

National Partnership for Maternal Safety: Consensus Bundle on Safe Reduction of Primary Cesarean Births—Supporting Intended Vaginal Births

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ABSTRACT

Cesarean births and associated morbidity and mortality have reached near epidemic proportions. The National Partnership for Maternal Safety under the guidance of the Council on Patient Safety in Women's Health Care responded by developing a patient safety bundle to reduce the number of primary cesarean births. Safety bundles outline critical practices to implement in every maternity unit. This National Partnership for Maternity Safety bundle, as with other bundles, is organized into four domains: *Readiness, Recognition and Prevention, Response, and Reporting and Systems Learning*. Bundle components may be adapted to individual facilities, but standardization within an institution is advised. Evidence-based resources and recommendations are provided to assist implementation.

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Currently one in three women in the United States gives birth surgically (Martin, Hamilton, & Osterman, 2014), and this high cesarean birth rate can be viewed as a significant maternal health safety issue. Cesarean birth has short-term complications, including blood loss, infection, and venous thrombosis (Bauserman et al., 2015), and long-term effects in subsequent pregnancies and births, including abnormal placentation and increased risk of hemorrhage and hysterectomy (Bauserman et al., 2015; Marshall, Fu, Guise, 2011). Although appropriate intervention with cesarean birth can save the lives of women and newborns, overuse can be viewed as a significant maternal safety issue.

Seeing unnecessary cesarean birth as a preventable cause of maternal morbidity and mortality and

reduction of cesarean birth rates as an important strategy to improve women's health, a workgroup of the National Partnership for Maternal Safety within the Council on Patient Safety in Women's Health Care was appointed in April 2015 to address the high cesarean birth rate in the United States. The members of the workgroup, who represent women's health care professional organizations, including the American Academy of Family Physicians, the American College of Nurse-Midwives (ACNM), the American College of Obstetricians and Gynecologists (ACOG), the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN), and consumers through the National Partnership for Women and Families, developed a safety bundle of actions focused on lowering the primary cesarean birth rate and improving care to increase the opportunity for a vaginal birth in the hospital setting (Table 1).

Effective initiatives to reduce cesarean birth rates have been described in the literature and include a variety of clinical models, team-based care, and application of new recommendations for labor management. Achievement of the goal to reduce cesarean births was demonstrated by several authors in a wide range of clinical settings

Table 1: Safe Reduction of Primary Cesarean Births: Supporting Intended Vaginal Births

Readiness

Every Patient, Provider and Facility

- Build a provider and maternity unit culture that values, promotes, and supports spontaneous onset and progress of labor and vaginal birth and understands the risks for current and future pregnancies of cesarean birth without medical indication.
- Optimize patient and family engagement in education, informed consent, and shared decision making about normal healthy labor and birth throughout the maternity care cycle.
- Adopt provider education and training techniques that develop knowledge and skills on approaches which maximize the likelihood of vaginal birth, including assessment of labor, methods to promote labor progress, labor support, pain management (both pharmacologic and nonpharmacologic), and shared decision making.

Recognition And Prevention

Every Patient

- Implement standardized admission criteria, triage management, education, and support for women presenting in spontaneous labor.
- Offer standardized techniques of pain management and comfort measures that promote labor progress and prevent dysfunctional labor.
- Use standardized methods in the assessment of the fetal heart rate status including interpretation, documentation using NICHD terminology, and encourage methods that promote freedom of movement.
- Adopt protocols for timely identification of specific problems, such as herpes and breech presentation, for patients who can benefit from proactive intervention before labor to reduce the risk for cesarean birth.

Response

To Every Labor Challenge

- Have available an in-house maternity care provider or alternative coverage which guarantees timely and effective responses to labor problems.
- Uphold standardized induction scheduling to ensure proper selection and preparation of women undergoing induction.
- Utilize standardized evidence-based labor algorithms, policies, and techniques, which allow for prompt recognition and treatment of dystocia.
- Adopt policies that outline standard responses to abnormal fetal heart rate patterns and uterine activity.
- Make available special expertise and techniques to lessen the need for abdominal delivery, such as breech version, instrumented delivery, and twin delivery protocols.

Reporting/Systems Learning

Every Birth Facility

- Track and report labor and cesarean measures in sufficient detail to: 1) compare to similar institutions, 2) conduct case review and system analysis to drive care improvement, and 3) assess individual provider performance.
- Track appropriate metrics and balancing measures, which assess maternal and newborn outcomes resulting from changes in labor management strategies to ensure safety.

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(Chaillet & Dumont, 2007). Specific approaches included the use of multidisciplinary teams of physicians and midwives who provide hospitalist coverage and the use of standardized clinical protocols based on current labor management guidelines that redefine active labor and expectation of labor progress (ACOG & Society for Maternal-Fetal Medicine [SMFM], 2014; Spong, Berghella, Wenstrom, Mercer, Saade, 2012).

