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Safety for Women Opting for TOLAC Versus an Elective Repeat Cesarean Section.

A MASTER'S PROJECT  
SUBMITTED TO THE GRADUATE FACULTY  
OF THE GRADUATE SCHOOL  
BETHEL UNIVERSITY

BY

Nicole M. Rothgarn, MSN, RN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF  
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BETHEL UNIVERSITY

Safety for Women Opting for TOLAC Versus a Primary Repeat Cesarean Section

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May 2016

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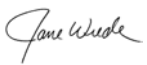
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## Abstract

**Background/Purpose:** TOLAC is the trial of labor after cesarean. VBAC is the successful birth after cesarean. The aim of this paper is to establish safety for women opting for the trial of labor after a primary cesarean. The purpose is to be able to determine how we can better counsel our women opting for TOLAC to improve the worldwide cesarean rate.

**Theoretical/Conceptual Framework:** Imogene King's theory of goal attainment is used to show the correlation between the patient and the midwife thorough the journey of pregnancy. The ultimate goal is to use the four paradigm's Imogene describes to achieve a successful VBAC.

**Methods:** Using the matrix method articles were analyzed for similar themes. The themes were then reviewed and analyzed to be able to show a commonality of success rates and the themes that were pulled out from the research.

**Results/Findings:** Overall uterine rupture rates were between 0.38-0.9%. The use of scar dehiscence and uterine rupture for terms that indicate an emergent situation needs to be better clarified. The safety of TOLAC does not pose a higher risk to the woman than if she were to opt for a repeat cesarean section.

**Conclusion:** Midwives need to ensure adequate teaching to women wanting a TOLAC and offer them the risks and benefits of TOLAC. Women who opt for a TOLAC rather than a repeat cesarean section will not have any higher risk imposed on them.

**Implications for Research and Practice:** Midwives hold the key for the future of decreasing the worldwide cesarean rate, with the use of evidence-based practice we can empower women to be able to achieve a VBAC.

**Keywords:** vaginal birth after cesarean, trial of labor after cesarean, safety of VBAC, safety of TOLAC, Imogene King's Theory of Goal Attainment, uterine rupture, scar dehiscence, hemorrhage, NICU admissions in VBAC, NICU admissions in TOLAC.

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## **Chapter I: Introduction**

Vaginal birth after cesarean (VBAC) has been a topic of much debate in the United States obstetric community for the past two decades. A variety of recommendations have been suggested by the American College of Obstetricians and Gynecologists (ACOG) in the last two decades. It was once thought that if a woman had a cesarean birth, she would then have to have subsequent cesareans due to the risk to herself and the fetus of a trial of labor (Bangal, Giri, Shinde, and Gavhane, 2013).

ACOG defines trial of labor after previous cesarean delivery (TOLAC) as a trial of labor for “those women who have had a previous cesarean delivery, regardless of the outcome” (ACOG Practice Bulletin 115, 2010, p. 450). After a cesarean, a woman can attempt a trial of labor and go on to deliver vaginally (ACOG Practice Bulletin 115, 2010, p. 450). Once the woman has successfully delivered her baby vaginally she has had what’s known as a VBAC (vaginal birth after cesarean). ACOG defines VBAC as vaginal birth after cesarean to suggest “a vaginal delivery after a successful trial of labor” (ACOG Practice Bulletin 115, 2010. p. 450). The terms TOLAC and VBAC do seem to be used interchangeably in the obstetric world. However, TOLAC is the attempt of labor and VBAC is a successful TOLAC.

### **Need for Critical Review**

In 2008, many practitioners were under the assumption that once the woman had a cesarean for either complications in labor, breech baby, or fetal heart rate intolerances during labor, she would not be able to safely deliver vaginally because the incision made into her uterus and this carried risk to both the mother and child in the event of a uterine rupture. Therefore, ACOG made guidelines stating a TOLAC could be attempted for

women who met strict guidelines (2010). Exclusions for a TOLAC at that time included: no risk for labor dystocia; increased maternal age; non-white ethnicity; gestational age greater than 40; maternal obesity; preeclampsia; short interval between pregnancies; and an increased neonatal birth weight (ACOG Practice Bulletin 115, 2010, p. 451). With these strict guidelines in place, TOLAC attempts have been successful, and uterine rupture rates are as low as 0.38% or one out of every 460 births (Algert, Morris, Simpson, Ford & Roberts, 2008) and successful vaginal deliveries as high as 94.6% (Gyamfi, Juhasz, & Stone, 2004). Subsequently, a search of the literature conducted by Dodd et al. (2013) concluded that after reviewing numerous articles, “there were no statistically significant differences in risk between planned cesarean birth and planned vaginal birth identified” (p.2) ACOG has made recommendations since 2007 stating that the attempt of a trial of labor does outweigh the risk of having a repeat cesarean. Unfortunately, even with current ACOG recommendations there still seems to be a lack of support for TOLAC in all delivery settings.

The World Health Organization (WHO) is challenging countries worldwide to maintain the cesarean section rate between 10% and 15% (World Health Organization Statement, 2015) with the current estimate for the number of cesarean sections performed worldwide being 18.5 million (World Health Organization Statement, 2015). According to the National Vital Statistics Report, the United States’ last reported cesarean section rate was at 32.2% in 2014. Even though this is the lowest it has been since 2007 (CDC.gov, 2014), it is still double the WHO suggested rate of 15%. When compared with previous years, this number has stayed pretty consistent. In 2013, the number of cesarean deliveries totaled 1,284,339, which was 32.7% of the total women in the United States

having children during that year (CDC.gov, 2015). Many cesareans could be avoided if women were consistently offered a TOLAC if they met ACOG's screening guidelines and if every attempt was made by the healthcare team to avoid a primary cesarean while securing the safety of both mother and baby.

### **Statement of Purpose**

The intent of this critical review of literature is to confirm rates of safety for women opting to attempt a vaginal birth after cesarean birth and to set some evidence-based guidelines for screening so facilities can establish their own set of parameters for allowing women the chance to have a VBAC.

Question 1: Is offering women who meet screening criteria a TOLAC safe practice?

Question 2: What screening criteria are needed according to the evidence to continue to offer TOLAC to women in a variety of settings?

According to ACOG, it is much safer to allow the woman the option of attempting a TOLAC than it is to have another cesarean. These risks include: hemorrhage, scar dehiscence, uterine rupture, and poor infant outcomes.

One of the major barriers to all women being offered a TOLAC is the fear of malpractice litigation (Cox, 2011). Also feared by many providers was the loose language involved with the terms "immediately available" for the availability of the surgery crew. These definitions were set forth by ACOG to allow institutions to be able to give this standard their own acceptable timeframe in case the woman started having complications during the attempted TOLAC (Cox, 2011). The other factor in the rapid decline of TOLAC attempts was the media which took the ACOG statement of

“immediately available” to mean women were in severe danger if they thought of attempting the TOLAC (Cox, 2011). A recent study (Cox, 2011) conducted in the state of Florida, the state with the lowest number of attempts at TOLAC (one percent) compared to a repeat cesarean rate of (37.2%), surveyed out of 20 physicians and midwives. It concluded that the main reason they do not provide women with counseling regarding the option of TOLAC is because of the fear of being sued (Cox, 2011).

A set of structured protocols is needed to ensure safety for women attempting TOLAC. There also should be standards put in place ensuring that the facility will be able to make the cesarean incision within a certain amount of time, usually 20 minutes or less. Women are usually not considered for TOLAC if there is the presence of high-risk maternal disease (hypertension, diabetes, asthma, seizures, renal disease, thyroid disease, heart disease) and if these women were included in the attempt of a trial of labor after cesarean, the rate of successful TOLAC attempts would be less. Data collected between 1996 and 2011 held that the rates of success for 5,982 women who had a failed TOLAC with a previous operative delivery were between 8.9-12.9% (Melamed, et al., 2013).

Another guideline that will ensure a successful TOLAC is that the woman must have had one successful vaginal delivery (ACOG Practice Bulletin 115, 2010, p. 451). The success rate of a woman having a VBAC has been shown to be higher when the woman has an advanced cervical effacement, baby is in a vertex position, and a cervical BISHOP score above 7, and has had a previous vaginal delivery (National Institutes of Health, 2011, p. 11).

A search of the literature conducted by Dodd et. al. (2013) concluded after reviewing numerous articles, “there were no statistically significant differences in risk between planned cesarean birth and planned vaginal birth identified” (p. 2).

Researchers in recent years have aimed at evaluating the safety of TOLAC (Algert et al., 2008; Avery et al., 2004; Balachandran et al., 2014). These studies suggested that cesarean isn't safer than trial of labor after previous cesarean. Since July 2004, ACOG has maintained standards to allow women to have a trial of labor under strict screening guidelines. Of ACOG's screening recommendations the most important include, a prior vaginal birth, and spontaneous labor (ACOG Practice Bulletin 115, 2015).

### **Significance to Nurse-Midwifery**

The meaning of the word midwife is to be with women. Part of being with women includes advocacy for women and empowering women to choose how their bodies will be treated throughout their life, whether that is during pregnancy or during menopause.

The history of midwifery is rooted deep within the hills of Hyden, Kentucky where midwives used to ride horses to get to women in labor throughout Hazard County. Mary Breckinridge, a famous midwife during the 1920's, took what she learned in London as a midwife and brought it over to North America for others to embrace. The beginning practice was geared more toward public health nursing than it was for midwifery. This then turned into helping women in labor making sure it was healthy when it was born, and ultimately going back for the post-partum check, weeks later.

Midwives provide evidence-based care for women from adolescence through menopause (ACNM, 2011). Midwives also can provide services such as:

“Primary care, gynecologic and family planning services, preconception care, care during pregnancy, childbirth and the postpartum period, care of the normal newborn during the first 28 days of life, and treatment of male partners for sexually transmitted infections. Midwives can provide initial and ongoing comprehensive assessment, diagnosis and treatment, conduct physical examinations; prescribe medications including controlled substances and contraceptive methods; admit, manage and discharge patients; order and interpret laboratory and diagnostic tests and order the use of medical devices,” (ACNM, 2011, para 3).

Helping women choose TOLAC is just one of the many things midwives can do to help advocate for the safest option for delivery.

The significance in midwifery is evident in the current position statements made by the ACNM. The position statements uphold the integrity of the practice of midwifery and hold midwives to a higher standard of care, including using current, evidence-based guidelines. Included in this discussion of implications for midwifery are the current position statements in regard to vaginal birth after cesarean. The position of the ACNM shows how women should be offered this service while maintaining the safety of the woman. The first position statement states, “All women who have experienced cesarean birth have the right to safe and accessible options when giving birth in subsequent pregnancies” (ACNM Position Statements, 2011). Given this statement, all women

should be offered the best choice in delivering their babies and be given all the information on their choices.

The next position statement given by the ACNM is, “Women who have had a prior cesarean birth have the right to evidence-based information to guide their decision-making when considering a trial of labor after cesarean (TOLAC) versus an elective repeat cesarean birth” (ACNM Position Statements, 2011). This ensures women are given the data and statistics when providers are presenting the delivery options to women. If providers can allow the woman to receive all of the current data and trends at the time, she will then be able to make her choice based on the current, evidence-based guidelines.

“Informed consent regarding TOLAC or elective repeat cesarean includes an evidence-based presentation of the benefits and potential harms for both the mother and infant of both options” (ACNM Position Statements, 2011). Informed consent ensures the choice of delivery is ultimately the woman’s. According to American College of Nurse Midwives (2011), “Providers, practices, and institutions should develop protocols that match resources available in the clinical setting to the client risk status” (p. 522). This statement proves there is much work to do on how women are counseled on their next delivery and their choice of whether to attempt a TOLAC or elect for a repeat cesarean delivery. Overall, safety of the woman and unborn child needs to be upheld.

The position statements assert, “Women should have access to qualified maternity care providers who can offer the opportunity for a TOLAC regardless of geographic location, socio-economic status or type of medical coverage” (ACNM Position Statements, 2011). This blanket statement provides women with assurance that they will not be discriminated against in being offered a trial of labor after cesarean simply because

of who they are. It is the thought of discrimination still does exist in the world today, but allowing *all* women, not just certain women, the right to have a TOLAC just makes sense.

The statements say, “Certified nurse-midwives (CNMs) and certified midwives (CMs) are qualified to provide education, informed consent and risk assessment regarding a woman’s decision to have a TOLAC” (ACNM Position Statement, 2011). Midwives can and do provide care for women attempting a trial of labor after cesarean and have actually been shown to have better outcomes compared to other providers. Although sufficient studies are lacking for midwives who provide care for women who have successful VBAC’s, the ACNM (2011) states, “Most women may safely choose VBAC under the care of a certified nurse-midwife (CNM) or certified-midwife (CM)” (p. 522).

