MATERNAL911

Operative Vaginal Delivery

Click the next button to continue...

Course Description:

Operative vaginal birth is the use of forceps or a vacuum device to assist with a vaginal delivery. The laboring woman may or may not push during the assistance. The health care provider will learn when an operative device is used and how it will be selected. The health care provider will be aware of the risks and benefits of use and complications that may occur to mother and fetus. This education course will keep maternal and fetal safety a priority.

Approximate Time to Complete: 55 minutes

Revised: 5/20/2018

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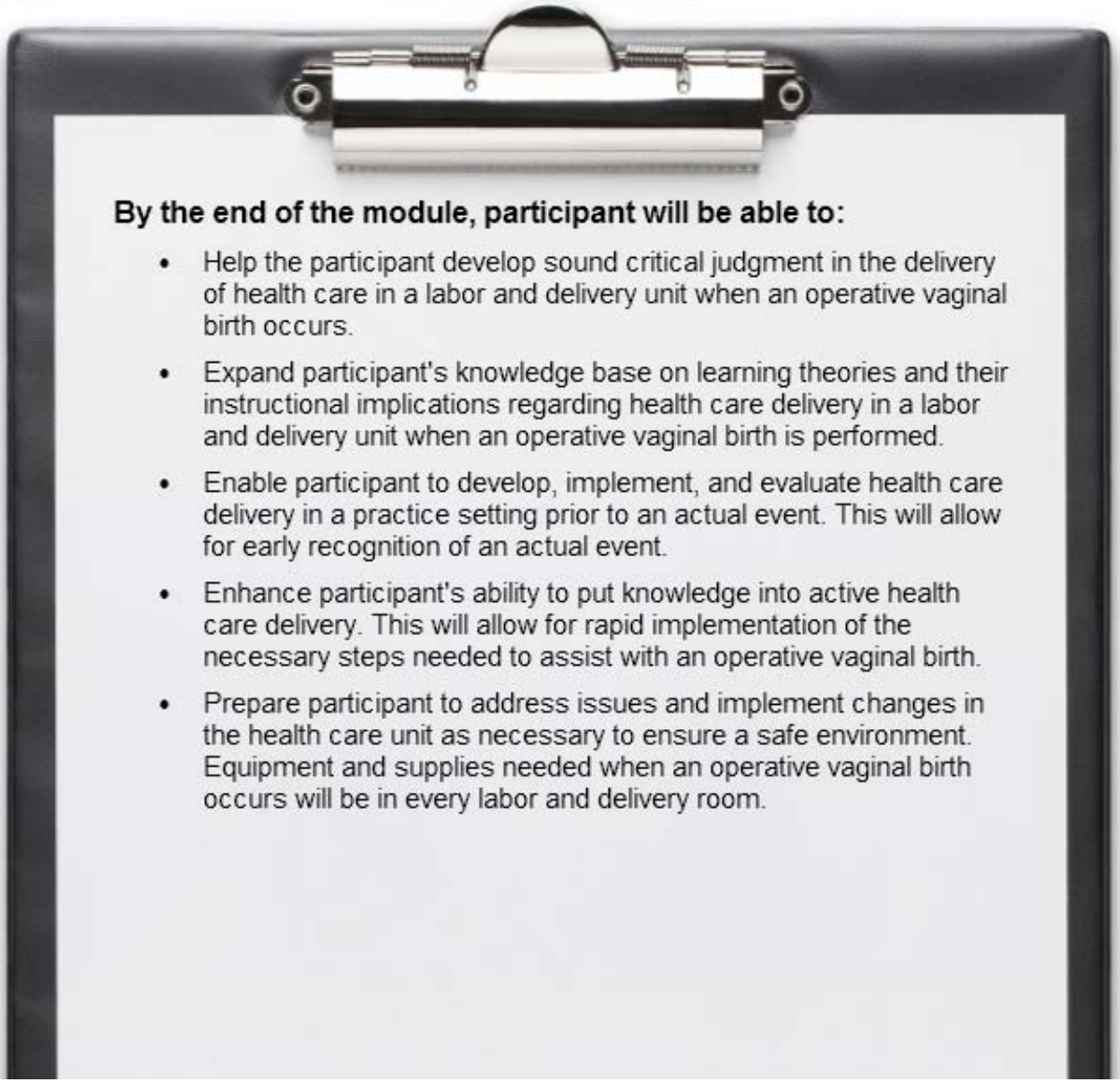
print version

Introduction



By the end of the module, participant will be able to:

- Help the participant develop sound critical judgment in the delivery of health care in a labor and delivery unit when an operative vaginal birth occurs.
- Expand participant's knowledge base on learning theories and their instructional implications regarding health care delivery in a labor and delivery unit when an operative vaginal birth is performed.
- Enable participant to develop, implement, and evaluate health care delivery in a practice setting prior to an actual event. This will allow for early recognition of an actual event.
- Enhance participant's ability to put knowledge into active health care delivery. This will allow for rapid implementation of the necessary steps needed to assist with an operative vaginal birth.
- Prepare participant to address issues and implement changes in the health care unit as necessary to ensure a safe environment. Equipment and supplies needed when an operative vaginal birth occurs will be in every labor and delivery room.