Much of the focus has been on lowering first-time cesarean births, particularly for those women with single fetuses in vertex presentation, because this group accounts for downstream increased morbidity in subsequent pregnancies and approaches to these are different than preventing the first cesarean birth in multiparous women (ACOG & SMFM, 2014). Continuous labor support has positively affected primary cesarean

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birth rates (Hodnett, Gates, Hofmeyr, & Sakala, 2013), as have methods to track individual health care providers attending births (physician or midwife) and system outcomes (Council on Patient Safety in Women's Health Care, 2015; Flamm, Berwick, & Kabcenell, 1998; Lagrew & Morgan, 1996; Main, 1999; Myers & Gleicher, 1988). In addition to these successful efforts, the wide variation in cesarean birth rates by state (23–40%), between hospitals (which vary by 10-fold; Kozhimannil, Law, & Virnig, 2013), and among individual providers (Chaillet & Dumont, 2007) suggests that improvement is possible. However, effective leadership from all members of the maternity care team and their administrators should be combined with a culture in which achievement of vaginal birth is valued (Marshall et al., 2011).

The purpose of this article is to provide a quality and safety bundle to support health systems and health care professionals to reach safe primary cesarean birth rates and to promote vaginal births, thereby improving maternal and infant outcomes. A national standard for a safe primary cesarean birth rate has not been firmly established because of variation in population risk status. Although some targets have been proposed (for example, the World Health Organization recommended total cesarean birth rates of 10–15%), a careful analysis that included rates from 194 countries suggested that 19% may be the better cutoff based on maternal or neonatal mortality (Molina et al., 2015). The 14 key elements of this safety bundle are divided into the four major groupings used in other bundles from the Council on Patient Safety in Women's Health Care: *Readiness, Recognition and Prevention, Response, and Reporting and Systems Learning*. Experts recommend strategies that are straightforward, evidence-based, and proven useful in prior successful programs (ACOG, 2017a; ACOG & SMFM, 2014; Chaillet & Dumont, 2007; Spong et al., 2012). As a first step in any quality improvement initiative, it is necessary to assess baseline process and outcome metrics and available resources. This assessment should also include identification of priorities and opportunities for improvement. The goal of the workgroup in creating this bundle is that all birthing facilities, health care providers, and quality improvement organizations will tailor the recommendations to their own institutions to improve performance (ACOG, 2017a). Although the bundle was developed for use in the hospital setting, the goal is that it would be used in all settings where births occur.

Readiness—Every Patient, Provider, and Facility

The *Readiness* domain includes three areas of focus that should be addressed by patients, health care providers, and facilities to ensure all team members are prepared to implement elements of the bundle to reduce the likelihood of primary cesarean birth. These include the knowledge, skills, and attitudes needed to achieve successful vaginal birth and avoid unnecessary or nonmedically indicated cesarean birth.

1. Develop a Unit Culture That Supports Vaginal Birth in Which All Team Members Clearly Articulate the Risks and Benefits of Cesarean Compared With Vaginal Birth

Some of the lessons learned from prior cesarean birth reduction efforts and analysis of health care provider (physician or midwife) influence demonstrate the importance of achieving a cultural change throughout an institution (Roseman, Osborne-Stafsnes, Amy, Boslaugh, & Slate-Miller, 2013). To successfully lower cesarean birth rates, health systems must develop environments in which everyone (a) appreciates the true value of achieving vaginal birth; (b) respectfully acknowledges the desires of the patient; and (c) maintains educational processes, facilities, equipment, and staff expertise that maximize the likelihood of safe vaginal birth. Strategies to achieve this goal include health care professionals engaging patients on their desires and education initiatives, which incorporate evidence-based literature on which to base clinical protocols and approaches. An additional strategy is to support quality improvement throughout the organization, which supports clinical practice change to improve outcomes and meets established metrics to support culture change. The resulting culture will allow organizational leaders to overcome resistance from those health care professionals who are hesitant to implement clinical changes. An existing culture that supports quality improvement and has had prior success with other initiatives is more likely to efficiently and effectively achieve further improvement (Roseman et al., 2013).