The statements also say, “CNMs and CMs are qualified to provide antepartum and intrapartum care for women who are candidates for a TOLAC including establishing appropriate arrangements for medical consultation and emergency care if necessary” (ACNM Position Statements, 2011). The CNM has the obligation to collaborate with others to ensure the safety of women. All arrangements should be made with the worst-case scenario in mind. Being prepared for emergencies is a responsibility of the midwife, and making sure she’s working in the best interest of the mother and the baby by providing them with safe, reliable care. The ACNM also discusses the importance of making sure the woman is aware of the risks and if the midwife thinks there is something wrong, that an emergency cesarean is performed (ACNM, 2011). Also discussion between providers needs to take place before an event of having an emergent cesarean so



the cesarean can be performed within a 15-minute timeframe to ensure good outcomes for mom and baby (ACNM, 2011).

Another current position statement is that “Professional liability carriers and hospital administrators should not prohibit maternity care providers or facilities with maternity services from providing care to women who are candidates for a TOLAC” (ACNM Position Statement, 2011). Again, women need to understand the risks and benefits of having a TOLAC. The provider has the responsibility of giving appropriate information to the woman and her family to allow them to make a diligent, informed decision. The ACNM (2011) states, “women should be informed of the probability of VBAC success, the risks associated with VBAC trial of labor including uterine rupture, and the risks of emergency cesarean birth as part of the process of seeking informed consent for her choice of TOLAC or ERCD” (p. 522).

The last position statement offered by the ACNM states, “Continued research should be conducted to identify the necessary resources that should be available in sites where services are provided for women who desire a TOLAC, including VBAC success rates and maternal and newborn health outcomes” (ACNM Position Statements, 2011). Midwifery care in studies related to outcomes of women who attempt a trial of labor after cesarean and are successful needs consideration and will be discussed later.

Midwives are now at the forefront of advanced practice. CNM’s “are licensed, independent health care providers with prescriptive authority in all 50 states, the District of Columbia, American Samoa, Guam, and Puerto Rico” (ACNM, 2015, para 4). According to ACNM (2015), “CNMs are defined as primary care providers under federal law” (ACNM, 2015). Midwives have been gaining more recognition today as more

women are choosing to have midwives as primary care providers. CNMs value the “normalcy of women’s lifecycle events and believe in watchful waiting and non-intervention in normal processes, appropriate use of interventions and technology for current or potential health problems, and consultation, collaboration and referral with other members of the health care team as needed to provide optimal health” (ACNM, 2015, para 3). Midwives ensure optimal health for their women by using the whole health care team to aid in the women’s lifetime health.

Midwives are also known to have very low rates of cesarean delivery. The National Birth Center Study II, conducted from 2007 to 2010, found that out of 15,500 women who were taken care of in 79 midwife led birth centers across the United States, fewer than six percent of those women required cesarean sections compared to 24% of similar low-risk women who were taken care of in a hospital setting (ACNM, 2013).

If midwives can educate women about the power of their bodies in order for them to be able to have a successful TOLAC in birth centers, hospitals, or even at home, we can help drastically reduce the cesarean section rate in North America, and then ultimately worldwide. It is because of the impact midwifery can have in helping women choose the option of TOLAC that midwives should be at the forefront of empowering women to make informed decisions about delivery after a previous cesarean.

The significance of reviewing the literature regarding safety of women attempting a VBAC versus a repeat cesarean section is imperative in changing our practice and ultimately the healthcare community in general. It is up to the provider to discuss risks and benefits of every delivery method. If this is not done, women are not being offered every available option. According to Bangal et al., (2013) “if women are explained about

the option of VBAC and told about the risk associated with a repeat CS, many CS's can be avoided" (p. 5). Our cesarean rate in the United States alone is well over 30%, which is not as high as some countries, but there is nonetheless much work to do in reducing this number (World Health Organization Statement, 2015).

Avery, Carr, & Burkhardt (2004) concluded more studies with larger cohorts need to be done to allow more data to be collected in an organized fashion. However, their study concluded the VBAC success rate in their small study of nine birth centers was at 72% (Avery, Carr, & Burkhardt, 2004).

Additionally, Roy et al., (2008) found that out of 217 patients who underwent a cesarean section for a non-reassuring fetal heart rate pattern during labor, 184 babies (84.7%) were born healthy and didn't require NICU admission. These studies suggest that the use of continuous fetal heart rate monitoring during labor can increase the incidence of cesarean section, and also cannot prove the cesarean was a necessary intervention.

Midwives can assess women in labor without the use of continuous fetal heart rate monitoring, thereby decreasing the rate at which women will have cesarean sections. Also women who are deemed low-risk can have intermittent auscultation of the fetal heart rate to detect variances in the fetal heart rate. This type of monitoring also ensures the baby is tolerating the labor process just as well as continuous fetal heart rate monitoring. ACNM promotes the use of intermittent auscultation of the fetal heart rate and strives to allow midwives to use technology based on the evidence presented in each woman's case, not to just avoid litigation or reduce liability associated with outcomes in midwifery care (American College of Nurse Midwives, 2014).

### **Conceptual Model/Theoretical Framework**

The conceptual model for this integrative review of the literature regarding women choosing VBAC for their mode of delivery is Imogene King's Theory of Goal Attainment. If a woman trusts the provider-patient relationship she will trust her body to be successful in having her baby vaginally. King's theory places importance on the nurse-patient dyad to help patients reach their health goals, and as nurse-midwives take care of the growing population of women, trust needs to be in place for the dyad to work (Caceres, 2015). Caceres (2015) goes on to describe the shift towards a newer model of a shift of client-family-centered care. Midwives are at the forefront of this model. We can allow women to make the choices necessary to empower their bodies to have a vaginal birth is they desire.

King's theory focuses on the care of the human being, and the health care of individuals and groups (Current Nursing, 2012). The basic assumption of goal attainment theory is that midwife and client communicate information, set a goal mutually and then act to attain the goal. This model is based on the nursing process (Current Nursing, 2012).

Imogene King highlights four nursing paradigms that are within the nursing theory of goal attainment. These four paradigms are human being, health, environment and nursing. All of these paradigms relate to one another to help the individual attain his or her goal as related to health care.

The first paradigm is human being/person. People have the ability to perceive, think, feel, choose, and set goals, to select means to achieve goals and to make decisions. This is the basic set of information that they need to process the health information to

seek care to prevent illness, and to care for individuals when they are unable to care for themselves.

The second paradigm is health. Health “involves dynamic life experiences of a human being, which implies continuous adjustment to stressors in the internal and external environment through optimum use of one’s resources to achieve maximum potential of daily living” (Current Nursing, 2012, para 4). Daily living requires the individual to be functioning at full capacity; when this is not the case, the nurse/midwife can help the individual achieve the level of functioning they wish to obtain to fulfill their own goals.

The third paradigm is the environment. This paradigm uses the internal environment to support the needed energy to help people adjust to the external environment that is constantly changing around us. The external environment continually involves formal and informal organizations, and the nurse or midwife is a part of the patient’s environment (Current Nursing, 2012). The environment is around us at all times. Patients, nurses, and midwives all interact within this environment. Once the internal and external world is established in a particular pattern for a woman or family, they are set to interact at full healthy capacity.

The fourth paradigm and most important part of this theory is nursing. Imogene King gives an excellent definition of how all four paradigms can all come together; “A process of action, reaction and interaction by which nurse and client share information about their perception in nursing situation, and a process of human interactions between nurse and client whereby each perceives the other and the situation, and through

communication, they set goals, explore means, and agree on means to achieve goals (Current Nursing, 2012, para 6).

Imogene King's theory of goal attainment ensures that the patient and the midwife are seeking the same goal. This goal is to have the woman maintain a healthy lifestyle while allowing the woman take steps to achieve the goals of the midwife and woman. If the woman has sought out the in order to attempt the goal of a TOLAC, then the midwife and the woman will collaborate to first do a thorough history taking session. Once the history is obtained from the patient, the midwife can then discuss the risks and benefits of the attempt at TOLAC.

Once the established relationships are put in place, the remaining appointments made with the woman and the midwife will ascertain if the relationship is working. The woman has to take care of herself during the pregnancy and work well with the midwife to be able to watch for any sign that she is not a candidate for TOLAC. Caceres (2015) states, "The success of a nurse-client dyad in this situation depends on the expertise and skills of the nurse to help guide client's willingness to participate as an equal partner in decision-making and care planning is just as important to goal attainment as the expertise of the nurse" (p. 154). This places the responsibility of success on the provider who is taking care of the woman and on the woman who is pregnant and wanting the TOLAC.

Successful goal attainment for the woman requires trust in the midwife. Conversely, the midwife has to trust that the woman that she is taking care of herself during the pregnancy in order to make vaginal birth a reality. Using Imogene's theory of goal attainment for this critical review of literature clarifies how the midwife and the

patient can be equal partners in the successful birth of a healthy baby by way of a TOLAC.

### **Summary**

VBAC is a safe method of delivery. The overall rate of risks versus benefits should be presented and the provider should be the one who makes the decision regarding whether they want to allow a patient to attempt a TOLAC. Many factors come into play in a successful VBAC. One of those factors may be a higher rate of midwives caring for women.

## **Chapter II: Methods**

This chapter summarizes the process of the article selection along with the critical appraisal of articles for this critical review of the literature. Information based on inclusion and exclusion of the articles will also be articulated. Finally, a description of the evaluation process will be given to help in determining the level and quality of the articles used in this critical review of literature.

### **Search Strategies:**

The overall purpose of conducting this critical review of literature is to determine the overall safety of women having a primary cesarean and opting for a TOLAC. The initial search for articles was performed on CINAHL, PubMed, Scopus, and ScienceDirect. These search engines were used based on the understanding that they yield the best results for articles related to health care and nursing, and these databases include only peer-reviewed articles. Peer-reviewed articles are articles that go through a vigorous review process to ensure the information provided is valid. The peer-reviewed articles are reviewed by experts in the field to ensure the study is pertinent to the journal they publish.

The search terms used was “VBAC after primary cesarean,” and this search yielded 1,055 articles. The author chose to only include those articles focusing on women who had only had one prior cesarean in order to keep the focus narrow. Thus, including two or more cesareans may alter the common themes found and because having more than one previous cesarean adds additional dimensions and concerns to VBAC management that may bias the findings. Filters included “full-text online,” “scholarly & peer reviewed articles,” and “journal article.” The “full-text online” feature allows the



researcher to be able to view the articles on-line. The “scholarly” category ensures that the articles that are pulled up are studies in pertinent journals relevant to nursing and allied health care. This narrowed the results down to 714 articles related to the current topic.

The publication dates for articles included in this study were limited to the past 15 years. The author first tried only to include studies from the past 10 years, but there were pertinent articles dating back into 1994. However, the author did not decide to include the articles dated back to 1994 as they lacked content relating to the themes in this review of literature.

Articles were then narrowed down to the years from 2000 to 2015. By limiting the studies to the last 15 years, the researcher was able to find and compare more recent information on VBAC and TOLAC. Two hundred fourteen articles remained after this search. This date range was selected to obtain the most up-to-date articles and to include the medical response to the 2010 ACOG position statement. Of the remaining articles the author then selected articles pertaining to the outcomes of TOLAC versus VBAC after a primary cesarean. Within this date range, opinions on how to manage delivery after a cesarean have not changed in the medical arena, even with the evidence for success and safety provided by the studies.

Review of these articles included looking for common themes including scar dehiscence, uterine rupture, neonatal outcomes, and maternal hemorrhage. These terms were then used for another search in Scopus, which included another 68 articles that noted outcomes for women attempting a TOLAC and VBAC. The most common author

revealed in this literature search was Dr. Melissa Avery. Avery authored 15 articles in the search, but these had all appeared in already completed searches.

The author then reviewed the studies and articles. Included in this critical review of literature are individual studies without meta-analysis. Meta-analysis requires “precise quantitative methods to summarize the results” (Garrard, 2014, p. 5). The author is not qualified or prepared to analyze data at this level. The author chose quantitative research to include in this critical review of literature to ensure comparison of maternal outcomes and neonatal outcomes pertinent for the safety of TOLAC after a primary cesarean only. According to LoBiondo-Wood & Haber (2014), qualitative research is “the study of research questions about human experience, often conducted in natural settings, and uses data that are words or text, rather than numerical, in order to describe the experiences that are being studied” (p. 581).

Quantitative research looks at “the process of testing relationships, differences, and cause and effect interactions among variables, the processes are tested with either hypotheses and/or research questions” (Lobiondo-Wood & Haber, 2014, p. 581). Quantitative research is more fitting to describe success and failure rates of TOLAC within the explored themes in this review of literature. Quantitative research also explores and “tests for intervention effectiveness” (Lobiondo-Wood & Haber, 2014, p. 8). Quantitative research contains numerical data that is looked at and summarized with the use of statistics.

**Inclusion Criteria**

The inclusion criteria for this critical review of literature is peer-reviewed journal literature published from 2010-2015, and the types of studies included quantitative journal articles.

The quantitative studies included are randomized control trials, matched cohorts, and cross-sectional and longitudinal studies. Cross-sectional and longitudinal studies were used because they look at two different themes and the studies relate to two different periods of time during each study. Cross-sectional studies are studies that “collect information on interventions (past or present) and current health outcomes, for a group of people at a particular point in time, to examine associations between the outcomes and exposure to interventions” (Cochrane, 2016, para7). Randomized control trials “randomly assign subjects to groups, and this may make an important contribution to the scientific literature” (Garrard, 2014, p. 66). Cohort study is a study “in which a defined group of people is followed over time, to examine associations between different interventions received and subsequent outcomes, a ‘prospective’ cohort study recruits participants before any intervention and follows them into the future, a ‘retrospective’ cohort study identifies subjects from past records and describing the interventions received and follows them from the time of those records” (Cochrane, 2016, para 5).