Objectives

Operative Vaginal Delivery

Operative vaginal delivery, also known as, assisted vaginal birth (AVB), occurs during the second stage of labor and refers to the use of a vacuum or forceps to achieve a vaginal birth [1].

The health care provider uses the instrument to extract the fetus, using traction, during a contraction with or without maternal pushing efforts.

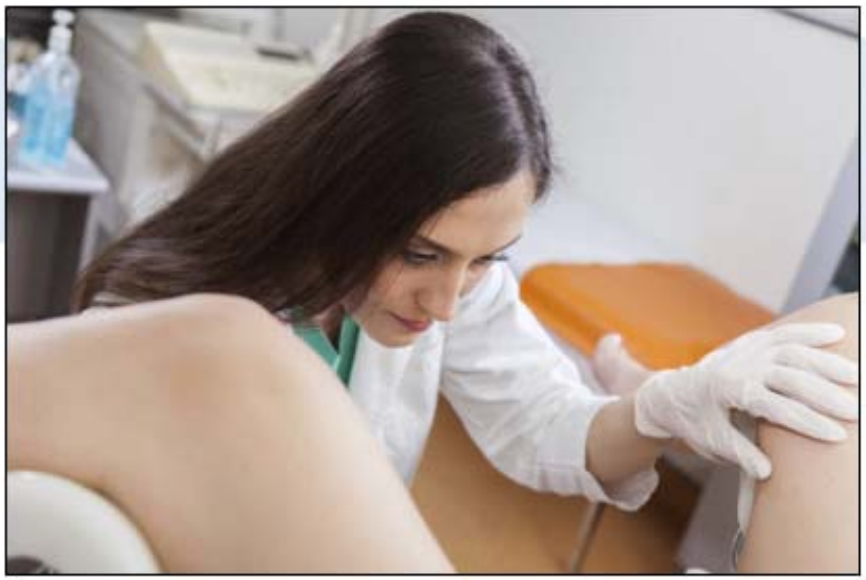
The provider is not pulling the fetus but guiding with this traction to assist the woman.

- In 2015, 3.1% of all deliveries in the United States were operative vaginal births [2].
- This rate has declined, but the rate of vacuum assisted births remains four times the rate of forceps assisted births, or 2.58% of vaginal births are vacuum assisted and 0.56% are forceps assisted [2].
- Overall, the rates vary worldwide and are associated with local practice and availability of trained professionals [3].

- In a systematic review 91% of forceps deliveries and 86% of vacuum deliveries were successful [14].
- There is however, in the U.S., a 1 to 23% operative vaginal delivery rate within some regions which suggest the evidence based guidelines (EBG) are not equally applied [4].