2. Optimize Patient and Family Engagement

Patient and family engagement is a critical pathway toward achievement of the Institute for Healthcare Improvement (2012) Triple Aim of better health, better experience of health care,

and lower costs. The provision of maternity care during the prenatal, intrapartum, and postpartum periods offers a sustained opportunity for maternity care professionals to routinely engage women and families in education and informed and shared decision-making that can enhance opportunities for vaginal birth. Education should address the evidence-based benefits and risks of vaginal birth, risks associated with unnecessary cesarean birth, and ways women and health care providers can work together to improve the likelihood of vaginal birth. Researchers found that pregnant women wanted to be actively involved in decisions about their care and to receive information from their health care providers about potential risks and benefits associated with maternity care tests, treatments, procedures, nonintervention, and the cost of each (Declercq, Sakala, Corry, Applebaum, & Herrlich, 2013). Health care providers and facilities moving toward more patient-centered maternity care cultures can implement institutional practices and caregiver workflows that facilitate informed choice and shared decision-making between patients and health care providers (Gee & Corry, 2012). Such practices promote continuity of care, communication of patient care desires, use of standardized documentation of patient care goals, and tracking metrics to measure nursing care influence on type of birth (Edmonds, O'Hara, Clarke, & Shah, 2017).

Shared decision-making, a fundamental principle of health care, is designed to ensure respect for patient autonomy and depends on open communication between the woman and the care team (Barry & Edgman-Levitan, 2012; Gee & Corry, 2012). Sharing of relevant information and adequate disclosure empower the woman to exercise personal choice. Recently, a more comprehensive concept of shared decision-making has been advocated in favor of a narrowly defined legal process of informed consent (King & Moulton, 2006). Shared decision-making is a collaborative process between a woman and her health care provider to identify treatment options based on clinical evidence and her values and beliefs (Gee & Corry, 2012). It involves the provision of evidence-based information about options, outcomes, and uncertainties; support of decision-making; and a system to record and implement the woman's informed decisions. Tools to support this process include risk-benefit calculators for selected procedures, expanded informational resources included in the electronic medical record that can

be tailored to specific conditions, and algorithms for specific care practices based on unique patient characteristics (Dugas et al., 2012). Shared decision-making can improve patient engagement, satisfaction, treatment adherence, and outcomes while reducing risks (Gee & Corry, 2012).

A woman's ability to make informed decisions is enhanced when she is provided with culturally sensitive, literacy-appropriate resources that support the shared decision-making process. The use of decision aids in maternity care improves knowledge, increases perception of having made an informed choice, improves satisfaction, reduces anxiety, and lowers decisional conflict (Gee & Correy, 2012).

3. Adopt Health Care Provider Education and Training

Facilities are encouraged to adopt health care provider education and training techniques that improve knowledge and skills that maximize the likelihood of vaginal birth. Training should be focused on assessment of labor, methods to promote labor progress, labor support, pain management (pharmacologic and nonpharmacologic), and shared decision-making. Health care provider education and training are meant to improve the knowledge, attitudes, and skills of health care professionals to ultimately improve patient health outcomes. Although there is insufficient information to reliably estimate the direct effect of health care provider education and training on mode of birth, education is widely considered a necessary component of any patient safety and quality improvement program in maternity care (Bisognano, Cherouney, & Gullo, 2014). Targeted, repetitive training to reinforce essential messages, opportunities to practice skills, and mechanisms to foster interdisciplinary interaction are recommended (Bisognano et al., 2014; Chaillet & Dumont, 2007).

The successful implementation of this bundle calls for additional health care provider education and training to avoid practices that increase the potential for unneeded primary cesarean births (e.g., early admission and early labor induction) and promote practices that maximize the likelihood of vaginal birth (e.g., use of revised labor guidelines and continuous support of the woman during labor; Marshall et al., 2011). Increased education has the potential to enhance the adoption of less widespread skills such as operative vaginal birth, intermittent auscultation, non-pharmacologic pain management, and use of

doulas. Strategies to promote these evidence-based practices include the use of local, unit-based opinion leaders who advocate for change (Bisognano et al., 2014) and interdisciplinary, team-based training in maternity care skills laboratories using simulations. Furthermore, user-friendly tools at the point of care have the potential to improve the decision-making skills of health care providers. One example is the use of low- and high-fidelity mannequins with trained patient actors in clinical scenarios to engage health care providers in the training process; ideally all members of the maternity care team are represented (Utz, Kana, & van den Broek, 2015). Increased support for patients and professionals is thought to help health care providers engage in shared decision-making (Gee & Corry, 2012).

Recognition and Prevention— Every Patient

4. Implement Standard Admission and Triage Management

Numerous researchers have demonstrated that admission of women who present in latent labor leads to higher rates of cesarean birth and interventions (ACOG, 2017a; ACOG & SMFM, 2014; Spong et al., 2012). Abnormal progress of labor is associated with 34% of the primary cesarean births performed (Barber et al., 2011). Redefining one criteria of the active stage of labor as dilatation at 6 cm rather 4 cm is based on the work of Zhang et al. (2010) and strengthens the rationale to avoid early admission of women in pre-active labor who have not demonstrated labor progress (less than 6-cm dilatation). This strategy is proposed to reduce the chances of cesarean birth in nulliparous women and improve their satisfaction with the birth experience (ACOG, 2017a). Implementation of such a strategy requires careful consideration, planning, and education of women on the normalcy of the latent phase of labor. Virtually all modern labor and delivery units have standardized triage policies and protocols to assess the status of the woman and fetus during spontaneous labor. In most low-risk pregnancies, the statuses of the woman and fetus are normal, and the decision to admit is made by assessing the presumed stage of labor and comfort of the woman. Currently, there is consensus that labor should be assessed by multiple factors: regular contractions that require focus and attention by the woman, significant effacement (greater than or equal to 80%), and greater than 4- to 5-cm dilatation with documented cervical change (ACOG, 2017a;