**Exclusion Criteria**

This review excluded qualitative studies, articles older than 15 years, level V evidence, and all duplicate studies. Qualitative studies were excluded from this review because the author was not looking for feelings related to women who were satisfied or dissatisfied with their TOLAC or VBAC experience, and this author is not equipped to

decipher data in qualitative studies. Maternal wellbeing after a failed TOLAC, was also not the purpose of this literature review.

Level V evidence was not included in this review because it suggests the articles include evidence that is found from literature reviews, quality improvement processes, and case reports or financial evaluations (Dearholt & Dang, 2012, p. 250). Level V evidence found in the author's searches included articles about issues such as the impact of Obstetrician/Gynecologist Hospitalists on Quality of Obstetric Care (Cesarean Delivery Rates, Trial of Labor After Cesarean/Vaginal Birth After Cesarean Rates, and Neonatal Adverse Events). This article was based interviews to assess quality in a hospitalist concept. This type of article were excluded, but reviewed by the author to assess level of evidence and quality of evidence.

A total of 214 studies were examined for maternal and neonatal outcomes. The outcomes looked at were neonatal death, scar dehiscence, uterine rupture, and maternal hemorrhage. The process of elimination began and was based on choosing the type of research; randomized control trials; systematic review of a combination of RCT's; and quasi-experimental and longitudinal prospective cohort studies. After this process, the total number of articles was narrowed down to 42. Once the author began reviewing these articles, many common themes were found, and this narrowed the focus again to a total of 24 articles for comparison on the matrix. Of the 24 articles, four were randomized control trials with meta-analysis, two were longitudinal studies, and the remaining 18 were longitudinal, prospective cohort studies.

Duplicate studies were eliminated for this literature review. Studies cited by other authors and included in the study selected had to be reviewed and assessed for pertinent themes relevant to this review of literature. The remaining articles for this review include: two randomized-control trials; 14 longitudinal retrospective cohort studies; six retrospective descriptive studies; and two observational studies.

### **Quality of the Evidence**

The evaluation of research studies was based off of the Johns Hopkins Nursing Evidence-Based Practice: Model and Guidelines (Deerholt & Dang, 2012). The author used this model to appraise the evidence-based articles in order to select studies that are in levels I-III and are of quality A, based on the evidence level and quality guide designed by Deerholt & Dang (2012). This guide indicates that level I studies include experimental studies, randomized control trials, and systematic review of RCT's with or without meta-analysis (Deerholt & Dang, 2012). Level II consists of quasi-experimental, systematic review of a combination of RCT's and quasi-experimental, or quasi-experimental studies only, with or without meta-analysis (Deerholt & Dang, 2012). Level III contains non-experimental studies, systematic review of a combination of RCTs, quasi-experimental and non-experimental studies, qualitative study, or systematic review with or without a meta-analysis (Deerholt & Dang, 2012). Level IV is based off of opinions of the author, which could be a renowned author in the topic of choice, can include practice guidelines, or consensus panels (Deerholt & Dang, 2012).

The level of a study will identify the quality of a study which exhibits “consistent, generalizable results, sufficient sample size for the study design, adequate control, definitive conclusions, consistent recommendations based on comprehensive literature

review that includes thorough reference to scientific evidence” (Deerholt & Dang, 2012, p. 232). For level V articles, the highest quality is “material officially sponsored by a professional, public, private organization, or government agency” (Deerholt & Dang, 2012, p. 232).

The articles were placed in a matrix listing their sample size, results, and conclusions based on the topic selection, research design, literature review, and population of participants. The articles were then scanned for the evidence level and quality level.

At the conclusion of the evaluation of evidence quality, the author ended up with one level I article, seventeen level II articles, five level III articles, one level IV article, and no level V articles. One article included in this review of literature had a quality level of A, 15 had a quality level of B, eight had a quality level of C.

The quality of evidence suggests that level A is of high quality, meaning there is “sufficient size for the study and design; adequate control; definitive conclusions; consistent recommendations based on comprehensive literature review that includes thorough reference to scientific evidence” (Deerholt & Dang, 2012, p. 232). Quality level B is of good quality and offers “reasonably consistent results; sufficient sample size for the study design; some control; fairly definitive conclusions; reasonable consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence” (Deerholt & Dang, 2012, p. 232). Quality level C is “low quality or major flaws: little evidence with inconsistent results; insufficient sample size for the study design; conclusions cannot be drawn” (Deerholt & Dang, 2012, p. 232).

**Themes**

The outcomes of a TOLAC were identified using the matrices method by Garrard (2014). As mentioned earlier, the matrices columns include the citation of the article, purpose, sample, design, measurement, results/conclusions, recommendations for practice, and level of and evidence and quality. According to Garrard (2014) the matrices method “is a strategy for reviewing the literature, especially scientific literature” (p. 4). The review of literature consists of the author “reading, analyzing, and writing a synthesis of scholarly materials about a specific topic” (Garrard, 2014, p. 4). The author can then take all of the gathered literature and draw conclusions based on the interpretation of the articles selected (Garrard, 2014). Using the matrix to organize the articles allows the author have an index system to keep track of information obtained from the review of articles. The matrices method also lets the author elaborate on common themes within the specific research. In chapter 3, each of the themes identified in this review of the literature will be explored.

**Summary**

This chapter has summarized the search for research studies examining the safety of TOLAC after a primary cesarean. Inclusion and exclusion criteria for this critical review of literature are included followed by an examination of the quality of evidence for each study. The collection of articles was examined for emerging outcomes themes. These themes will be described in depth in Chapter 3.

### **Chapter III Literature Review and Analysis**

This chapter provides a review and analysis of literature related to the safety of TOLAC. The review will focus on the four main themes disseminated from the literature, which include risk for uterine rupture, risk for hemorrhage, scar dehiscence, and neonatal complications. Strengths and weaknesses of the evidence will also be discussed in this chapter and the review will focus on evidence to support to claim that there is no greater risk in attempting a TOLAC than in having a repeat cesarean section.

#### **Synthesis of Matrix**

The matrix method was used to organize the selected research studies to look for common themes, and to assess the overall risk of TOLAC after a primary cesarean. The risks associated with a TOLAC are equal to the risks associated with a repeat cesarean. The final matrix is shown in table 1. The headings included in the matrix include: citation, year, purpose, sample, design, measurement, results, recommendations, level/quality, and recommendations for practice.

The matrix also evaluated studies of the highest level and quality, and list those studies in alphabetical order according to author name. The author reviewed each individual study's implication for the question of safety for women opting to have a trial of labor after a cesarean versus an elective repeat cesarean. As previously stated, only peer-reviewed articles were included; level V and poor-quality studies were not used in this matrix. After the initial examination studies were placed in the matrix in order to discuss implications for this critical review of literature.

#### **Synthesis of Major Findings**



The four main themes disseminated from the VBAC articles for analysis were: risk for uterine rupture, risk for hemorrhage, scar dehiscence, and neonatal complications.

**Uterine rupture.** The first theme or concern for VBAC or TOLAC appearing in the literature review was uterine rupture. Uterine rupture is defined by Landon et al., (2006) as “a disruption of the uterine muscle and visceral peritoneum or a uterine muscle separation with extension to the bladder or broad ligament found at the time of cesarean delivery or laparotomy following VBAC” (p. 13). Avery et al., (2004) concludes that the risk of rupture is always potentially catastrophic and that this outcome is usually associated with an induction of labor during a second pregnancy after a primary cesarean. The overall rate of uterine rupture was reported to be 0.38%-0.9% in all of the studies in the review of literature (Algert et al., 2008; Balachandran, Vaswani, & Mogotlane, 2014; Blanchette, Blanchette, McCabe, & Vincent, 2001; Durnwald & Mercer, 2004; Landon et al., 2004; Loebel, Zelop, Egan, & Wax, 2004; Macones et al., 2006; Melamed et al., 2013; Stamilio et al., 2007).

Other factors surrounding the decision to attempt a TOLAC are the common predictors for failure of an attempted TOLAC. Those include: a recurrent indication for initial cesarean; increased maternal age; non-white ethnicity; gestational age greater than 40 weeks; maternal obesity; preeclampsia; short interpregnancy interval; and increased neonatal birth weight (ACOG Practice Bulletin 115, 2010, Figure #2). No one factor should indicate an increase risk for attempting at TOLAC, but a combination of two or more of these factors could decrease the success rate for a TOLAC and increase the risk for a poor outcome.

According to Gyamfi et al., (2004), the rupture rate in N=1216 cases was 1.56%, in a retrospective chart review for patients seen from 1996-2000. In the sample, 336 patients had a history of one or more successful VBAC attempts; of those 336 patients, 94.6% had another successful VBAC. The remaining 70.5% of women (880 women) had another successful attempted VBAC, but had only had one prior delivery (Gyamfi et al., 2004). This study had a confidence interval of 95%, but was also based on women who had already had one or more successful attempts at VBAC. Other data included in this study which was not weighed in the outcomes were the “woman presenting in normal spontaneous labor, history of diabetes, labor induction, and recurrent indication for cesarean delivery” (Gyamfi et al., 2004, p. 715). These identifiers were the outliers and didn’t get tabulated into the final results of successful VBACs. Landon et al., (2006) suggested in their study that, by increasing the number of women studied, the threshold of uterine rupture would continue to increase based on the cohort size of the study. Therefore, if N=17,890 women underwent a TOLAC, of those women 13,138 were successful at VBAC (73%). Uterine rupture occurred in 9 (0.9%) cases. In this study, Landon et al., (2006) included the finding of African-American women as that demographic of women was found to have more cesarean sections. This information was introduced into the study to encourage the highest success rate of an attempt of TOLACs. Landon et al.’s (2006) study goes on to use multivariable regression models including “age, race, weight, insurance status, marital status, tobacco use” to identify if there was a correlation between certain characteristics and TOLAC success (p. 14). This information did not suggest that outcomes were different based on the demographic information; the outcomes suggest the highest rate of failed TOLAC was among African-American

women who were not married and were receiving public assistance (Landon et al., 2006) The selection of women in this study was very different from others as it included social demographics while many of the other selected studies only specified whether women had had a previous cesarean delivery.

Durnwald & Mercer (2004) also investigated rupture rates of women and concluded that, without the use of interventions, women are more successful in their attempt of TOLAC. The information found in their retrospective chart analysis stated N=768 studied women and included 522 women (68%) who attempted VBAC; 344 women (66%) were successful. Variables that increased the success rate for TOLAC included: a previous cesarean section, a favorable pelvic exam, spontaneous labor, no use of oxytocin, a low transverse uterine incision, and no previous vaginal deliveries. In comparing the group of women that attempted VBAC and the group that failed VBAC using a 95% confidence interval, the study concluded there was no difference in the outcomes comparing VBAC and an elective repeat cesarean. (Durnwald & Mercer, 2004). The total number of women who had uterine rupture was four (0.8%), which didn't vary from the group of failed TOLAC attempts (Durnwald & Mercer, 2004). This study considered the woman's pelvic examination to be the determining factor for the success of a VBAC. When the women were examined, if their cervical dilation was found to be greater than one centimeter they were more likely to deliver vaginally than if their cervical exam indicated their dilation was less than or equal to one centimeter (Durnwald & Mercer, 2004). Effacement and station were also contributing factors for a successful VBAC; if the woman presented with effacement greater than 50% and a

station of minus one or lower, women were more likely to have a successful VBAC. No other studies included this finding.

Stamilio et al. (2007) had a unique finding in their retrospective cohort study regarding rupture rates based on the interval between pregnancies. Out of 286 women who had a TOLAC with an interval less than six months, the rupture rate was 19.7%. Comparing this to women who had a TOLAC at 60 months or more with a rupture rate of 0.9%, the authors concluded that shorter interpregnancy intervals increases the risk of uterine rupture (Stamilio et al., 2007). ACOG does not suggest an interval between pregnancies to offer a higher success rate in TOLAC compared to the woman experiencing a uterine rupture. A study done by Macones et al., (2006) included 25,000 women with a previous cesarean section and found 134 cases of uterine rupture, and of those 134 cases of uterine rupture there were over 670 identifiable risk factors. The percentage range of uterine rupture in the selected risk factors was 0.38 in the group with a prior vaginal delivery and up to 3.68 in a labor that was induced. Macones et al., (2006) concluded this data is so variable it is hard to predict the outcome of a uterine rupture looking at all of the different variables presented in their multicenter case-control study compared to other studies. Macones et al., (2006) found that out of 134 cases of uterine rupture, there were 665 noncases (successful TOLACs) in their chart review. They used this data to compare antepartum and early intrapartum factors to determine the predictability of a woman having the uterine rupture. This study also suggests that the confidence interval was low based on the information the study provided, since it didn't correlate sufficient data in relation to the women who had successful VBAC's. The conclusion of the study by Macones et al. (2006) was that previous cesarean section rate

and rate of uterine rupture did not provide a great predictor of success rates; rather, uterine rupture can happen at any time and with no predictability.

