cesarean deliveries (NTSV, Repeat) and their primary reason for the Cesarean delivery.

Birth facilities in states with a Perinatal Quality Collaboratives (PQCs) ([State Perinatal, 2020](#), [Berns et al., 2018](#)) should confirm if they are a member and if so, contact the PQC Leadership and confirm what data resources are available to them regarding reducing the Cesarean delivery rate in their state. Regardless, these state-based PQCs who are actively participating in quality improvement initiatives to reduce their Cesarean delivery rates share their project and data plans and they can be adapted locally ([Brown and Evilsizer, 2021](#), [CMQCC, 2016](#)). It also presents a dynamic opportunity to network with other birth facilities who are pursuing a shared goal which is key to improving patient outcomes. Another resource is the Alliance for Innovation on Maternal Health (AIM) Program ([Safe Reduction, 2015](#)) managed by ACOG and funded by the Health Research and Services Administration-Maternal Child Health Bureau (HRSA-MCHB) is a national quality improvement program that has developed a maternal safety bundle and data plan for reducing unnecessary Cesarean deliveries.

Once the primary drivers to your birth facility's Cesarean delivery rate are identified, it is important to track, trend, and monitor performance improvement (at a minimum) on a monthly basis. Assigning an OB and Nurse Reviewer to review the monthly PC-02 fallout cases is an effective strategy to identify opportunities for improvement and share systems-learning with the maternity care team leadership and staff. It is also important that reducing unnecessary Cesarean deliveries be prioritized as an organizational quality, safety, and performance improvement goal and that 'the why' behind your facility's Cesarean delivery rate is transparent and communicated to Leadership and Staff. Providing timely data (at a

minimum) on a monthly basis to the maternity care team leadership and staff will help build their capacity to address their primary drivers and systems issues with a responsive rapid-cycle quality improvement mindset.

See [Alliance for Innovation on Maternal Health](#) for more information about data collection for improving maternal outcomes.

Technology

SYSTEM OR PRACTICE
<p>ONC Meaningful Use Certified Electronic Health Record (EHR) System - should have these capabilities:</p> <p>Proper data elements: Review the EHR to make sure proper data elements are present, and are formatted and defined into standard terminologies for incorporating your alerting, measure reporting, and documentation needs.</p> <ul style="list-style-type: none"> • For example: Use national or international standards for definitions and value sets that are available, such as fetal heart rate interpretations defined by NIHCD consensus <p>This will allow for comparisons between institutions and help in defining normal practice and thresholds.</p> <p>Labor tools: Use standard reporting tools, such as a labor curve, intervention curve, and trending visualizations for fetal heart rate interpretations. These enable providers to more accurately assess the overall labor status that should be incorporated into systems.</p>
<p>Device integration: The EHR should have robust device integration of fetal monitoring data, intravenous pumps, and vital sign devices, which can reduce mundane documentation for caregivers and allow them to devote more of their time to more value-added processes such as labor support. In addition, newer monitoring devices incorporate continuous decision support/artificial intelligence and analysis which should integrate into the EHR and ensure a single source of accurate data truth and improve provider interpretations.</p> <p>Decision support: Standard practice alerts, used in a judicious manner to prevent alert fatigue, can incorporate best practice guidelines for labor interventions and responses to fetal heart rate patterns in a standard way. Incorporate: Other methods of decision support into documentation tools and order sets to improve documentation and reporting, and allow clinicians to follow standardized protocols more frequently Best practice content sources into standard workflows allowing for easier review by clinicians</p> <p>Embedded reporting data elements: EHR should allow collection of clinical data as part of standardized documentation, and collection of ongoing data entered by nurses, physicians, and others. Specific data elements for labor support can help you review and train on these new techniques and enable you to evaluate compliance. Carefully review and maintain these so that robust data analytics can be routine.</p>
<p>Fetal monitors</p> <p>Newer fetal monitors have strip analysis artificial intelligence algorithms incorporated into the systems. These will aid clinicians in their interpretation skills and allow for easier and more complete documentation. Wireless monitoring can also lead to greater ambulation and positioning options for patients in active labor.</p>
<p>Cervical ripening techniques</p> <p>Device manufacturers and pharmaceutical companies should expand the list of options for safe and effective ripening of the cervix. Programs should target reduction and elimination of induction of labor with an unripe cervix. Nevertheless, induction with an unripe cervix will be required in many labors, and better methods are needed. In addition, the goal for safe outpatient methods should be proposed to reduce cost.</p>
<p>Web/mobile-based learning tools</p> <p>All major guidelines call for better education for providers and patients. Unfortunately, traditional didactic teaching will not be possible on that scale, and newer online education techniques are required for cost-effective delivery. For patients, convenient methods on electronic hand-held devices can be developed for both learning and communication. Paired with group prenatal care, the patients can also work and learn together to understand risks, benefits, and techniques of modern labor.</p>



Resources

For Reducing Unnecessary Cesarean Deliveries:

- [Interventions targeted at health professionals to reduce unnecessary caesarean sections: a qualitative evidence synthesis](#)
- [WHO: Guide to Reducing Unnecessary Cesarean deliveries](#)
- [ACOG: Safe Prevention of the Primary Cesarean Section](#)
- [Alliance for Innovation on Maternal Health \(AIM\): Meaningful Measurement](#)
- [CMQCC: Toolkit to Support Vaginal Birth and Reduce Primary Cesareans](#)
- [Preventing the First Cesarean Delivery: Summary of a Joint Eunice Kennedy Shriver National Institute of Child Health and Human Development, Society for Maternal-Fetal Medicine, and American College of Obstetricians and Gynecologists Workshop](#)

For General Improvement:

- [CMS: Hospital Improvement Innovation Networks](#)
- [IHI: A Framework for the Spread of Innovation](#)
- [The Joint Commission: Leaders Facilitating Change Workshop](#)
- [IHI: Quality Improvement Essentials Toolkit](#)
- [SIPOC Example and Template for Download](#)
- [SIPOC Description and Example](#)

Endnotes

Conflicts of Interest Disclosure

The Patient Safety Movement Foundation partners with as many stakeholders as possible to focus on how to address patient safety challenges. The recommendations in the APSS are developed by workgroups that may include patient safety experts, healthcare technology professionals, hospital leaders, patient advocates, and medical technology industry volunteers. Workgroup members are required to disclose any potential conflicts of interest.

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