California Maternal Quality Care Collaborative, 2016). The first decision the health care provider can make to support intended vaginal birth is to delay admission to the labor and delivery unit until the onset of active labor for women with normal, term pregnancies and fetuses in vertex presentation (ACOG, 2017a).

Women may have expectations for admission in labor that may lead to conflict and confusion. This is particularly true for those who have not been educated about normal labor progress and labor support techniques before and after admission to the hospital (Tilden et al., 2016). It is important that all maternity care professionals agree on and then participate in educating women on the importance of physiologic labor to help reduce fear and anxiety related to the timing of admission in labor (California Maternal Quality Care Collaborative, 2016). Innovative management approaches for the latent phase of labor include dedicated areas in the hospital in which women can ambulate and access other comfort measures such as visualization, hydrotherapy, or massage (Paul et al., 2017).

5. Provide Pain Management Techniques That Promote Labor Progress and Prevent Dysfunctional Labor

Pain management techniques include pharmacologic and nonpharmacologic approaches that can be used as primary or complementary measures (Hodnett et al., 2013). The choice of pain management should be made through a process of shared decision-making with the woman. Counseling during the prenatal and intrapartum periods should include the benefits and risks of available pharmacologic and nonpharmacologic methods with the understanding that she may change her mind during the course of labor. Free movement should be encouraged as a pain management strategy (AWHONN, n.d.). Although an array of pain management techniques during labor exists, two of the most deliberated are epidural anesthesia and continuous support during labor (Anim-Somuah, Smyth, & Jones, 2011; AWHONN, n.d.; King & Pinger, 2014).

Regional epidural anesthesia is routinely used to effectively manage pain during labor. The association between epidural anesthesia and labor dystocia has led to the recommendation to administer epidural anesthesia only after 4- to 5-cm cervical dilatation to prevent prolonged latent phase labor. However, the evidence to support this recommendation is limited (Anim-Somuah et al., 2011).

In response to concerns that epidural anesthesia use increases the duration of the second stage of labor or challenges a woman's ability to accomplish birth through active pushing, ACOG (2017b) and AWHONN (2008) published guidelines for second-stage labor management for women who have epidural anesthesia. Well-administered epidural anesthesia is not associated with an increase in risk of maternal or neonatal mortality (Anim-Somuah et al., 2011). Best practice recommendations for the care of women with regional anesthesia in labor include the following:

- Encourage frequent changing of position to promote optimal rotation of fetal vertex presentation.
- Allow a longer duration of the second stage of labor per ACOG (2017b) guidelines.
- Allow passive descent of the presenting part when there is no urge to push.
- Preserve as much motor function as possible with epidural anesthesia.
- Maintain the epidural anesthesia infusion during the second stage of labor.
- Allow the woman to control epidural anesthesia with a background maintenance infusion (California Maternal Quality Care Collaborative, 2016).

These recommendations can be easily translated into policies and procedures for labor and delivery units.

The benefits of continuous, one-to-one intrapartum labor support provided by a family member, doula, or nurse are well established. In a systematic review of 22 randomized controlled trials ($N = 515,288$ women), Hodnett et al. (2013) found that women who received continuous labor support were more likely to have spontaneous vaginal births and were less likely to have cesarean or instrumental vaginal births. Furthermore, they used less pharmacologic intervention, were more satisfied with their childbirth experiences, and neonatal outcomes were improved (Hodnett et al., 2013). Subgroup analyses of the various models of continuous labor support suggested that continuous support is most effective when the health care professional is neither part of the hospital staff nor the woman's social network, and birth occurs in settings in which epidural anesthesia is not routinely available (Hodnett et al., 2013). Women

who labored with independent labor support personnel (e.g., doulas) had 25% fewer cesarean births than women who received usual care (Hodnett et al., 2013). Many of the women who labored with doula support also received additional labor support from members of their social networks and from hospital employees such as nurses. Hodnett et al. (2013) concluded that the independent effect of continuous labor support by hospital employees alone could be overpowered in interventionist birth environments. Overall, these results underscore the importance of providing continuous labor support, and hospitals are encouraged to develop policies and guidelines to provide continuous support during labor for all women (California Maternal Quality Care Collaborative, 2016). Payment for these types of services has been included under some health plans or has been included as part of the health care system resources for their patient population (Kozhimannil & Hardeman, 2016).