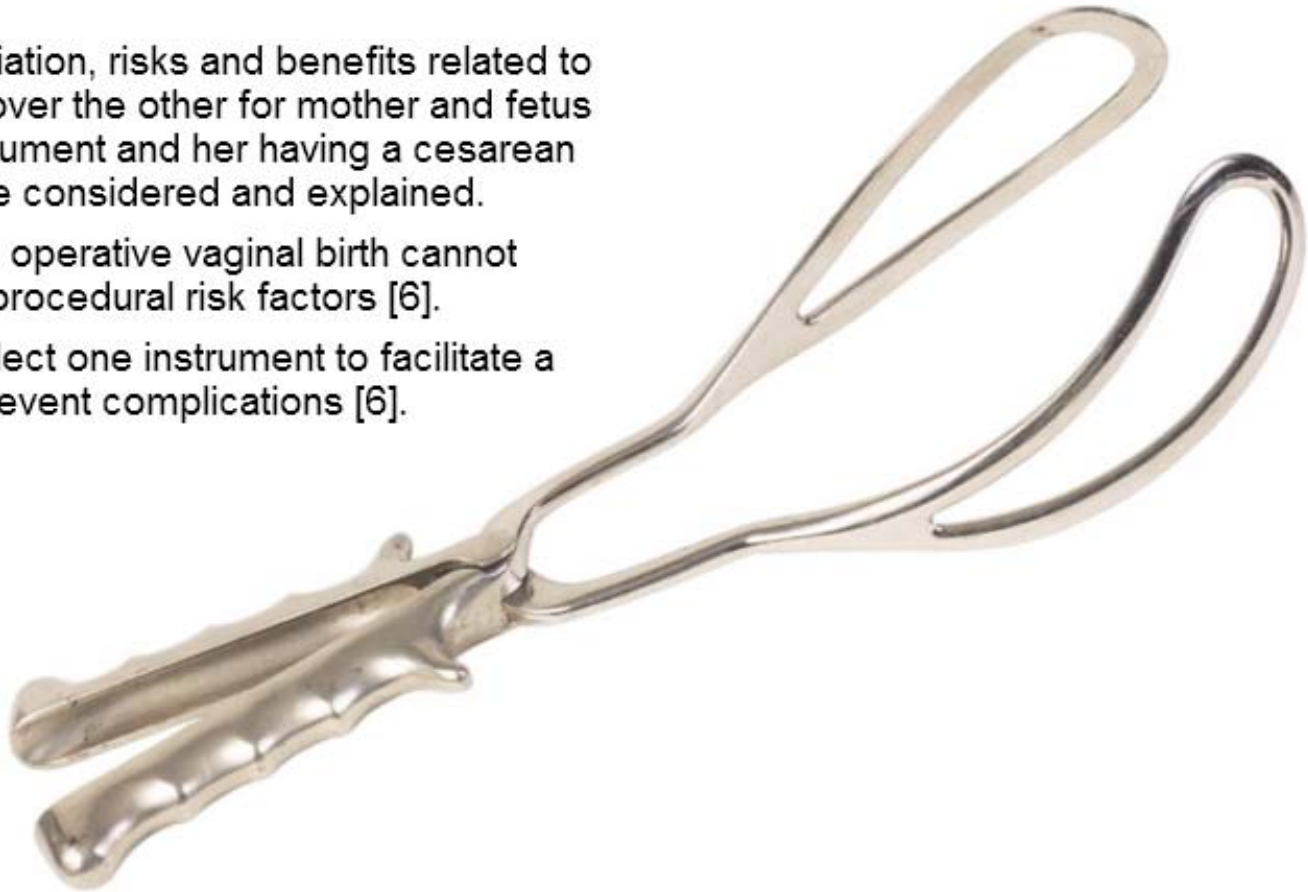
Occurrence

- An assessment of the pelvis is necessary to evaluate for cephalopelvic disproportion (CPD) in every pregnant woman.
- With this exam the position or attitude of the fetal head must be assessed and fetal station.
- This can be accomplished abdominally and with a pelvic exam.
- Variables associated with failure rates include occiput posterior (OP) presentation and macrosomia so the pelvic exam is important for decision making regarding delivery [5].



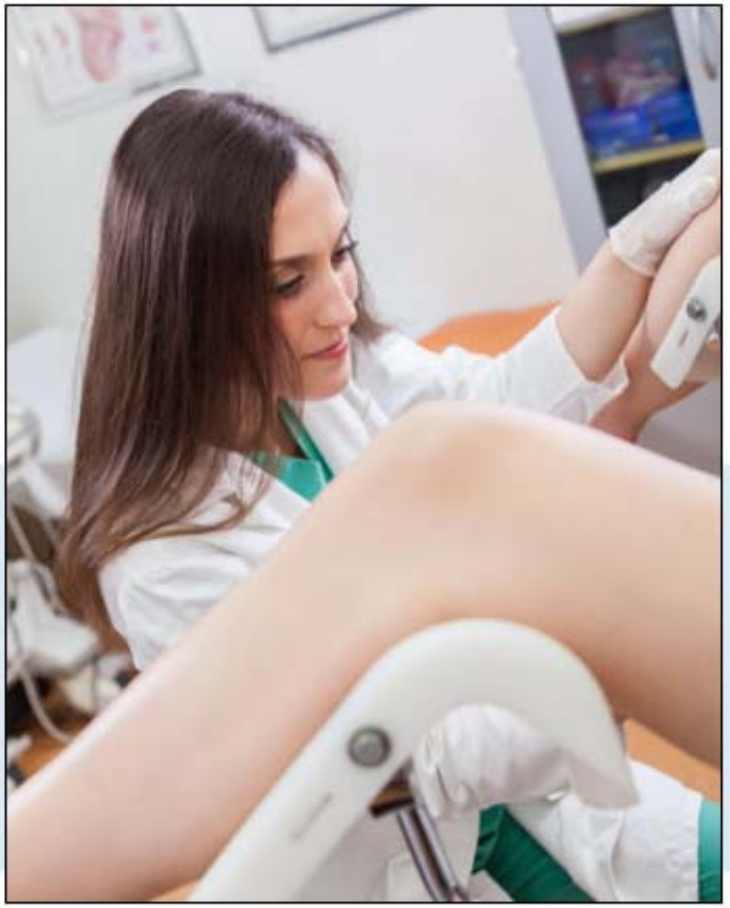
Risk Factors

- In every situation, prior to initiation, risks and benefits related to the use of either instrument over the other for mother and fetus and risk of not using the instrument and her having a cesarean section (c/s) delivery must be considered and explained.
- The success or failure of the operative vaginal birth cannot exactly be predicted by pre-procedural risk factors [6].
- The skilled provider must select one instrument to facilitate a successful vaginal birth to prevent complications [6].