Gregory et al., (2008) suggested that calculating VBAC success rates with certain antenatal conditions is an important way to screen women for TOLAC. Gregory et al., (2008) identified over twenty high-risk conditions through chart review of VBAC success rates compared with complications the women presented with. This study looked at women who were selected following discharge at their antenatal conditions and their success rates with TOLAC. A total of “41,450 women, 29.72% (12,320 of 41,450) had maternal, fetal, or placental conditions complicating pregnancy, attempted VBAC rates and VBAC success rates varied widely by these clinical conditions, ranging from 10% to 73%” (Gregory et al., 2008, p. 452e.1). The suggested overall success rate for “low-risk women (no conditions) was 73.76% versus 50.31% for high-risk women (at least one condition)” (Gregory et al., 2008, p. 452e.1).

Out all of the complications listed uterine rupture had a risk rate of 0.28 in the 41,450 charts reviewed. This was also the rate suggested among the high-risk conditions found in the review of charts. Their study suggests identifying women with high-risk conditions and excluding them from the attempt of a TOLAC (Gregory et al., 2008). Some high-risk conditions suggested by Gregory et al. (2008) include diabetes (N=3644 women) with a 58.21% success rate; active herpes (N=338 women) with a 71% VBAC success rate; known heart disorders (N=224), with a 55.32% VBAC success rate; and severe hypertension/preeclampsia (N=158), with a 48.48% VBAC success rate. Additionally, 97 women were found to have other types of uterine scars rather than the preferred, low-lying vertical incision, and those women had a VBAC success rate of

23.53%. Overall outcomes based on these high-risk conditions suggest women with low-risk conditions were found to have a 73.76% success rate of VBAC, whereas the women with high-risk conditions had a much lower success rate at 50.31%. (Gregory et al., 2008).

Evidence has shown that a woman who is induced is also at a higher risk for uterine rupture (Algert et al. 2012; Grasek et al., 2012; Lydon-Rochelle, Hold, Easterling, Martin, 2001; Macones et al., 2006). Induction of labor is an attempt to put the woman in labor with the use of medicine or mechanical means. The induction and augmentation of labor has been addressed by ACOG in their position statement: “induction of labor for maternal or fetal indications remains an option for women undergoing TOLAC, however, the potential increased risk of uterine rupture associated with any induction, and the potential decreased possibility of achieving VBAC, should be discussed (ACOG practice bulletin #115, para 23). In the study by Lydon-Rochelle et al. (2001) researching uterine rupture rate, N=20,095 women and relative risk instead of percentages were used to suggest the percent of women who had a uterine rupture. They found that the rate of uterine rupture was “1.6 per 1,000 women with repeated cesarean delivery without the woman going into labor” (Lydon-Rochelle et al., 2001, p.3). The rate of women who did not have their labor induced was found to be 7.7 (15 women) per 1000, and the women who went into spontaneous labor had a uterine rupture rate of 5.2 (56 women) per 1000 (Lydon-Rochelle et al., 2001, p.3). The women who were induced with prostaglandins were found to have the highest rate of uterine rupture at 24.5 (9 women) per 1,000 with a confidence interval at 95% (Lydon-Rochelle, 2001). Therefore, the results of this study suggest a higher rate of uterine rupture when the woman is

induced rather than going into labor on her own for a TOLAC, which agrees with the statement made by ACOG. Though the use of prostaglandins for induction will increase the overall rate of uterine rupture no safety guidelines exist regarding dosages safe for a TOLAC.

In addition, no research has been done to guide practice on cervical ripening agents such as Cervadil or Cytotec or augmentation/induction agents such as Oxytocin. ACOG does not give support either way for regarding the debate surrounding induction versus augmentation during a TOLAC. ACNM also does not provide a statement based on the use of these agents during an attempt at TOLAC, which suggests to the author that they increase the risk of uterine rupture for women attempting TOLAC.

**Hemorrhage.** The next theme found in the critical review of literature is the risk of hemorrhage. A postpartum hemorrhage is defined as a blood loss greater than 500cc of blood during labor or during the postpartum period. The national average for women suffering postpartum hemorrhage during labor is up to 11.3% and these women may end up dying as a result of a postpartum hemorrhage (CDC.gov, 2016). This average increases for women who have a cesarean section in which the average blood loss during the cesarean alone is 1000cc. The risk of women having a hemorrhage is conversely related to the risk of uterine rupture and if the woman's blood volume drops enough they will need to be offered a blood transfusion, which is considered a critical event in the obstetrical world.

Cheng et. al. (2011) concluded in a retrospective cohort study that no significant risks were present for a woman who opted for a VBAC compared with a repeat cesarean delivery. Hemorrhage rates for a woman having an elective repeat cesarean delivery were

at 0.28% compared with women who were attempting a TOLAC at 0.17% (Cheng et al., 2011) This number is not relatively significant, but once the study looked at the risk of a blood transfusion being necessary, the rates were higher at 0.67% in the group that chose to have an elective repeat cesarean delivery compared to 0.18% for those who had a successful VBAC (Cheng et al., 2011). This study did conclude the difficulty in finding accurate information to classify women who had a significant postpartum hemorrhage because of an inconsistency in definitions in the charts the authors reviewed (Cheng et al., 2011). Risk for hemorrhage is not discussed in great detail by ACOG or the ACNM, as this is usually noted to be a side effect of having an operative delivery as well as a vaginal delivery for many different reasons. Because of this, ACOG supports the opinion of providing the woman with the experience of having a vaginal birth: women who achieve VBAC “avoid major abdominal surgery, resulting in lower rates of hemorrhage, infection, and a shorter recovery period compared with elective repeat cesarean delivery” (ACOG Practice Bulletin #115, 2010, para 11).

The two additional studies pertaining to this theme are those by Balachandran, Vaswani, and Mogotlane (2014) and Cahill et al. (2006). Balachandran et al. (2014) found that out of 151 women, only four women were discovered to have a possible incidence of postpartum hemorrhage. This study found 151 women, only 115 were candidates for a TOLAC. Out of those 151 women, 96 of them had a successful VBAC (83.47%) and 19 (16.5%) had a repeat cesarean section (Balachandran et al., 2014). Also, the studies contained no mention of having a uterine rupture causing postpartum hemorrhage. Balachandran et al. (2014) went on to conclude that, since no incision type was identified, an incision type other than a low transverse may increase the chance for



rupture. This information does not correspond with the definition of postpartum hemorrhage as an undiagnosed uterine rupture. Cahill (2006) concluded that in their study 0.44% of the 5,041 women in their study were found to have a postpartum hemorrhage that needed a blood transfusion. The findings suggest that “compared with the women who underwent an elective repeat cesarean delivery, women who underwent a trial of labor were less likely to have a postpartum fever or require a blood transfusion (0.44% vs. 2.09%)” (Cahill et al., 2006, p. 1145).

**Scar dehiscence.** The next theme apparent in the review of literature was scar dehiscence which is another complication associated with women attempting a TOLAC (Bangal et al., 2013). Scar dehiscence is defined as a “previous thinning or separation of a prior uterine scar, the uterine separation, unlike the case of uterine rupture, does not involve the uterine serosa or fetal membranes and is not associated with intra-abdominal hemorrhage” (Hasbargen, 2002, p. 2180). Scar dehiscence in this context is the opening of a previous uterine incision, but the term scar dehiscence has been used interchangeably with discussion uterine rupture in many of the articles about TOLAC and VBAC. For this critical review of literature, the terms will not be used interchangeably as scar dehiscence is a separate topic related to unfavorable outcomes linked with failed TOLAC. The risk of scar dehiscence was found to be at 2%, with most of these cases having to go to an emergent repeat cesarean section. Algert et al., (2008) found the scar dehiscence rate to be 13% out of 10,160 women studied. As in the findings of Stamilio et al., (2007), scar dehiscence occurred in 39 women whose pregnancies were closer to the initial cesarean section than the 95 women whose pregnancies were more than 18 months from their previous cesarean (Algert et al., 2008). In addition, Landon et al., (2004)

explored the relationship between types of incisions scar dehiscence, and they concluded that the type of incision is imperative for a successful TOLAC. Out of 17,898 women, 119 of the women were found to have a scar dehiscence, which is 0.7% of the women who underwent a trial of labor, and the number of women with a scar dehiscence who elected to have a repeat cesarean had a rate of 76%-scar dehiscence or 0.5% (Landon et al., 2004). The overall findings regarding the rate of scar dehiscence ( $\alpha=.05$ ) are not significant enough to allow us to say that a trial of labor is not a safe option for women which does not have significant findings ( $\alpha=.05$ ) to allow us to say that a trial of labor is not a safe option for women.

**Neonatal Complications.** The last theme in the review of literature is neonatal complications (Avery et al., 2004; Leobel et al., 2004; Oboro et al., 2010). In the study by Avery et al., (2004) rates of neonatal complications were determined based on admission to the NICU (neonatal intensive care unit), and an APGAR measurement less than seven at one minute of age. The APGAR acronym stands for appearance (skin color), pulse (heart rate), grimace (reflex irritability), activity (muscle tone), and respiration (American Academy of Pediatrics, 2012). Rates of neonatal adverse outcomes range from 0.10-5.33% in the literature review (Avery et al., 2004; Leobel et al., 2004; Oboro et al. 2010).

Avery et al., (2004) investigated neonatal outcomes and concluded that the mean APGAR rating was 7.99 at one minute of age and 8.84 at five minutes of age for infants who were born via successful VBAC. These were numbers from babies born by successful VBAC in multiple birth centers across North America. In this study, a total of 14 (5.3%) neonates were admitted to the NICU, but data was only present for 14% of

these NICU admissions (Avery et al., 2004). APGAR and NICU admission rates were reported to be no different from neonates who were born by elective repeat cesarean section. (Avery et al. 2004).

Oboro et al. (2010) looked at neonatal complications after successful and failed TOLACs and found that, out of 330 failed VBACs, there were 95 (28.8%) NICU admissions. In the successful VBACs, a total of 171 (25%) babies were admitted to the NICU. The confidence interval was at 95% (Oboro et al., 2010). In the 5-minute APGAR test, 38 babies scored less than seven (11.5%) in failed VBACs and 27 babies scored less than seven (4.0%) in successful VBACs (Oboro et al., 2010). The study concluded that for women attempting a VBAC, “over two-thirds will achieve vaginal delivery, unfortunately those who fail are at an increased risk of adverse neonatal outcomes” (Oboro et al., 2010, p. 1231). This study did not compare outcomes based on VBAC and repeat cesarean, but rather outcomes were compared based on a “failed versus successful VBAC in women who had a trial of labor after a previous cesarean” (Oboro et al., 2010, p. 1231).

Bangal et al. (2013) provided a prospective observation study in which N=100 women who were going to attempt a TOLAC. Of these women, 85% had a successful VBAC (Bangal et al., 2013). The neonatal morbidity selected in this study was based off of the neonate having an APGAR score less than six at one minute, and this was found in only 4% (4 out of 100) of the newborns. These four babies were born to three women who had a failed TOLAC and one woman who had a successful VBAC. The successful VBAC had to have the baby delivered by vacuum extraction due to a “prolonged second stage of labor, due to maternal exhaustion and poor maternal bearing down” (Bangal et

al., 2013, p. 5). All four of these infants were born with APGAR scores of less than six, were admitted into the NICU for further observation, and were discharged with their mothers with no morbidity noted in the infants after their NICU admission (Bangal et al., 2013).

Loebel et al. (2004) “out of 1408 deliveries, 749 out of 927 (81%) had a successful vaginal birth after a prior cesarean delivery” (p. 243). The number of NICU admissions in this study was found to be 28 (3.7%) in the successful VBAC group and 27 (5.6%) in the elective repeat Cesarean group of women. The APGAR was not measured in this study. The researchers did conclude “those women undergoing elective repeat Cesarean deliveries sustained a higher rate of respiratory complications: 19 (4.0%)” (Loebel et al., 2004, p. 245).

Neonatal considerations seem to be a consequence of having a primary cesarean and a failed TOLAC, and ACOG impresses on us that the risk of neonatal consequences is “higher in the setting of a failed TOLAC than in VBAC, women with higher chances of achieving VBAC have lower risks of neonatal morbidity” (ACOG Practice Bulletin # 115, 2010, para 11).

### **Strengths of Evidence**

One of the strengths of the evidence was that were many of the studies presented large sample sizes. When quantitative studies have larger cohort sizes, the data is more accurate and decreases the type II error. LoBiondo-Wood & Haber (2014) claim that “small samples tend to be unstable-the values fluctuate from one sample to the next and it is difficult to apply statistics meaningfully” (p. 245). Fourteen of the studies were longitudinal, prospective cohort studies. These types of studies are done to collect data

from the same group at different points in time. The other advantages of using these large cohort sizes are that “each subject is followed separately in the variables over time, and both relationships and differences can be explored between variables” (LoBiondo-Wood & Haber, 2014, p.206).