6. Use Standardized Methods in Assessment and Communication of Fetal Status, Including Methods That Allow for Patient Movement

Analysis has shown that approximately one-fourth to one-third of the increase in the current primary cesarean birth rate is the result of procedures that are performed for concerning fetal heart rate patterns (Macones, Hankins, Spong, Hauth, & Moore, 2008). Improper interpretation of continuous electronic fetal monitoring tracings and miscommunication can cause unnecessary cesarean births (Clark et al., 2013; Macones et al., 2008). Standard nomenclature for fetal heart rate assessment was developed by the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) to improve communication between health care professionals (Macones et al., 2008). Although category II tracings include a wide range of fetal statuses that convey various needs for intervention, the system allows caregivers to document patterns in a standardized fashion and respond appropriately. In addition, reduction of miscommunication should improve medicolegal risk (Macones et al., 2008).

Because other strategies to reduce dysfunctional labor involve positioning and movement (California Maternal Quality Care Collaborative, 2016), it is important that the assessment of fetal well-being does not restrict a woman's movement. In addition, no benefit from

continuous electronic fetal monitoring has been shown for the uncomplicated, nulliparous, term patient with a single fetus in vertex presentation in spontaneous labor (ACOG, 2017a). Intermittent auscultation, as endorsed by ACOG (2017a) and ACNM (2010) should be offered, and examples of successfully implemented hospital protocols exist (ACOG, 2017a; California Maternal Quality Care Collaborative, 2016). If continuous electronic monitoring is necessary, telemetric transmission devices should be made readily available for all women to facilitate movement in labor.

7. Adopt Protocols for Timely Identification of Preventable Causes of Cesarean Birth Such as Herpes and Breech Presentation

Herpes simplex virus (HSV) is ubiquitous; the greatest risk of neonatal infection is from transmission during vaginal birth, which can result in severe morbidity or mortality. There is a 5% rate of neonatal HSV infection when a genital culture obtained at the time of birth is positive (Hollier & Wendel, 2008). Significant postnatal transmission can occur by direct contact with oropharyngeal or skin lesions, so caution must be taken if any nongenital lesions are present (Hollier & Wendel, 2008).

Women with histories of genital herpes can be treated with oral acyclovir or valacyclovir for a recurrence during pregnancy and offered suppressive therapy for the remainder of their pregnancies. These antivirals are safe for use during pregnancy and lactation (Hollier & Wendel, 2008). When a pregnant woman develops recurrent genital herpes, she can be treated with oral acyclovir or valacyclovir and then offered suppressive therapy for the remainder of her pregnancy. In the absence of recurrence in pregnant women with known prior genital herpes, offer prophylactic antiviral therapy starting at approximately 36 weeks of gestation. For women with histories of HSV but with no recurrent symptoms during pregnancy, offer suppressive antiviral therapy starting at approximately 36 weeks of gestation (Hollier & Wendel, 2008). If no lesions or prodromal symptoms are present at the time of labor, vaginal birth is appropriate. Even with suppressive antiviral treatment, interventions such as scalp electrode and operative vaginal birth should be avoided when possible (Hollier & Wendel, 2008).

When primary herpes infection occurs in the latter part of pregnancy, HSV antibodies may not

develop, and primary cesarean birth may be the safest option. Otherwise, women on suppression as a result of a primary infection earlier in pregnancy can consider vaginal birth if they have documented HSV antibodies to the same HSV type that was detected earlier in pregnancy (Hollier & Wendel, 2008). Vaginal birth is recommended in the presence of nongenital herpes lesions on the buttock or thigh for example, and these should be covered with an occlusive dressing. Antiviral therapies can be given to shorten the course or for symptomatic relief for those nongenital lesions (Hollier & Wendel, 2008).

Approximately 3% of fetal presentations are breech at term with rates less than 10% in the late preterm period (Hofmeyr, Kulier, & West, 2015; Hutton, Hofmeyr, & Dowswell, 2015). Presenting symptoms may include fetal kicking in the lower abdominal region. Clinical assessment may identify the fetal heart rate by auscultation or Doppler higher on the maternal abdomen than typically found. Leopold maneuvers or pelvic examination may raise suspicion for breech presentation. Regular assessment of fetal presentation in the late third trimester during each prenatal care visit is a standard of care and can aid in earlier identification of breech presentation in time to allow for possible version. If there is suspected breech presentation, confirmation by ultrasonography is warranted. At such point, shared decisions about positioning measures and whether and when to attempt external cephalic version should be made (Hofmeyr et al., 2015; Hutton et al., 2015).