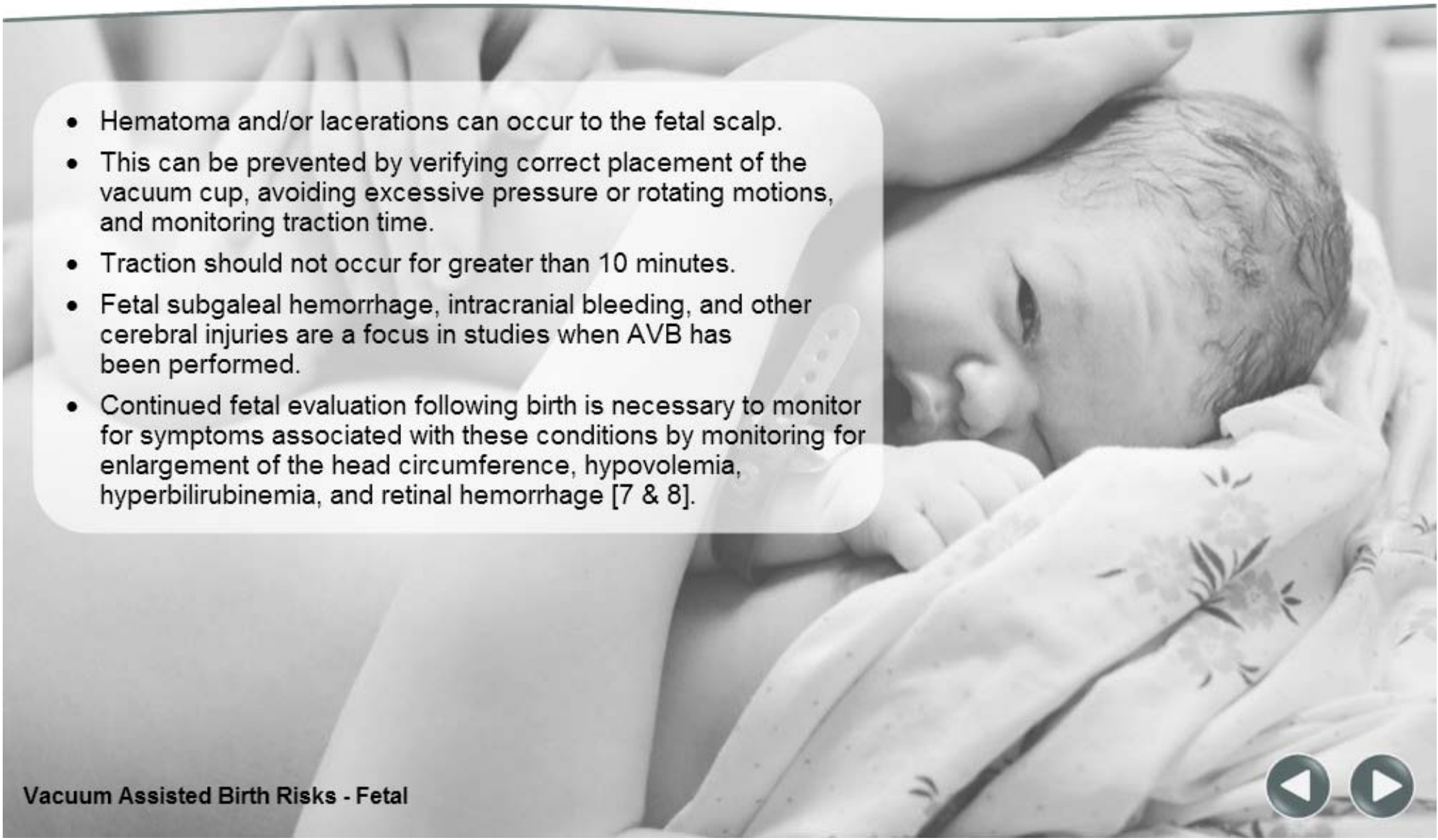


Risk Factors Continued

- Hematoma and/or lacerations can occur to maternal soft tissue.
- This can be prevented by verifying the placement of the vacuum cup, ensuring the instrument does not entrap maternal soft tissue, use proper technique to prevent pop off of the cup, controlling descent of the fetal head, and controlling delivery over the perineum.