Seventeen of the studies used for this critical review of literature were level II. Quality B is included for the majority of these articles, and quality B suggests “reasonably consistent results; sufficient sample size for the study design some control, fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence” (Dearholt & Dang, 2012, p. 232).

Peer-reviewed studies are important in a critical review of literature, as they provide the reader with articles that have been reviewed by the experts in the field the article pertains to. All of the studies included in this review of literature were peer-reviewed and all were all published in a medical journal to which practicing providers subscribe.

There were seven articles obtained from *Obstetrics & Gynecology*, seven articles from the *American Journal of Obstetrics and Gynecology*, three articles from the *Journal of Midwifery & Women’s Health*, two articles from the *Journal of Maternal-Fetal & Neonatal Medicine*, two articles from *The New England Journal of Medicine*, and one each from the *Journal of Clinical and Diagnostic Research*, *North American Journal of Medical Sciences*, *Pediatric and Perinatal Epidemiology*, and *Acta Obstetrica & Gynecologica Scandinavica*. All of these journals are highly reputable and reproduce research articles presented by obstetricians and midwives who are highly respected in

their fields. Among respected individuals, Melissa Avery seems to be the midwife with the most input on the topic of TOLAC and VBAC.

### **Weaknesses of Evidence**

The need for studies conducted through the midwifery perspective need to be utilized using a large sample study. The midwifery model of care suggests midwives work “with women” to provide women outcomes they wish to achieve throughout the pregnancy. Studies are lacking regarding midwifery’s way of empowering women. A study comparing the medical model of care compared to the midwifery model of care could give us data comparing the two models, success rates of TOLAC, and data to suggest the four common themes found in this critical review of literature (uterine rupture rates, hemorrhage rates, scar dehiscence rates, and neonatal complications).

There is a need for midwifery care to be a part of a larger sample study to discover safety rates midwives can attain for TOLAC. In addition, a randomized control trial comparing the success rates for VBAC patients of midwives compared to obstetricians would be useful.

### **Summary**

This chapter summarized articles found on the safety of TOLAC after a primary cesarean. The overall success rate in all studies was 60-80%, and adverse maternal and neonatal adverse outcomes are low compared to the outcomes for women having another cesarean. Many studies compare outcomes in relation to another events, so the outcomes could not be directly correlated to TOLAC alone.

There were three co-factors that were examined for women attempting a VBAC in several studies. These factors include induction, cervical exam at term, and pregnancy

spacing. It was determined that hemorrhage unrelated to uterine rupture was no different in the VBAC and elective cesarean groups. Finally, neonatal outcomes between VABC and elective groups were also no different. In fact, it was found that more respiratory complications arose in newborns born by elective repeat cesarean section than by successful VBAC.

## **Chapter IV Discussion, Implications, and Conclusions**

This chapter offers discusses the critical review of literature. Material presented will include discussion of current issues in TOLAC, the gaps in the literature, the implications for midwifery, recommendations for current practice, and the application of the theoretical framework discussion. This discussion will be based on the articles present in the matrix seen on Table 1. The purpose for this critical review of literature is to discuss the overall safety for women attempting a trial of labor after cesarean.

### **Current Trends**

Unfortunately, the rate of cesarean delivery is rising in North America. Suggested reasons for this increase of cesarean delivery are “technological advances of ultrasound and fetal monitoring; an increasing reluctance to use forceps, fear of litigation, societal changes towards joint-decision making, and increased maternal age with fewer pregnancies” (Stadtlander, 2014). Due to the rising rate of cesarean sections in this country, many providers (including midwives) need to provide options for women to help decrease the operative delivery of babies worldwide.

It has been suggested by the National Institutes of Health (2010) that “a through evaluation of the relevant research would help pregnant women and their maternity care providers when making decisions about the mode of their delivery after a previous cesarean delivery” (p. 5). It is because of this that ACOG and ACNM provide position statements regarding current trends in providing women with a trial of labor after previous cesarean delivery.

Trial of labor after cesarean and vaginal birth after cesarean have been a topics of great interest in the last two decades. Facilities struggle with allowing women to attempt



a vaginal birth after they have had a cesarean, even with all of the literature that has been published. There are many reasons why hospitals do not offer this service to women, and women are being turned away from their providers because of the lack of evidence presented to the facility regarding these services.

In the last six years ACOG and ACNM have published position statements to include their stance on the subject. Although these statements have been published it remains to be a highly debatable topic. Women should be able to voice their opinion to providers, and if they cannot, they should be able to seek other advice. If the administrators would look through the data on how many women are refused TOLAC, they could see the lost revenue. Safety is essential in healthcare, and after safety is established, it would be essential to evaluate cost.

Current trends in the literature focus on uterine rupture and why a trial of labor should not be attempted by the women. Many studies focus on all of the co-morbidities related to a trial of labor, and unfortunately, they do not include the benefits of offering a TOLAC. Therefore, it seems as though the current trend could be focusing on risk and fear when attempting a TOLAC rather than the empowerment and success that have been documented in the literature surrounding TOLAC.

### **Gaps in the Literature**

The first gap in the literature is that there seems to be insufficient evidence to prove that there are ethnic, racial, geographic, and socioeconomic factors in comparing the success rates of women are offered a trial of labor and VBAC as compared to an elective repeat cesarean section. Most of the studies analyzed did not have implications

related to different ethnic or racial backgrounds. Further studies are needed to explore these differences.

Another gap in the literature is a lack of studies that include a definition of uterine rupture versus scar dehiscence. A majority of the studies equate these two terms, and “Uterine rupture is considered the most dangerous and life threatening complication associated with TOLAC” (ACNM, 2011, p. 519). When studies have reported statistics related to uterine rupture, they have been conversely using the term scar dehiscence along with it, suggesting the data is not entirely accurate regarding success rates and ultimately maternal morbidity factors. ACNM (2011) suggests uterine rupture is rare and “studies require large sample sizes to detect significant associations” (p. 519). This means large cohorts are needed to be able to accurately depict the overall uterine rupture rates. Along with this, it would be good to make sure the correct uterine rupture definition is included in the study. Scar dehiscence is not a complete tear through the uterus and is therefore not considered as problematic as a uterine rupture because scar dehiscence does not lead to as significant neonatal morbidities as uterine rupture.

Another gap in evidence is knowledge of factors that may affect the woman during the course of her labor along with clinical management (National Institutes of Health, 2010). We are lacking studies that look at types of inductions agents and outcomes related to the type of induction agent used. Large cohort, well-designed studies based on different methods of induction need to be done. The setting of the practice should also be included in such studies: a birth center does not provide induction for women, so this would also be reflected in the rates of success in the TOLAC population.

To be able to provide optimal outcomes, it is necessary to ensure that there is good data available and low maternal and neonatal morbidity in a facility or practice.

Another useful study would be a qualitative study based on the feelings of the mother after being told she could not attempt a trial of labor and needed to have a repeat cesarean. This review of literature did not look at the empowerment for women who did not have a successful TOLAC. We do know that empowerment through pregnancy and childbirth can have long-term effects on women's mothering abilities, bonding, and emotional wellness. A future qualitative study examining women's emotions when TOLAC wasn't offered could identify the value of offering TOLAC. We have been talking mainly about the quantitative outcomes for mother and baby and the providers who care for them. We need to consider the feelings of empowerment for mother, and we need to be able to offer her sufficient counseling in order to cope with the birth outcomes.

Studies of women who prefer to have another cesarean section to see what the rates of complications are compared to those who opt for TOLAC have also not been done. An obvious result of an elective repeat cesarean delivery is a longer hospital stay, but many other findings could be included and need to be explored to ensure a high level of evidence. The use of qualitative data also could be included in this study to compare women's feelings related to their decision making and how their provider discussed the risks and benefits with them.

### **Implications for Midwifery**

More research is needed in order to look at how midwives can play a role in outcomes of TOLAC. In the research included here, there is only one study that looks at

success rates of VBAC, Avery et al. (2004) analyzed data from multiple midwifery practices and describe the outcomes of mother and baby. Outcomes were favorable, but the study used a small cohort of women, including 665 women who chose a trial of labor after cesarean section.

Another suggestion might be that the midwife establish a checklist of topics to cover with a woman who would like to attempt a trial of labor after cesarean, and this could be turned into a tool to be able to assess the woman's risk. There is a lack of understanding of how risk plays a part in a woman's attempt at a TOLAC, and not enough evidence supports a woman choice not to attempt a TOLAC.

Midwifery is deeply rooted in being "with women." Allowing women to be cared for during their attempt at a TOLAC is something that is happening already, but it needs to happen more in order for the national cesarean section rate to go down overall to lower than 20%, which is the proposal of Healthy People 2020, and the World Health Organization.

### **Recommendations for Future Research**

Many recommendations for practice were found in this critical review literature. Women who present in spontaneous labor have a greater success of VBAC than women who does not present in active labor. Parameters suggesting the women who are best candidates for a TOLAC need to be developed to help midwives and providers more safely predict a successful VBAC. A suggested scoring system much like what is used for induction (the BISHOP score) could be developed to give a woman a score and a certain score would indicate a woman is not recommended for a TOLAC.

The type of cesarean scar the woman has should be included in the recommendations. Good candidates for a successful trial of labor have had a transverse low-lying incision. The incision type needs to be documented in her record when consulting about options for delivery. The provider is responsible for looking through her medical records for information relating to her previous cesarean section and the type of incision she had with her cesarean section. Since the type of scar is vital to ensure a greater success rate of TOLAC, this is an essential piece in order for the midwife and the provider to even allow an attempt of a TOLAC.

Another future research recommendation would be to look at women's feelings about their successful or unsuccessful TOLACs. What things they would change about their delivery if they could and how they were counseled about their options for their next delivery after a cesarean delivery would be useful. This may change the way providers counsel their women effectively about their options.

Research needs to be done to follow the midwifery model of care to allow us to study the differences between the medical models. The use of fetal monitoring has frequently been shown to increase a woman's chances of having a cesarean section drastically (Devane, Lalor, Bonnar, 2007). Central fetal monitoring has been the common trend as of late, and the use of central fetal monitoring has not been shown to have a benefit in respect to perinatal outcome (Withiam-Leitch, Shelton, Fleming, 2006). Withiam-Leitch, Shelton, Fleming (2006) showed no significant difference in the rates of cesarean, and also no significant use of central fetal heart rate monitoring.

### **Integration and Application of Theoretical Framework**

The theoretical framework chosen for this critical review of literature is Imogene King's Theory of goal attainment. Midwives empower women to do the best for their bodies, and if women have put trust into a midwife the development of trust during her care has been achieved. This theory can also be applied to the themes chosen for this critical review of literature.

The four paradigms previously mentioned in this theory of goal attainment are human being, health, environment, and nursing. These four paradigms are located throughout this critical review of literature. The first paradigm is human being, including the way humans feel, choose and set goals, and make decisions. This is evident once the woman selects the midwife her care. The two of them will be in continuous motion throughout the prenatal period and will continue to interact with each other with emotion while setting goals for the birth of the baby. Each prenatal appointment with the selected provider will come with feelings and attitudes related to the day she gives birth; it is up to the dyad of the nurse-midwife and that woman to be able to explore these attitudes and feelings. Once the feelings and attitudes can be overcome, the goal setting will take place, allowing the woman the option of a TOLAC.

The midwife is then on a journey with the woman for nine to 10 months to be able to sustain the goal attainment and allow the woman an inner peace which may make her goal of attaining a TOLAC successful. The midwife has the duty to be the woman's watchful eye during the prenatal period to establish whether she becomes high-risk at any time, and to offer any reason why she should not attempt a TOLAC. This is providing

the patient with knowledge even though the outcome may not what the woman intends (an unsuccessful TOLAC).

By using Imogene's theory of goal attainment for this critical review of literature, the midwife and the patient are equal partners in the successful birth of a healthy baby by way of a successful TOLAC.

### **Summary**

This chapter has focused on current trends in trial of labor after cesarean, the gaps in literature, recommendations for current practice, and theoretical implications. The topics located within this chapter have an overall theme as well: much more research is needed to set the parameters for women to attempt a trial of labor after cesarean, so that more providers will be comfortable with allowing women to attempt a vaginal birth. Imogene King's theory of goal attainment would be accomplished when the woman who set out for a vaginal birth accomplished her goal.