Response—To Every Labor Challenge

8. Promote In-House Maternity Care Provider and Alternative Coverage Models

Another innovation that can contribute to the support of intended vaginal birth is the addition of in-house maternity care providers and development of collaborative coverage models. In general, these redesigns focus on having health care providers on the unit readily available for care of the laboring woman to provide timely assessment of labor progress. A consistent team in house supports communication about and adoption of other standard practices that are beneficial to reducing cesarean births such as labor progress algorithms and consistent admission policies for labor. Recent studies show a significant decline in rates of cesarean birth with the introduction of

midwife-laborist models (Nijagal, Kuppermann, Nakagawa, & Cheng, 2015; Rosenstein, Nijagal, Nakagawa, Gregorich, & Kuppermann, 2015) or laborist models (Iriye et al., 2013) focused on reducing cesarean births. These coverage changes provide around-the-clock health care providers who are responsible for directly assisting in labor management rather than assisting only for emergencies.

There are various explanations that may underlie the effectiveness of in-house, continuous health care provider coverage alone or in combination: having someone immediately available to respond to changes in the labor process, support of the labor and delivery staff, removal of economic and time-based incentives to perform a cesarean birth in response to protracted labors, and team-based care that maintains the right provider of care performing the level of care that is necessary in the situation. The usual model of coverage for health care providers working as hospitalists also includes working a shift schedule that allows health care providers to avoid fatigue. Collaborative models of care using a team-based approach also offer a more coherent approach to labor management. Use of certified nurse-midwives and certified midwives as providers of care who use practices to promote physiologic birth can aid in changing culture on a labor and delivery unit (Nijagal et al., 2015). In one study, investigators documented a drop in cesarean birth rates for nulliparous women with singleton term pregnancies and fetuses in vertex presentation from 29.8% to 15.9% for the collaborative laborist model using midwives and physicians (Nijagal et al., 2015). Therefore, institutions that are planning on adopting these programs for other reasons or have existing programs that do not focus on assisting direct labor management should consider redesign. Hospitals that have not considered adoption of alternative coverage should consider doing so given this important benefit. Collaborative practice models have been shown to improve access to care as well (Nijagal et al., 2015).

9. Use Standardized Scheduling and Execution for Induction of Labor

Although there are medical indications for induction of labor for women with specific medical conditions or pregnancy complications, which may actually lead to lowered cesarean birth rates and improved infant and maternal outcomes, professional organization guidelines from ACOG (2009) and ACNM (2016) highlight the need to

consider the risk compared with the benefit of elective induction of labor in women with low-risk pregnancies without medical complications. Retrospective cohort analysis of women who enter spontaneous labor compared with those who experience an induction shows an approximate twofold increase in cesarean birth rates for women whose labors were induced (Caughey et al., 2009). Other experts have challenged such studies and argue instead for comparisons between women who have inductions of labor with those who continue their pregnancies (Caughey et al., 2009; Cheng, Kaimal, Snowden, Nicholson, & Caughey, 2012). Although some randomized controlled trials demonstrated lowered cesarean birth rates compared with expectant management, they were performed in settings in which the authors carefully controlled for cervical status, followed standardized labor protocols, and were usually in settings where there were resident physicians, 24/7 staff coverage, or both (Caughey et al., 2009; Cheng et al., 2012; Gibson, Waters, & Bailit, 2014). In the private setting, where there is generally more individualized care and not as much adherence to protocols, programs that included careful induction of labor scheduling and use of hard stops against being able to schedule nonmedically indicated inductions (Molina et al., 2015) have successfully led to reduced rates of unnecessary inductions and cesarean birth (Reisner, Wallin, Zingheim, & Luthy, 2009). The ACOG patient safety checklist is based on work by Clark et al. (2007) who demonstrated a system-wide cesarean birth rate lowering with adoption of new oxytocin-administration protocols. Careful protocols for scheduling can help in a number of ways: (a) ensuring a safe gestational age; (b) clarifying that the woman has an evidence-based medical indication; (c) making sure that appropriate cervical status and fetal positioning are present; and (d) validating that the scheduling health care provider has documented appropriate counseling on the risks and benefits and techniques of the process (California Maternal Quality Care Collaborative, 2016). Management approaches for the induction of labor process are detailed in ACOG's (2009) practice guidelines and an ACNM (2016) position statement.