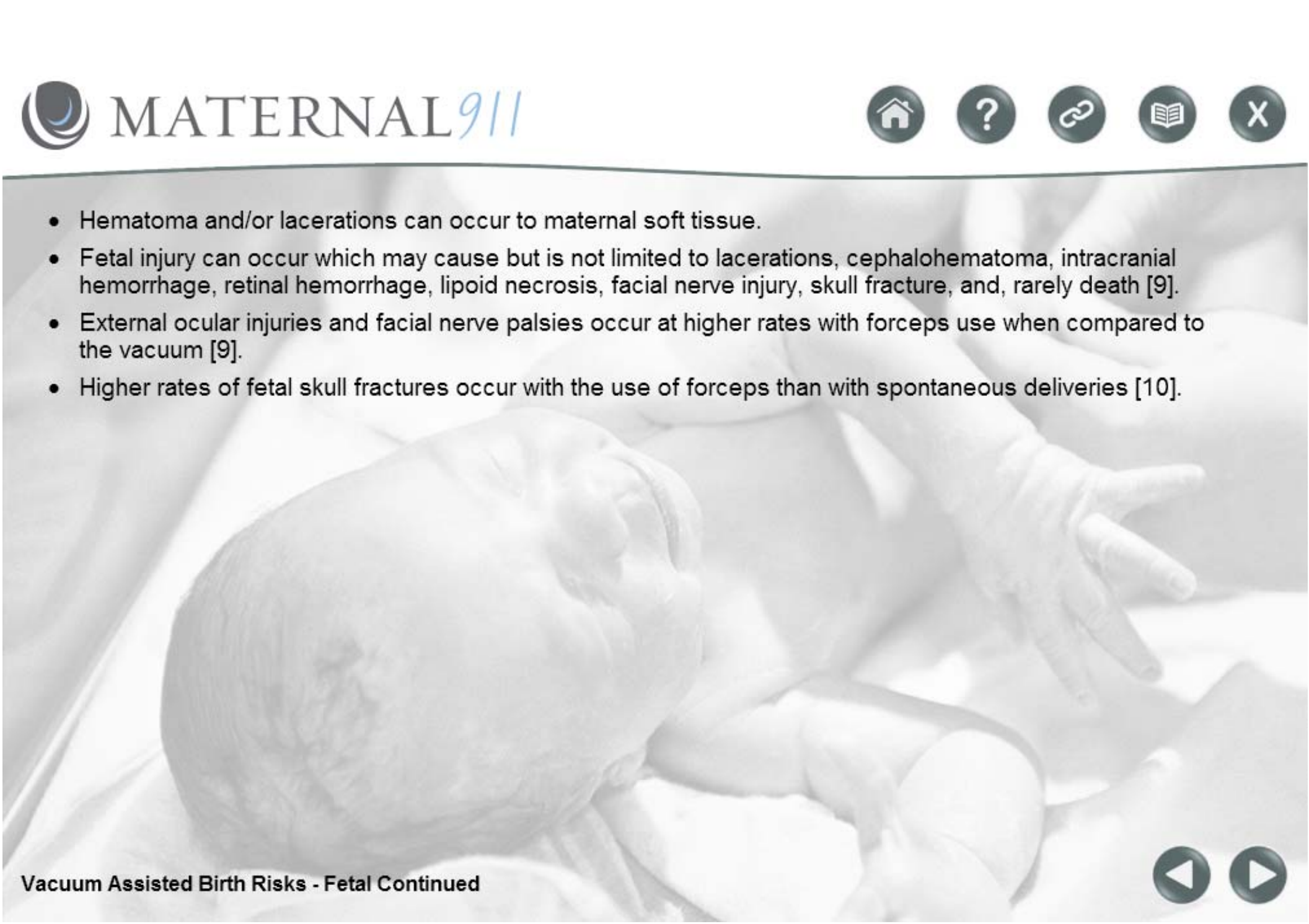
Vacuum Assisted Birth Risks - Maternal



- Hematoma and/or lacerations can occur to the fetal scalp.
- This can be prevented by verifying correct placement of the vacuum cup, avoiding excessive pressure or rotating motions, and monitoring traction time.
- Traction should not occur for greater than 10 minutes.
- Fetal subgaleal hemorrhage, intracranial bleeding, and other cerebral injuries are a focus in studies when AVB has been performed.
- Continued fetal evaluation following birth is necessary to monitor for symptoms associated with these conditions by monitoring for enlargement of the head circumference, hypovolemia, hyperbilirubinemia, and retinal hemorrhage [7 & 8].