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Citation:	Purpose:	Sample:	Design:	Measurement :	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
<p>Algert, C. S., Morris, J. M., Simpson, J. M., Ford, J. B., &amp; Roberts, C. L. (2008). Labor before a primary cesarean delivery: Reduced risk of uterine rupture in a subsequent trial of labor for vaginal birth after cesarean. <i>Obstetrics and Gynecology</i>, 112(5), 1061-1066. doi:10.1097/AOG.0b013e31818b42e3</p>	<p>To estimate the effect of the onset of labor before a primary cesarean delivery on the risk of uterine rupture if VBAC is attempted in the next pregnancy .</p>	<p>10,160 women who had a trial of labor, women who were induced, augmented . Women were between 37-41 weeks, exclusions included breech delivery, grand multipara, and women whose first cesarean was a classic cesarean (incision).</p>	<p>Longitudinal , retrospective cohort study.  Theme: Maternal Risks; uterine rupture (higher with augmenting), with spontaneous labor risk 1 uterine rupture for every 460 women.</p>	<p>Rupture rates were measured.</p>	<p>39 women had a uterine rupture, (overall rate of 0.38%) women who were induced or augmented for their trial of labor had a greater relative risk of uterine rupture, women whose primary cesarean was planned or followed induction of labor also had an increased risk of uterine rupture. Women with a history of either spontaneous labor or vaginal birth had one uterine rupture for every 460 deliveries; women without this history who required induction or augmentation to proceed with a VBAC attempt had one uterine rupture for every 95 deliveries. Risk of rupture is approximately</p>	<p>Recommendations include having labor before the primary cesarean delivery, which can increase the risk of uterine rupture in a subsequent trial of labor, a history of primary cesarean is more favorable for VBAC.</p>	<p>Level of Evidence: 2 Quality: B</p>



					4.84% per 460 births in this particular study.		
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Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
<p>Avery, M. D., Carr, C. A., &amp; Burkhardt, P. (2004). Vaginal birth after cesarean section: A pilot study of outcomes in women receiving midwifery care. <i>Journal of Midwifery &amp; Women's Health</i>, 49(2), 113-117. doi:<a href="http://dx.doi.org.ezproxy.bethel.edu/10.1016/j.jmwh.2003.12.014">http://dx.doi.org.ezproxy.bethel.edu/10.1016/j.jmwh.2003.12.014</a></p>	<p>Collect, aggregate, and analyze data from multiple midwifery practices and then describe outcomes in relation to having a midwife for a VBAC.</p>	<p>665 women who chose a trial of labor, prior vaginal birth, documentation of the type of scar in their medical record.</p>	<p>Retrospective descriptive study.</p> <p>Theme: Infant and Maternal Outcomes Uterine rupture, NICU admission.</p>	<p>Used APGAR scores and infant birth weight, and how the women ended up delivering (vaginal versus cesarean). Measurement was done over a 3-year period.</p>	<p>72% of women gave birth vaginally, mean infant birth weight was 3501 grams; APGAR scores were 7.99 at 1 minute, and 8.84 at 5 minutes. Only 5.3% of infants were admitted to the NICU.</p>	<p>To incorporate a larger scale study to continue to prove that outcomes are favorable for women to have a VBAC with the care of a midwife.</p>	<p>Level: 2 Quality: B</p> <p style="text-align: right;">65</p>

Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
<p>Balachandran, L., Vaswani, P. R., &amp; Mogotlane, R. (2014). Pregnancy outcome in women with previous one cesarean section. <i>Journal of Clinical and Diagnostic Research : JCDR</i>, 8(2), 99-102. doi:10.7860/JCDR/2014/7774.4019</p>	<p>Determine the outcome of pregnancy in women with one previous cesarean section in relation to vaginal delivery and maternal and perinatal complications, it also aimed at identifying factors, which can influence the outcome of trial of scar.</p>	<p>151 women with one previous cesarean section who delivered between the period January-August 2011. Excluded were women with classic cesarean and those with extreme prematurity (32 weeks or less).</p>	<p>Retrospective analysis.</p> <p>Theme: Maternal Outcomes Uterine rupture, scar dehiscence, no perinatal morbidity, hemorrhage.</p>	<p>Data was collected using SPSS software and were presented in the form of mean, standard deviation, and percentage, while proportions were analyzed using the chi-square test, and a p-value &lt;0.05 was considered statistically significant.</p>	<p>Of the 151 women, 115 were candidates for TOS, of them 96 (83.47%) had a VBAC and 19 (16.5%) had a repeat cesarean. There were 4 (2.65%) cases of primary postpartum hemorrhage and two (1.32) cases of scar dehiscence in the study group. No perinatal morbidity was observed. 115 women had Trial of scar with 83.4% VBAC rate and 16% failed trial. Among 96 successful vaginal deliveries, 89 women had spontaneous vaginal deliveries, while 7 had repeat cesarean.</p>	<p>To select the women who are good candidates for VBAC we need to select the women in whom the balance of risks and chances of success are acceptable to the patient and to the midwife. The other influence found in this study were women's wishes and the presence of conditions favorable for vaginal delivery influenced the selection of patients for VBAC.</p>	<p>Level: 2 Quality: B</p>

Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions:	Recommendations for practice:	Level and Evidence & Quality
<p>Bangal, V. B.Giri, P. A., Shinde, K. K., &amp; Gavhane, S. P. (2013). Vaginal birth after cesarean section. <i>North American Journal of Medical Sciences</i>, 5(2), 140-144. doi:10.4103/1947-2714.107537</p>	<p>This study was done to assess the safety and success rate of vaginal birth after CS in selected cases of one previous lower segment CS.</p>	<p>100 cases of previous c-section were selected from the outpatient department or in labor at a tertiary care teaching hospital in a rural area of India. (Jan 2010-Dec 2011).</p>	<p>Prospective observational study.</p> <p>No infant mortality</p> <p>No maternal mortality included in the study</p> <p>Scar dehiscence, CPD.</p>	<p>Age, parity, registration status, interval between present pregnancy and previous CS, place, indication, and outcome of previous CS, mode of delivery in the present pregnancy, and maternal and perinatal outcome were inclusion material.</p>	<p>85% of women had successful VBAC's and 15% underwent a repeat emergency c-section for a failed trial of vaginal labor. There was no documented maternal or neonatal morbidity in this study. The indication of a repeat Cesarean due to fetal distress was set at 46%, scar dehiscence 13%, and undiagnosed cephalopelvic disproportion 13%. Women with a previous cesarean had a better chance 90% of a successful VBAC as compared to women who did not have a previous vaginal delivery 77%. A birth weight of 3,000 grams was also associated with an increased number of repeat cesarean.</p>	<p>To include these women in the high-risk category due to the risk of scar rupture.</p>	<p>Level 3, Quality C 67</p>

Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions:	Recommendations for practice:	Level and Evidence & Quality:
<p>Blanchette, H., Blanchette, M., McCabe, J., &amp; Vincent, S. (2001). Is vaginal birth after cesarean safe? experience at a community hospital. <i>American Journal of Obstetrics and Gynecology</i>, 184(7), 1478-1487. doi:10.1067/mob.2001.114852</p>	<p>To evaluate the effectiveness and safety of promoting a trial of labor after prior cesarean birth in a community hospital.</p>	<p>All patients who had prior cesarean births (n=1481), a comparison of outcomes were performed between those who elected repeat cesarean delivery (n=727) and those who attempted a trial of labor after previous cesarean (n=754).</p>	<p>4 year prospective cohort study  Theme: Maternal and infant outcomes</p>	<p>Analysis of variance (parametric) and x2 analysis (nonparametric) were used, with p &lt; .05 defined as statistically significant. Statistical calculations were performed with analysis of variance version 2.0 (Clear Lake Research, Houston, Texas) software.</p>	<p>A total of 754 (51%) women in the group who attempted a TOLAC and 727 (49%) women who elected to undergo a repeat cesarean. There were a total of 12 (0.02%) uterine ruptures in the group who attempted TOLAC and required emergency cesarean and a total of 1 (0.001%) uterine rupture in the successful VBAC group (that was found upon exploration of the placenta after delivery).</p>	<p>Promote better standards at small community hospitals to ensure safety to women who wish to attempt a trial of labor after a cesarean.</p>	<p>Level: 2 Quality: C due to study size and limitations.</p>

Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
<p>Cahill, A. G., Stamilio, D. M., Odibo, A. O., Peipert, J. F., Ratcliffe, S. J., Stevens, E. J., . . . Macones, G. A. (2006). Is vaginal birth after cesarean (VBAC) or elective repeat cesarean safer in women with a prior vaginal delivery? <i>American Journal of Obstetrics and Gynecology</i>, 195(4), 1143-1147. doi:10.1016/j.ajog.2006.06.045</p>	<p>To determine whether vaginal birth after cesarean or elective repeat cesarean delivery is safer overall for a woman with a prior vaginal delivery.</p>	<p>6619 pregnant women from 1996-2000 who had a prior cesarean delivery, conducted in 17 centers.</p>	<p>Retrospective cohort study.</p> <p>Theme: Maternal outcomes Fever Rupture Bleeding</p>	<p>Extraction of historical and maternal outcome data using standardized tools, and a secondary analysis examined the sub cohort who had previously undergone a vaginal delivery, then they performed bivariate and multivariate analyses.</p>	<p>Of the 6,619 women with a prior cesarean delivery who had also had a vaginal delivery, 5041 patients attempted a VBAC delivery and 1578 (31%) had an elective cesarean delivery. No significant differences were noticed in uterine rupture or bladder injury between the two groups, women who underwent a VBAC attempt were less likely to experience the composite adverse maternal outcome, have a fever (6.52% vs. 18.63%), or require a blood transfusion (0.44% vs. 2.09%)</p>	<p>VBAC candidates who have had a prior vaginal delivery, those who attempt a VBAC trial have decreased risk for overall major maternal morbidities, as well as maternal fever and transfusion requirement. Physicians and practitioners should make this more favorable benefit-risk ratio explicit when counseling this patient and subpopulation on a trial of labor.</p>	<p>Level: 2 Quality: C</p>

Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions:	Recommendations for practice:	Level and Evidence & Quality:
<p>Carr, C. A., Burkhardt, P., &amp; Avery, M. (2002). Vaginal birth after cesarean birth: A national survey of U.S. midwifery practice. <i>Journal of Midwifery and Women's Health</i>, 47(5), 347-352.</p>	<p>As part of an effort to understand VBAC care provided by midwives, this study used a national survey sample to examine practices, scope, and recent changes in the provision of VBAC care.</p>	<p>Purposeful sample of 325 midwifery practices</p> <p>The sample was also stratified to include the 6 ACNM regions with the sample percentage equal to the regional representation in the national practice population.</p>	<p>Pilot Study Versus Survey</p> <p>Theme: Provider Preference</p>	<p>The survey, included demographic and practice items was mailed in late 2000 to a sample of 325 midwifery practices. Only practices that provided intrapartum care were considered for selection. IRB permission was received from the primary investigators institution. The survey was developed and investigated for content accuracy by expert clinicians.</p>	<p>The return rate was 62%. (94%) of the responding practices were providing VBAC care, and almost half of them (43%) stated that their ability to do so had changed within the past 2 years secondary to recent studies in the obstetric literature, the 1999 ACOG statement, and concerns from third-party payers.</p>	<p>This study provides background for future research that will determine how midwifery care affects the rate of successful VBACs.</p>	<p>Level 1 Quality A</p>

Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
Dinsmoor, M. J., & Brock, E. L. (2004). Predicting failed trial of labor after primary cesarean delivery. <i>Obstetrics &amp; Gynecology</i> , 103(2), 282-286. doi:10.1097/01.AOG.0000110544.42128.7a	To apply published scoring systems retrospectively to patients who have undergone a trial of labor after cesarean delivery to estimate whether there was a score at which trial of labor should be discouraged.	Patients with 1 previous cesarean delivery who delivered between January 1, 1998 and December 31, 1998. (one year)	Retrospective analysis.  Theme: Maternal outcome Success rate  Failed trial of labor	Measured success rate and the rate of failed trial of labor.	76% (117/153) of trial of labor patients had a vaginal birth after cesarean. Patients with an unfavorable score of 3 had complicated deliveries in 50% of cases, including 40% of successful VBAC and 63% of failed trial of labor resulting in cesarean delivery. In 2 of 3 scoring systems, the rate of major complications was significantly higher in patients with “unfavorable” scores than in those with “favorable” scores.	A better system to predict the success or failure of trial of labor is needed; making a tool for prediction seems to be an unfavorable method of choice to predict successful VBAC patients.	Level of Evidence: 3 Quality: B

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Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions:	Recommendations for practice:	Level and Evidence & Quality:
<p>Durnwald, C. P., &amp; Mercer, B. M. (2004). Vaginal birth after cesarean delivery: Predicting success, risks of failure. <i>Journal of Maternal-Fetal and Neonatal Medicine</i>, 15(6), 388-393. doi:10.1080/14767050410001724290</p>	<p>To identify predictors of successful trial of labor in women after one low transverse cesarean delivery and no prior deliveries, and to assess perinatal morbidity associated with a failed vaginal birth after cesarean.</p>	<p>All women who delivered their first live-born singleton infant by primary low transverse cesarean delivery and their subsequent pregnancy at MetroHealth Medical Center's level III perinatal center between January 1989 and December 2001. Cesarean delivery in their subsequent pregnancy were included.</p>	<p>Randomized control trial with meta-analysis</p> <p>Theme: Maternal and infant outcomes</p>	<p>Statistical analysis was conducted using Statview 5.0, Fisher's exact test and Student's t test. Multivariate logistic regression was performed to evaluate the likelihood of successful VBAC during a subsequent trial of labor, a p value of &lt;0.05 was considered statistically significant.</p>	<p>A total of 768 women met the inclusion criteria. A total of 1536 maternal and infant charts were reviewed. Of the 768 women, 522 (68%) attempted VBAC and 246 underwent elective repeat cesarean delivery, of those attempting VBAC, 344 (66%) were successful. There were 4 uterine ruptures (0.08%) in the women who attempted VBAC and none in the women who had elective repeat cesarean delivery. There were no maternal or neonatal deaths.</p>	<p>Identify predictors of successful VBAC, a prior history of vaginal delivery favorably influences the likelihood of a successful vaginal delivery in women undergoing a trial of labor.</p>	<p>Level: 2 Quality: B</p>

Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
<p>Graseck, A. S., Odibo, A. O., Tuuli, M., Roehl, K. A., Macones, G. A., &amp; Cahill, A. G. (2012). Normal first stage of labor in women undergoing trial of labor after cesarean delivery. <i>Obstetrics &amp; Gynecology</i>, 119(4), 732-736. doi:10.1097/AOG.0b013e31824c096c</p>	<p>To compare first-stage of labor patterns in women undergoing trial of labor after cesarean delivery and those without a previous cesarean to explore whether a uterine scar alters this stage of labor.</p>	<p>5,388 pregnant women between 2004-2008 at a single academic teaching hospital who underwent labor and achieved the second stage of labor (10cm dilation). Gestation was greater than or equal to 37 weeks, vertex presentation, and spontaneous labor.</p>	<p>Retrospective cohort study.</p> <p>Theme: Maternal Outcomes</p>	<p>Extraction of data from records and of resident physicians who performed cervical examinations at regular intervals, usually every 2 hours. Fisher exact test were used for categorical variables, and Shapiro-Francia test and the Mann-Whitney <i>U</i> test, normal distribution, and repeated measures analysis with a ninth-degree polynomial model.</p>	<p>Of 5,388 women in the sample, labor was induced in 1,647 (30.5%), and 1,720 (31.9%) were augmented using oxytocin, the rate of oxytocin augmentation in spontaneously laboring women undergoing TOLAC (45%) was similar to the rate in women without a history of cesarean delivery (46%; <math>p=.09</math>). Only 5 women in the TOLAC group (3.6%) delivered by cesarean in the second stage, and none of these had their previous cesarean for the recurrent indication. Almost all women in the study sample delivered vaginally (99%), of the 140 women undergoing TOLAC, 16.4 % had their previous cesarean delivery for a recurrent indication.</p>	<p>Diagnosing labor disorders should be made on a personal basis and not with similar standards between those with and without a uterine scar.</p>	<p>Level: 2 Quality: C</p>

Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
<p>Gregory, K. (2008). Vaginal birth after cesarean: Clinical risk factors associated with adverse outcome. <i>Am J Obstet Gynecol</i>, 198(4), 452.e1-452.e12. doi:10.1016/j.ajog.2008.01.008</p>	<p>The goal was to identify vaginal birth after cesarean success rates and maternal and neonatal complication rates for selected antenatal conditions.</p>	<p>Women who gave birth at hospitals that allowed a VBAC attempt during 2002-2003, as reported by the labor and delivery nurse managers in a comprehensive VBAC survey of all labor and delivery units in California.</p>	<p>Population-based cohort study</p> <p>Theme: Maternal Outcomes Placental conditions Infant outcomes Stated as neonatal outcomes</p>	<p>Using discharge data from a linked database combining data sets generated by California Office of Statewide Health Planning and Development for the calendar year 2002. Infant vital stat's, discharge record, maternal discharge record.</p>	<p>Of the 47,223 women with prior cesarean section, 18,093 had 1 or more maternal, fetal, or placental conditions. VBAC success rate for low-risk women was 73.76%, neonatal complications and successful VBAC was at a low 1-2%. Perhaps the most clinically important column is the VBAC success rate, ranging from a low of 9.8% for unengaged head at term to 71.7% for mental conditions. Importantly, the VBAC success rate for low-risk women was substantially lower at 50.31%.</p>	<p>To recognize the variation in rates of VBAC success and childbirth morbidities that can be attributed to the clinical factors complicating pregnancy. Women without such conditions show improved VBAC success and fewer maternal and neonatal complications.</p>	<p>Level: 2 Quality: B</p>

Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions:	Recommendations for practice:	Level and Evidence & Quality:
<p>Grobman, W. A., Lai, Y., Landon, M. B., Spong, C. Y., Rouse, D. J., Varner, M. W., . . . Eunice Kennedy Shriver National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. (2011). The change in the rate of vaginal birth after caesarean section. <i>Paediatric and Perinatal Epidemiology</i>, 25(1), 37-43. doi:10.1111/j.1365-3016.2010.01169.x</p>	<p>To determine whether, and to what degree, the change in vaginal birth after cesarean section rate is due to a change in characteristics of the obstetric population, the undertaking of TOL, or the tendency to abandon a TOL once it has been initiated.</p>	<p>9,643 women in 8 different academic centers during a 4-year period. (1996-2002).</p>	<p>Retrospective Study: looking at medical records.  Theme: Maternal Outcome</p>	<p>A multivariable logistic regression model was used.</p>	<p>5334 women underwent a TOL, of whom 3968 (74.4%) were successful in having a VBAC. The VBAC rate for this study group during the period of analysis was 41.2%. During the period of study, women became significantly more likely to forego a TOL, 68.4% in 1999, 60.5% in 2000, 49.9% in 2001, 41.9% in 2002, regardless of their chances of success, women were significantly more likely to forego a TOL over the years of the study.</p>	<p>Suggests that as health care providers it's important to take each mother case-by-case to allow for better data giving to those mothers.</p>	<p>Level 3, quality C.</p>

Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
<p>Gyamfi, C., Juhasz, G., Gyamfi, P., &amp; Stone, J. L. (2004). Increased success of trial of labor after previous vaginal birth after cesarean. <i>Obstetrics and Gynecology</i>, 104(4), 715-719. doi:10.1097/01.AOG.000139516.43748.1b</p>	<p>To estimate whether a history of a previous successful vaginal birth after cesarean delivery has an effect on a subsequent VBAC attempt.</p>	<p>A total of 1,216 cases of attempted VBAC cases from 1996-2000. Data gathered from these cases included history of previous successful vaginal VBAC. Variables of interest included previous successful normal spontaneous vaginal delivery, and recurrent indication for cesarean delivery.</p>	<p>Cohort study  Maternal theme</p>	<p>Statistical analysis was performed using x2 for the dichotomous variables. Continuous variables were analyzed with the Student t test. Univariate and multivariate logistic regression analyses were then performed to evaluate predictors of VBAC success. The study was approved by the Mount Sinai Institutional Review Board.</p>	<p>Of the 336 patients with a history of one or more successful VBAC attempts, 94.6% had a subsequent successful VBAC, whereas 70.55 of the remaining 880 patients were successful. For those patients with one or more previous successful normal spontaneous vaginal deliveries, 87.8% had a successful VBAC, whereas 75.6% were successful without this history.</p>	<p>Women who have had previous successful attempts of having a VBAC have an increased likelihood for success with future attempts.</p>	<p>Level: 2 Quality: B</p>

Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
<p>King, T. L. (2010). First do no harm: The case for vaginal birth after cesarean. <i>Journal of Midwifery and Women's Health</i>, 55(3), 202-205. doi:10.1016/j.jmwh.2010.03.010</p>	<p>To weigh the benefits and harms of TOL versus PRCD and to understand the rates of health benefits and adverse outcomes following a TOL that results in a successful VBAC and the benefits and harms for women who have a TOL that results in a cesarean delivery, and the benefits and harms for women who chose a PRCD.</p>	<p>Pregnant women and the rates of VBAC and TOL since 1980-2010.</p>	<p>Retrospective data analysis  Theme: Maternal Outcome</p>	<p>Standard deviation, statistical analysis along with percentages of the population.</p>	<p>Short-term maternal complication rates of TOL are no higher than the risk of complications faced by all nulliparous women in labor. (1 per 1000 labors vs 1 per 2000 labors).</p>	<p>Women need to be given accurate, patient-specific info about the risks and benefits of TOL and PRCD. Women also need accurate info about the resources within the setting that they plan to give birth.</p>	<p>Level: 4 Quality: B</p>



Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions:	Recommendations for practice:	Level and Evidence & Quality:
<p>Landon, M. B., Hauth, J. C., Leveno, K. J., Spong, C. Y., Leindecker, S., Varner, M. W., . . . National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. (2004). Maternal and perinatal outcomes associated with a trial of labor after prior cesarean delivery. <i>The New England Journal of Medicine</i>, 351(25), 2581-2589. doi:10.1056/NEJMoa040405</p>	<p>To compare the proportion of women who attempt vaginal delivery after prior cesarean delivery and prove the absolute and relative risks associated with trial of labor in women with a history of cesarean delivery, as compared with elective repeat cesarean delivery without labor.</p>	<p>All women from 1999-2002 at 19 academic medical canters belonging to the National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network, who were 20 weeks or more of gestation or whose infant had a birth weight of at least 500 grams. 8 centers participated throughout the study, 5 participated only during the first 2 years and 6 participated for part of the last two years. The cesarean registry was</p>	<p>Prospective cohort study</p> <p>Theme: Maternal and Infant outcomes</p>	<p>Continuous variables were compared with the use of the Wilcoxon rank-sum test, and categorical variables with the use of the chi-square test or Fisher's exact test. Multivariate logistic-regression analysis was performed to adjust for potential confounding factors for the composite end point of the rate of maternal adverse events and of neonatal adverse events at term.</p>	<p>There were 378,168 births during the study period. 45,988 women who had a singleton gestation and a history of cesarean delivery, 17,898 (38.9%) underwent a trial of labor and 15,801 (34.4%) had an elective repeated cesarean delivery. Of the remaining 12,289 women undergoing cesarean delivery, 9013 had indications for a repeated operation. There were 3276 women (7.1%) who presented in early labor without a documented plan for a TOL before cesarean section. The rate of TOL ranged from 18.7% to 63.2% among the 19 centers. The rate of trial of labor declined significantly during the study period (1999, 48.3%; 2000, 42.7%; 2001, 34.4%; 2002, 30.7%; p for trend, &lt;0.001. The overall success rate for</p>	<p>When counseling women with their choices of delivery it is recommended to discuss the associated perinatal morbidity and mortality that are directly attributable to uterine rupture.</p>	<p>Level: 2 Quality: B</p>



		planned as a 3-year study in order to collect sufficient data about uncommon and rare maternal complications such as uterine rupture.			vaginal delivery was 13,139 of 17,989 women (73.4%). There were 124 cases of uterine rupture among women who underwent a TOL; the rate of uterine rupture did not change drastically during the study period. Women with a prior low transverse incision had rates of 105 of 14,483 (0.7%), prior low vertical incision were 2 of 102 (2.0%), and 15 of 3206 (0.5%) for those with an unknown type of incision. 2 in 105 (1.9%) with a prior classical, inverted T, or J incision who either presented in advanced labor or refused a repeated cesarean delivery.		
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Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
<p>Loebel, G., Zelop, C., Egan, J., &amp; Wax, J. (2004). Maternal and neonatal morbidity after elective repeat cesarean delivery versus a trial of labor after previous cesarean delivery in a community teaching hospital. <i>Journal of Maternal-Fetal and Neonatal Medicine</i>, 15(4), 243-246. doi:10.1080/14767050410001668653</p>	<p>To compare maternal and fetal outcomes after elective repeat cesarean section versus a trial of labor in women after one prior uterine scar.</p>	<p>All women with a previous low transverse cesarean section delivered at term with no contraindications to vaginal delivery from January of 1995 to October of 1998. N=1408 women</p>	<p>Randomized Control Trial with Meta-analysis.</p> <p>Theme: Maternal and Infant outcomes Uterine Rupture</p> <p>Neonatal deaths=2 (hypoplastic left heart syndrome)</p>	<p>X2 and Fisher exact tests for categorical data and student's <i>t</i> test for continuous data. Outcomes were first analyzed by comparing mother-neonate dyads delivered by elective repeat cesarean section to those undergoing trial of labor. In a secondary analysis, those who achieved a successful or failed a trial of labor were separately compared with women undergoing elective repeat cesarean delivery.</p>	<p>Of the 1408 deliveries, 481 (34.2%) were by elective repeat cesarean section and 927 (65.8%) followed a trial of labor. Of the 927 women attempting a trial of labor, 729 (80.8%) were successful. There were no maternal deaths. 4 women (0.4%) women in the trial of labor group experienced uterine rupture, all were repaired successfully. There were two neonatal deaths, one in each group; both infants were diagnosed prenatally with hypoplastic left heart syndrome.</p>	<p>To better discuss the outcomes of a repeat elective cesarean section versus the trial of labor after having a primary cesarean section.</p>	<p>Level: 2 Quality: B</p>

Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
<p>Lydon-Rochelle, M., Holt, V. L., Easterling, T. R., &amp; Martin, D. P. (2001). Risk of uterine rupture during labor among women with a prior cesarean delivery. <i>The New England Journal of Medicine</i>, 345(1), 3-8. doi:10.1056/NEJM200107053450101</p>	<p>To review concerns related to a trial of labor for women who have had a previous cesarean section, and that a trial of labor may increase the risk of uterine rupture, an uncommon, but serious obstetrical complication.</p>	<p>All primiparous women who gave birth to live singleton infants by cesarean section in civilian hospitals in Washington from January 1 1987, through December 31, 1996, and who delivered a second child in Washington during the same period. A total of N= 20,095 women.</p>	<p>Population-based retrospective cohort analysis (longitudinal cohort study)</p> <p>Theme: Maternal outcome, uterine rupture.</p>	<p>Mantel-Haenszel rate ratios to estimate the relative risks and 95 percent confidence intervals. Likelihood-ratio test, with p values below 0.05 denoting statistical difference.</p>	<p>Uterine rupture complicated 4.5 second singleton deliveries per 100 (91 women), uterine rupture occurred at a rate of 1.6 per 1000 among women with a repeated cesarean delivery without labor (11 women), 5.2 per 1000 among women with spontaneous onset of labor (56 women), 7.7 per 1000 among women whose labor was induced without prostaglandins (15 women), and 24.5 per 1000 among women with prostaglandin-induced labor (9 women).</p>	<p>To weigh the risks of using prostaglandins for women who wish to undergo a trial of labor and those who wish to proceed with induction for a VBAC attempt.</p>	<p>Level: 2 Quality: B</p>

Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
<p>Macones, G. A., Cahill, A. G., Stamilio, D. M., Odibo, A., Peipert, J., &amp; Stevens, E. J. (2006). Can uterine rupture in patients attempting vaginal birth after cesarean delivery be predicted? <i>American Journal of Obstetrics and Gynecology</i>, 195(4), 1148-1152. doi:10.1016/j.ajog.2006.06.042</p>	<p>To use multivariable methods to develop clinical predictive models for the occurrence of uterine rupture by using both antepartum and early intrapartum factors.</p>	<p>Women with a prior cesarean delivery from 1996-2000. N=25,000 deliveries of women were reviewed.</p>	<p>Planned secondary analysis from a multicenter case-control study.</p> <p>Theme: Maternal</p> <p>uterine rupture</p>	<p>ICD codes were used to identify women with a previous cesarean delivery; a team of trained nurse abstractors reviewed each medical record for this cohort, using standardized, close-ended data collection forms.</p>	<p>25,000 cases were reviewed and only 134 (0.0053%).cases were identified uterine rupture and 670 (0.0268%). cases of controls. Few variables were reported, and the only factors reported were associated with rupture were maternal age, ethnicity, prior vaginal delivery, gestational age at delivery, and birth weight, the need for induction/augmentation, and cervical dilatation at the time of admission.</p>	<p>Uterine rupture cannot be accurately predicted, but the use of counseling and care of the women with a prior cesarean section can also be done to the best of the midwife's or practitioners ability.</p>	<p>Level: 3 Quality: C</p>

Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
<p>Macones, G. A., Peipert, J., Nelson, D. B., Odibo, A., Stevens, E. J., Stamilio, D. M., . . . Ratcliffe, S. J. (2005). Maternal complications with vaginal birth after cesarean delivery: A multicenter study. <i>American Journal of Obstetrics and Gynecology</i>, 193(5), 1656-1662. doi:10.1016/j.ajog.2005.04.002</p>	<p>To determine incidence and risk factors for uterine rupture in women attempting vaginal birth after cesarean in a wide range of hospital settings.</p>	<p>17 participating hospitals in Southern Pennsylvania and one large teaching hospital in Rhode Island. ICD codes of the women indicated they have had one previous cesarean delivery.</p>	<p>Case-control study</p> <p>Theme: Maternal outcome Uterine Rupture</p>	<p>Descriptive statistics, t tests, Mann-Whitney U tests, Fisher exact for variables were identified.</p>	<p>25,005 records of women with a prior cesarean were reviewed, of which 13,706 (53.7%) underwent a VBAC attempt and 11,299 (44.3%) underwent elective repeat cesarean. 59% of subjects were delivered at nonuniversity hospitals and 41% at university hospitals. Vaginal delivery rate was 75.5% and this was similar among the group of women attempting VBAC with a single prior cesarean (75.5%) and the women attempting VBAC with 2 or more prior cesareans (75.0%).</p>	<p>Women with a prior cesarean should be offered a VBAC, and women with a prior vaginal delivery should be encouraged to VBAC. The use of inductions in this population has been suggested to be avoided.</p>	<p>Level: 2 Quality: B</p>

	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
Melamed, N., Segev, M., Hadar, E., Peled, Y., Wiznitzer, A., & Yogeve, Y. (2013). Outcome of trial of labor after cesarean section in women with past failed operative vaginal delivery. <i>American Journal of Obstetrics and Gynecology</i> , 209(1), 49-e7. doi:10.1016/j.ajog.2013.03.010	To assess the outcome of trial of labor after cesarean in women with past failed operative vaginal delivery.	All women who underwent CS following a failed OVD in a university-affiliated tertiary medical center between 1996 and 2011. N=533 women	Retrospective Study  Theme: Lack of progress No uterine rupture Elective cesarean	Cases were identified using the comprehensive computerized perinatal database maintained in their medical center. Electronic medical records were reviewed for data. SPSS data analysis was done using Mann-Whitney U test, and Student t test, normal and nonnormal distribution, and Q-Q plot and the Kolmogorov-Smirnov test.	533 women underwent CS because of failed OVD during the study period. 204 women (38.3%) had a subsequent delivery, of whom 93 (45.6%) had a TOLAC and 111 (54.4%) had a repeat elective CS. The success rate in the TOLAC group was 61.3% (n=57). Most common indication for repeat CS was lack of progress (72.3%) among the 36 women in which TOLAC failed (38.7%). No cases of uterine rupture were found.	This info and the risk factors for TOLAC failure can be used when counseling these women regarding mode of delivery in subsequent pregnancy.	Level 2 Quality: B



Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
<p>Metz, T. D., Stoddard, G. J., Henry, E., Jackson, M., Holmgren, C., &amp; Esplin, S. (2013). How do good candidates for trial of labor after cesarean (TOLAC) who undergo elective repeat cesarean differ from those who choose TOLAC? <i>American Journal of Obstetrics and Gynecology</i>, 208(6), 458-e6. doi:10.1016/j.ajog.2013.02.011</p>	<p>To compare good candidates for trial of labor after cesarean (TOLAC) who underwent repeat cesarean to those who chose TOLAC.</p>	<p>All women who delivering a singleton pregnancy at 14 Intermountain Healthcare hospitals from July 2000 through July 2008. Patients who had a primary cesarean delivery at one of the 4 hospitals were included. Only the delivery following the primary cesarean was used for analysis. N=3120 women who were “good” candidates for TOLAC</p>	<p>Retrospective Cohort Study</p> <p>Theme:</p> <p>Maternal outcome Elective cesarean TOLAC success</p>	<p><math>X^2</math> test, and a mixed-effects approach was not needed for this analysis, P values were adjusted for multiple comparisons using the Hochberg procedure. 2-sided p value.</p>	<p>3120 (63.1%) were calculated to be good candidates for TOLAC. The other study group contained 2195 (70.4%) women who underwent elective cesarean section and 925 (29.7%) who chose TOLAC. The rate of successful VBAC was 85%. In the study population, only 30% of women who were good candidates for TOLAC but undergo an elective repeat cesarean differ from those who choose TOLAC. In the study population only 30% of women who were good candidates for TOLAC chose to undertake a trial of labor.</p>	<p>To explain the benefits and risks of choosing TOLAC versus repeat cesarean delivery, and the provider makes the difference in the way the information is delivered and what the patient decides.</p>	<p>Level: <del>2</del>7 Quality: B</p>



Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions:	Recommendations for practice:	Level and Evidence & Quality:
<p>Oboro, V., Adewunmi, A., Ande, A., Olagbuji, B., Ezeanochie, M., &amp; Oyeniran, A. (2010). Morbidity associated with failed vaginal birth after cesarean section. <i>Acta Obstetrica Et Gynecologica Scandinavica</i>, 89(9), 1229-1232. doi:10.3109/00016349.2010.499448</p>	<p>To investigate Morbidity and factors associated with failed vaginal birth after cesarean delivery.</p>	<p>N=1,020 women who delivered in 3 Nigerian University teaching hospitals and underwent trial of labor after a previous cesarean.</p>	<p>Retrospective cohort study.</p> <p>Theme: Maternal and infant outcome</p> <p>No maternal deaths</p> <p>One neonatal death</p> <p>Failed TOLAC</p>	<p>Univariate analysis, using the pie squared test for differences in continuous variables. Also used was a multivariable logistic regression model. (p-value and confidence interval).</p>	<p>683 of 1,013 women (67.4%) had a successful vaginal delivery, and 330 (32.6%) had failed trial of labor and delivered by emergency c-section. There were no maternal deaths noted, and one neonatal death.</p>	<p>Study does not have reliable data and suggestions to practice were not included within the context of the study.</p>	<p>Level 3, Quality C.</p>



Citation:	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions:	Recommendations for practice:	Level and Evidence & Quality:
<p>Rosenstein, M. G., Kuppermann, M., Gregorich, S. E., Cottrell, E. K., Caughey, A. B., &amp; Cheng, Y. W. (2013). Association between vaginal birth after cesarean delivery and primary cesarean delivery rates. <i>Obstetrics and Gynecology</i>, 122(5), 1011-1017. doi:10.1097/AOG.0b013e3182a91e0f</p> <p>Signore, C. (2012). VBAC: What does the evidence show? <i>Clinical Obstetrics and Gynecology</i>, 55(4), 961-968.</p>	<p>To estimate the association between vaginal birth after cesarean delivery (VBAC) rates and primary cesarean delivery rates in California hospitals. N=72,865 women</p>	<p>Hospital VBAC rates were calculated using birth certificate and discharge data from 2009, and hospitals were categorized by quartile of VBAC rate.</p> <p>Theme: Maternal outcomes Vaginal delivery rate Hospital volumes Midwifery coverage Obstetric coverage</p>	<p>Cross-sectional historical cohort study.</p>	<p>Multivariable logistic regression analysis was performed to estimate the odds of cesarean delivery among low-risk nulliparous women with singleton pregnancies at term in vertex presentation (nulliparous term singleton vertex) by hospital VBAC quartile while controlling for many patient-level and hospital-level confounders.</p>	<p>72,865 had a previous cesarean, of whom 6,905 (9.5%) delivered vaginally. The median VBAC rate was 5.0% overall, and an interquartile range of 1.5-13.9%. The differences in the ranges is thought to be due to the hospital volume, (862 compared to 1,926) teaching status ((0% compared with 32.3%), midwifery coverage (16.1% compared with 55.6%), and 24-hour obstetric coverage (13.1% compared with 61.9% coverage).</p>	<p>To have a culture on a labor and delivery unit that leads to a low rate of primary cesarean section, and have policies supportive of women having a VBAC.</p>	<p>Level 2 and Quality B</p>



	Purpose:	Sample:	Design:	Measurement:	Results/Conclusions :	Recommendations for practice:	Level and Evidence & Quality:
<p>Stamilio, D. M., DeFranco, E., Paré, E., Odibo, A. O., Peipert, J. F., Allsworth, J. E., . . . Macones, G. A. (2007). Short interpregnancy interval: Risk of uterine rupture and complications of vaginal birth after cesarean delivery. <i>Obstetrics &amp; Gynecology</i>, 110(5), 1075-1082. doi:10.1097/01.AOG.0000286759.49895.46</p>	<p>To investigate whether short or long inter-pregnancy interval is associated with uterine rupture and other major maternal morbidities in women who attempt vaginal birth after cesarean.</p>	<p>Pregnant women with at least one prior cesarean section, 17 hospitals in the Northeastern United States participated, including 6 university hospitals, five medical teaching community hospitals, and 6 non-teaching community hospitals. More than 25,000 patients who delivered between 1995-2000. Exclusion included unknown type of uterine incision or if she had a fetus with a major anomaly. N=13, 331 after exclusion of women in the designated time frame</p>	<p>Theme: Maternal Uterine rupture</p> <p>Pregnancy interval associated with uterine rupture</p>	<p>Stratified x2 and multivariable analyses, also a sensitivity analysis was done also due to the set dates of delivery. Statistical analysis consisted of descriptive statistics, univariable and stratified analyses, and finally a multivariable logistic regression. X2 and Fisher tests or unpaired t test or analysis of variance for continuous variables.</p>	<p>In this cohort of 25,005 pregnant women with prior cesareans, 55% elected to attempt a VBAC, among the 13,706 patients who elected a VBAC trial, 2.7% did not have interpregnancy interval data, leaving 13,331 for this analysis. There were 128 cases of uterine rupture, yielding a rupture rate of 0.9% in patients who attempted VBAC. Patients with a short interpregnancy interval (18 months or less) attempted a VBAC trial approx. 10% more often than patients with greater than an 18 month pregnancy interval. Patients with a short interpregnancy interval of less than 6 months who attempted a VBAC had a significant increase in uterine rupture rate, with an absolute risk of 2.7% which is nearly a threefold</p>	<p>Have teaching geared to reduce risk when it is related to their last date of cesarean delivery.</p>	<p>Level: 2 Quality: C</p> <p style="text-align: right;">92</p>

					increase in rupture rate.		
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