10. Use Standardized Labor Algorithms to Recognize and Treat Dystocia

Experts have suggested two primary areas of focus to address dystocia: proper diagnosis of dystocia and the utilization of oxytocin (Spong et al., 2012). Labor dystocia has been

classically defined based on old studies with small numbers of patients and without the presence of fetal monitoring, regional anesthesia, or both (Spong et al., 2012). Zhang et al. (2010) reviewed labor curves in the modern setting and found that the traditional starting point of 4-cm dilatation for active labor no longer applied and recommended the onset of active labor to be 6 cm. Because it can take several hours to progress from 4 cm to 6 cm, they suggested that using 6-cm dilatation as one of the criteria for defining active labor would lead to significant increases in latent phase intervention (Zhang et al., 2010). Best practice recommendations (ACOG, 2017a) include recommendations for adoption of this change, but widespread adoption has not occurred. Staff education and adoption of management protocols based on the 6 is the new 4 recommendation should lead to better and more appropriate interventions (California Maternal Quality Care Collaborative, 2016). Based on this recommendation, a prolonged latent phase should not be a reason for cesarean birth and relates to the importance of proper admission timing. In addition, progress in labor is defined not only in terms of cervical dilatation, but also in reference to cervical effacement and fetal station, and progress in the second stage must consider rotation as well as descent (California Maternal Quality Care Collaborative, 2016).

When dystocia is diagnosed, the use of oxytocin can be effective following standardized protocols for administration, including careful monitoring of the uterine activity response, which is dose-related (Institute for Safe Medication Practices, 2014). There are various protocols available to manage the administration of oxytocin that include careful observation of contraction frequency achieved in response to the oxytocin dosing level (Institute for Safe Medication Practices, 2014). Oxytocin has a rapid onset of less than 5 minutes; however, it slowly achieves a steady state within approximately 40 minutes (Institute for Safe Medication Practices, 2014).

11. Adopt Standard Response Protocols to Abnormal Fetal Heart Rate Monitoring Patterns and Uterine Activity

Professional organizations of maternity care providers have published guidelines outlining standards for assessment of fetal well-being, including various health care professional responsibilities, mode of assessment (intermittent auscultation or continuous electronic fetal monitoring), and interpretation of the data gathered

through fetal assessment (ACOG, 2017a; California Maternal Quality Care Collaborative, 2016; Marshall et al., 2011). All maternity care professionals (physicians, midwives, nurses, physician assistants, nurse practitioners) need to demonstrate proficiency through regular continuing education mechanisms in fetal heart rate assessment and interpretation. Interdisciplinary review of fetal heart rate tracings during morbidity and mortality conferences is another mechanism to use to support proficiency improvement.

In the context of shared decision-making and informed choice, women should be provided with information about indications for and methods of performing fetal assessment throughout the process of labor and birth. Patient preference for mode of assessment should be considered and when changes in mode of assessment are indicated, women should be updated on the approach that is indicated.

All hospitals and birthing centers need policies and procedures that outline responsibilities and interventions when an abnormal fetal heart rate is identified. This includes the routine use of NICHD terminology with specific interventions based on the heart rate classification (Macones et al., 2008). A monograph published by the National Certifying Corporation outlines potential intra-uterine interventions based on NICHD classifications (Macones et al., 2008). Of utmost importance is communication among all members of the maternity care team (nurses, midwives, physicians) and having in place a protocol for advancing review of abnormal or concerning fetal heart rate tracings within the team (California Maternal Quality Care Collaborative, 2016).

12. Make Available Special Expertise and Techniques

Breech presentation at term can be a significant contributor to cesarean births; 85% of women with persistent breech presentations at term undergo cesarean birth (Lee, El-Sayed, & Gould, 2008). In an effort to reduce this potential effect, an opportunity exists to promote techniques to change breech presentation to vertex. Positional changes and acupuncture or acupressure techniques have been evaluated individually and in combination as approaches to transition a breech presentation to vertex with no obvious adverse effects. Clinical success of these procedures is variable. Definitive success rates require further study (Coyle, Smith, & Peat, 2012; Hofmeyr et al.,

2015). External cephalic version has overall success rates of 60%, with an approximate 50% success rate for nulliparous women and approximately 80% for multiparous women (Hofmeyr et al., 2015). Compared with external cephalic version at term, when external cephalic version is performed before 37 weeks of gestation, there is a 10% increased success rate of achieving a cephalic presentation resulting in a vaginal birth but with a possible increase in preterm birth (Hutton et al., 2015). When performed at term, women who attempted external cephalic version had a 40% lower rate of cesarean birth (Hofmeyr et al., 2015).

External cephalic version should be performed after informed consent and in adherence with evidence-based, clinical guidelines. Key elements recommended are performance by an experienced practitioner in a hospital location capable of performing an emergency cesarean birth if necessary (Hofmeyr et al., 2015). Women who wish to undergo version should be referred to a center or practitioners with clinical expertise if they wish to have breech version attempted, and their primary maternity care provider does not have this expertise.