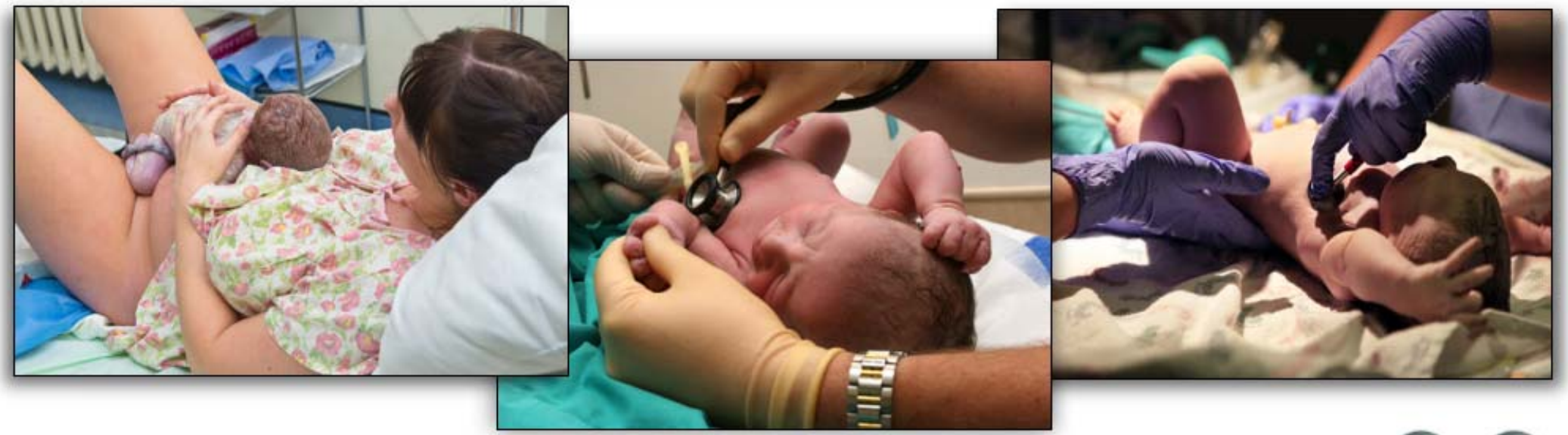
Vacuum Assisted Birth Risks - Fetal

- Hematoma and/or lacerations can occur to maternal soft tissue.
- Fetal injury can occur which may cause but is not limited to lacerations, cephalohematoma, intracranial hemorrhage, retinal hemorrhage, lipoid necrosis, facial nerve injury, skull fracture, and, rarely death [9].
- External ocular injuries and facial nerve palsies occur at higher rates with forceps use when compared to the vacuum [9].
- Higher rates of fetal skull fractures occur with the use of forceps than with spontaneous deliveries [10].



Vacuum Assisted Birth Risks - Fetal Continued

- An AVB may be considered when the likelihood for success is present.
- The health care provider must have the appropriate training, experience, and ability to use the selected instrument [1].
- Appropriately skilled personnel are in attendance to provide ongoing care to the mother during the procedure and personnel are present to provide neonatal resuscitation to the fetus following delivery.



Planning and Prevention

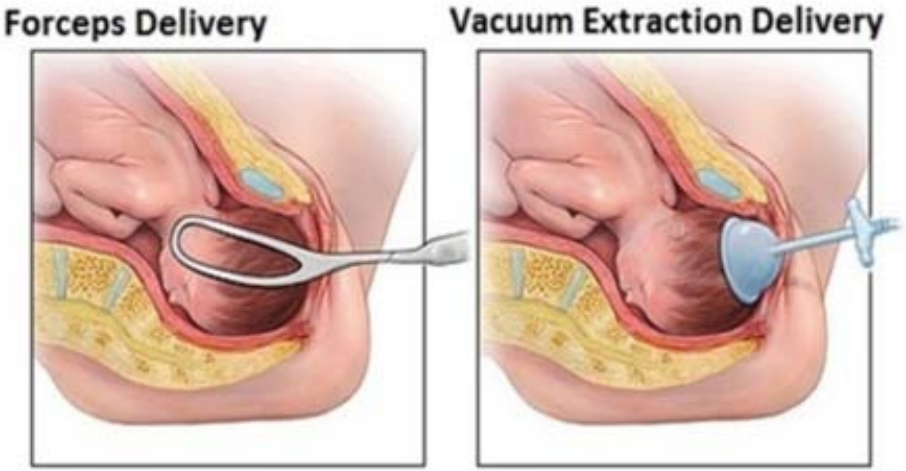
Advantages to the use of the forceps by the skilled provider [9];

- Less likely to become detached from the fetal head
- Has a higher success rate than a vacuum
- Are unlikely to detach from the fetal head
- Can be used on premature fetuses
- Can be used for rotation
- With proper placement causes less trauma to the fetal head in regards to cephalohematoma, retinal hemorrhage, and does not cause bleeding from scalp sampling or fetal scale electrode (FSE) sites.

Advantages to the use of the vacuum by a skilled provider

- Easy to apply
- Less force of the fetal head
- Decreased analgesia for the woman
- Less soft tissue trauma for the woman.

- A vacuum device cannot be used to rotate the fetus so cannot be the selected instrument if this maneuver is desired.
- Forceps delivery has a higher risk of maternal injury. There is uncertainity which procedure is safer for the fetus [14].



Planning and Prevention Continued

- Criteria for use of a vacuum or forceps must be well thought prior to initiation.
- American College of Obstetricians and Gynecologists (ACOG) practice bulletin identified indications for operative vaginal delivery; vacuum and forceps, is not absolute and c/s delivery is an appropriate option in certain situations [11].

Planning and Prevention Continued

Indications for Vacuum of Forceps Use

- Nonreassuring fetal status, per fetal heart rate (FHR) tracing, that is suspicious of immediate or potential fetal compromise.
  - This may be present with a placenta abruption. Operative vaginal delivery may expedite the delivery if criteria are appropriate for vacuum or forceps use; otherwise, a c/s delivery may be more effective and safer.
- Maternal cerebral vascular disease (CVD) or cardiac conditions which may indicate the need for her to avoid valsalva maneuver.
- Inadequate progress of labor or lack of effective pushing technique by the mother.
- A prolonged second stage of labor for a nulliparous woman with epidural anesthesia is defined as no descent or rotation following > 4 hours. Prolonged second stage for a nulliparous woman without an epidural is > 3 hours [12].
- A multiparous woman is considered to have a prolonged second stage of labor if no descent or rotation after > 3 hours with epidural anesthesia and without epidural anesthesia > 2 hours [12].