The increase in twin gestation also affords an area where more training and diligence can lead to an increase in vaginal births. Experts continue to recommend a trial of labor for women presenting with a first twin in vertex presentation beyond 32 weeks in non-monoamniotic twins because there is no evidence of increased morbidity to the woman or fetuses (Barrett et al., 2013). This was also borne out in a randomized trial of planned cesarean compared with vaginal birth in twin pregnancy (Barrett et al., 2013).

In addition, cesarean birth during second stage of labor can be avoided by increasing instrumented births (Bailit et al., 2016). Although the cesarean birth rate has risen over the past few years, the use of forceps and vacuum birth has declined, and yet attempted operative vaginal birth is successful at a rate of 95% (ACOG, 2017b).³⁴ Outcomes of attempting an operative birth have been shown not to substantially increase maternal or neonatal morbidity (Bailit et al., 2016). The exception is that vaginal and perineal lacerations increased, although postpartum infections decreased (Bailit et al., 2016). Long-term concerns over pelvic floor damage from instrumented births are still present but tempered by the realization that nonmodifiable

factors such as age also contribute to risk for pelvic floor damage (Miller et al., 2015). One of the major concerns about utilizing these techniques is the marked reduction in health care providers trained in these procedures, particularly use of forceps (Kyser et al., 2014).

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13. Provide Cesarean Birth Measures That Allow for Comparisons and Evaluation of Performances Across Health Care Providers

To assess progress and give feedback to all health care professionals working with women in labor, successful organizations need to have sufficient metrics to evaluate their efforts. Nearly all published efforts in cesarean birth reduction use health care provider feedback as a guide (California Maternal Quality Care Collaborative, 2016; Chaillet & Dumont, 2007). Open and confidential forms of feedback have an effect. Feedback can also be provided over time with recommendations for remediation being outlined. Previously used outcome measures include various rates of cesarean birth, including the total rate of cesarean births, but given that the changes in this bundle are focused on reducing primary cesarean births, the primary cesarean birth rate and the risk-adjusted nulliparous, term, singleton, vertex cesarean birth rate are probably more relevant (California Maternal Quality Care Collaborative, 2016). The nulliparous, term, singleton, vertex cesarean birth rate has the benefit of being well studied and risk-adjusted but requires larger numbers of births to make meaningful comparisons (California Maternal Quality Care Collaborative, 2016). Data should be accurate, current, and given to health care providers in a nonthreatening fashion.

To augment the use of such tools as checklists and algorithms, consideration of process measures, such as rates of active labor admission before 6-cm dilatation, inductions with unripe cervixes, failure to progress diagnosed at less than 6 cm, instrumented birth, and so on, can be used to evaluate specific clinical changes. These are likely to be cumbersome to routinely obtain and may be used for short tests of change to guide improvement (California Maternal Quality Care Collaborative, 2016). Hopefully the experience with the use of such new metrics will be validated and published and allow for evaluation of various clinical changes designed to affect clinical outcomes. Direct abstraction of clinical

data from electronic records must ultimately be developed to provide robust risk adjustment.

initiatives to improve health outcomes for women and newborns.

14. Track Sufficient Balancing Measures to Ensure Maternal and Neonatal Safety

Effective programs aimed at safe reduction of cesarean birth have not resulted in any negative effects such as lower Apgar scores or increased neonatal intensive care unit admissions secondary to the reduced use of cesarean birth (Chaillet & Dumont, 2007). Nonetheless, institutions need to track balancing measures and metrics of safety outcomes for women and infants to ensure that the program and changes are safely reducing cesarean births (California Maternal Quality Care Collaborative, 2016). These should include some standard measures of maternal adverse events (e.g., rates of intensive care unit admissions, hemorrhage, infection) that ensure that interventions on maternal behalf are still undertaken as indicated. In addition, measures of newborn well-being such as low Apgar scores, unplanned admissions to the neonatal intensive care unit, sepsis, and readmissions can identify problematic trends in their outcomes. The National Quality Forum measure, which addresses the rate of healthy term newborns, incorporates many of these components (California Maternal Quality Care Collaborative, 2016).

Discussion

This document presents a quality improvement bundle that outlines several steps recommended by experts to reduce primary cesarean birth and support intended vaginal birth. Excellent resources are readily available or are being developed, including the California Maternal Quality Care Collaborative Toolkit (2016) and BirthTOOLS.org (ACNM, n.d.), which aggregate a number of practical resources for institutions and health care providers to assist in implementing the bundle. These open-access materials are available to all birthing facilities, which reduces the burden of creating them at the local level. To successfully reduce the rate of primary cesarean birth, every organization will have to (a) make the appropriate commitment to the effort, (b) require quality improvement leadership from multiple types of health care providers, and (c) obtain strong administrative support and proper funding. Each organization that provides maternity care services will need to tailor the approach and resources they have available to integrate this quality improvement initiative to reduce primary cesarean births into other safety



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