- It is very important to have informed consent prior to using an instrument to facilitate a vaginal birth.
- This must include the risks and benefits of the instruments use and the understanding that an immediate c/s may be necessary if complications to mother and/or fetus arise.
- Following informed consent, the health care provider must perform a repeat assessment prior to AVB.

Informed Consent

Repeat Assessment

- The woman's bladder should be emptied to prevent injury during instrumentation use. If she cannot empty the bladder on her own a straight catheter may be used.
  - If a catheter is used it is not left in place as this contributes to injury of her urinary tract.
- A digital pelvic exam is performed to assess that the cervix is completely dilated.
- Evaluation that the fetus is engaged in the vertex presentation and is at an appropriate station is absolutely necessary.
  - Criteria to be considered is a large fetus, extreme molding or caput, extension of the fetal head, asynclitic fetal presentation, and maternal pelvic deformities or CPD which can make assessment of this difficult.
  - Ultrasound evaluation may help with this assessment but if not available, palpation of the maternal abdomen should demonstrate no more than one-fifth of the fetal head is palpable if appropriately engaged [13].
- Careful use of vacuum extractor or forceps is an acceptable consideration for a macrosomic fetus by a trained provider [11].
- The labor pattern identifies an adequate contraction pattern and the membranes are ruptured. If there is any uncertainty regarding fetal presentation an intrapartum ultrasound should be performed.
- Evaluation that appropriate anesthesia has been provided to the mother.
- Ensure the ability to perform a c/s is available if complications occur.

Soft Vacuum Cups

- Soft vacuums are made of silicone, plastic, polyethylene, or rubber and are bell or funnel shaped.
- A suction device is attached to the cup via a peripherally located vacuum port. Soft cups were found, in a meta-analysis of eight trials including 1076 women, to fail at achieving a vaginal delivery [14].
- The soft cup is more appropriate for an uncomplicated delivery.

Rigid Vacuum Cups

- Rigid vacuums are made of metal or a firm plastic, is mushroom-shaped, and vary from 40 to 60 mm in diameter.
- A suction device is attached to the cup via a peripherally located vacuum port.
- This type of cup is to be considered for a more difficult delivery such as OP, a transverse lie, and the more difficult occiput anterior (OA) deliveries [14].
- Vacuum cups can be disposable or reusable.
- This rigid device is less likely to become detached.

Types of Vacuums

Soft Cup Vacuums:

- Soft cup devices are easier to use and are associated with fewer fetal scalp injuries but can detach are higher rates [33]. Features in the soft cut include:
  - Mushroom-shaped cup of varying diameter, composition, and depth
  - A fixed guard inside of the vacuum cup for safety
  - A combined vacuum pump and handle device or a vacuum port for a vacuum hose attachment.
  - The design with the vacuum pump within the handle eliminates the need for a separate vacuum tube and the need for an assistant in producing the vacuum.
  - A handle for traction

- Forceps may be considered for rotation of the fetal head when in a cephalic presentation or used to assist in the delivery of the after coming head during a breech delivery.
- Forceps are not to be applied if the cervix is not completely dilated or the fetal presenting part is not engaged [11, 34].

Outlet Forceps	• Outlet forceps may be used when the fetal head is visible at the vaginal introitus without separating the labia majora, or the fetal head is on or at the perineum, and the fetal presentation is right or left occiput anterior or posterior position. • Rotation does not exceed 45 degrees [11, 34].
Low Forceps	• Low forceps may be considered if the fetal skull is +2 cm station or 2 cm or more beyond the ischial spines using a scale of up to +5 cm but not on the pelvic floor and rotation of the fetal head is no more than 45 degrees. • Rotation of 45 degrees or less may allow for a left or right occiput anterior to occiput anterior position or left or right occiput posterior to occiput posterior position [11, 34].
Midforceps	• Midforceps are used when the fetal head is engaged but is higher than +2 cm station beyond ischial spines [11, 34].

The type and placement of forceps will be determined based on maternal and fetal factors.

Correct placement is important to prevent both maternal and fetal injury.

Types of Forceps

Placement of Forceps 1

Placement of Forceps 2

Forceps

Contraindiction to Vacuum Use

- Fetal position other than vertex , brow, or face presentation
- Gestation less than 34 weeks
  - Extreme prematurity increases the occurrence of intraventricular hemorrhage
- Need for fetal rotation
- Contraindication for a vaginal delivery
- Fetal conditions
  - Bleeding disorders including;
    - Hemophilia
    - Alloimmune thrombocytopenia
  - Demineralization disorder
    - Osteogenesis imperfecta
- Fetal scalp electrode (FSE) sampling or numerous attempts to place a FSE may increase the risk of fetal cephalohematoma or bleeding from the sites.
- Unknown fetal position
- Suspected fetal-pelvic disproportion

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Contradictions

Typical steps for vacuum extraction

- Some vacuum extractor pressures are elicited by the provider.
- Other vacuum extractors require the provider to hand off the tubing to a nurse and he/she will connect this to a hand held pump.
  - The provider will tell the nurse when to increase the suction pressure.
    - This is initiated at the beginning of a contraction and traction is applied as the contraction builds.
  - Traction is maintained throughout the contraction.
  - The nurse will indicate when the suction gauge has reached the appropriate level to assist with the delivery.
  - The provider will begin using traction with maternal pushing efforts to facilitate birth.
  - The procedure should be abandoned if delivery does not occur within 3 pulls or 15 to 20 minutes [13].

- The type of forceps selected will be based upon
  - The size and shape of the fetal head
  - Size and shape of the maternal pelvis
  - The indication for forceps to facilitate delivery
  - Provider preference and experience
- To reduce the risk of lacerations to the fetus, confirmation of appropriate application is necessary prior to applying traction.
- To reduce maternal risk of lacerations, the forceps are removed when expulsion of the fetal head is assured but before the widest diameter of the fetal head passes the vaginal introitus.

- Forceps used for traction requires the provider to use steady movement following the birth canal limiting any rocking motion [13].
- Traction will occur with maternal pushing efforts and relaxed between contractions [13].
- Forceps may be used when rotation of the fetus is needed.
- Rotation of the fetus is associated with higher risk of complications for the fetus and woman when compared to use for traction.
- Progress should be noticed with the first two pulls and delivery by the third or fourth pull [15].
  - Forceps should be abandoned if descent does not occur in this time frame.

Forceps Delivery

- ACOG committee opinion discusses the increased incidence of intracranial injury when vacuum, forceps, and c/s occur in combination [11].
- ACOG recommends avoiding another attempt using a different instrument related to potential for fetal and/or maternal injury including but not limited to third and fourth degree perineal lacerations and postpartum hemorrhage [11, 16].

Guidelines from Professional Organizations

Complications to AVB are dependent on:

- Maternal parity
- Position/placement of the forceps or vacuum
- Fetal station
- Head position at the time of application
- Provider experience

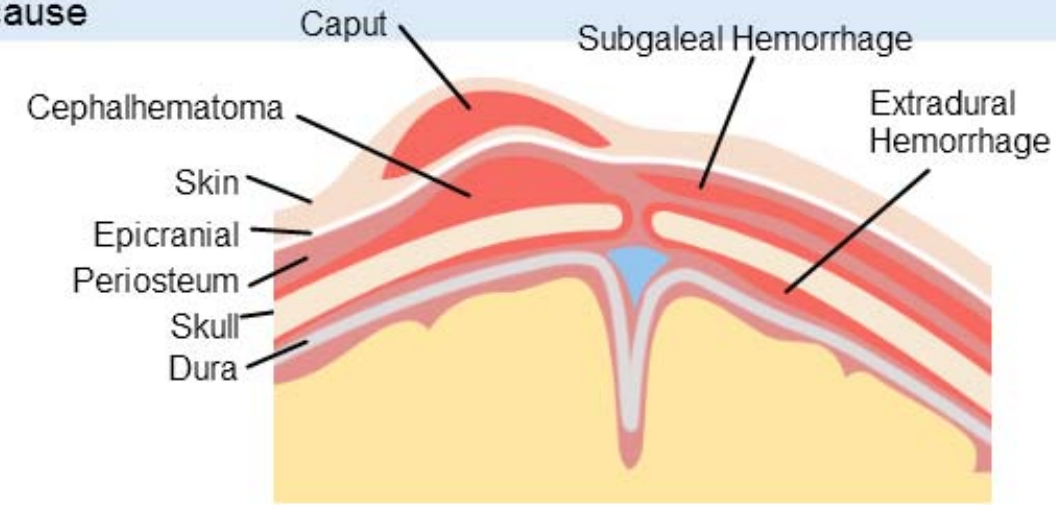
Complications

- Maternal complications associated with the use of forceps or vacuum at the time of delivery include:
  - Increase in pain
  - Continued perineal pain for 24 hours following delivery
  - Lower genital tract lacerations including third and fourth degree lacerations
  - Cervical lacerations
  - Vulvar and/or vaginal hematomas
  - Urinary incontinence or retention
  - Anal incontinence
  - Anemia related to blood loss [17-23]
- Rectal injury is greater for AVB when the fetus is in the OP position compared to OA [23].
- Readmission to the hospital is greater due to complications following AVB [17-23].
- Maternal complications in the postpartum period and beyond include [24]
  - Pelvic floor dysfunction
  - Pelvic organ prolapsed
  - Urine and/or fecal incontinence
  - Fistulas

Maternal Complications

Fetal complications associated with AVB vary with the method used.

- Intracranial hemorrhage increases with operative vaginal delivery [25].
- Rotation or movement of the vacuum cup can cause
  - Scalp abrasions
  - Lacerations
  - Cephalohematoma
  - Subgaleal hematoma
  - Intracranial hemorrhage
  - Retinal hemorrhage
  - Hyperbilirubinemia
  - Skull fracture (26, 27, & 28)



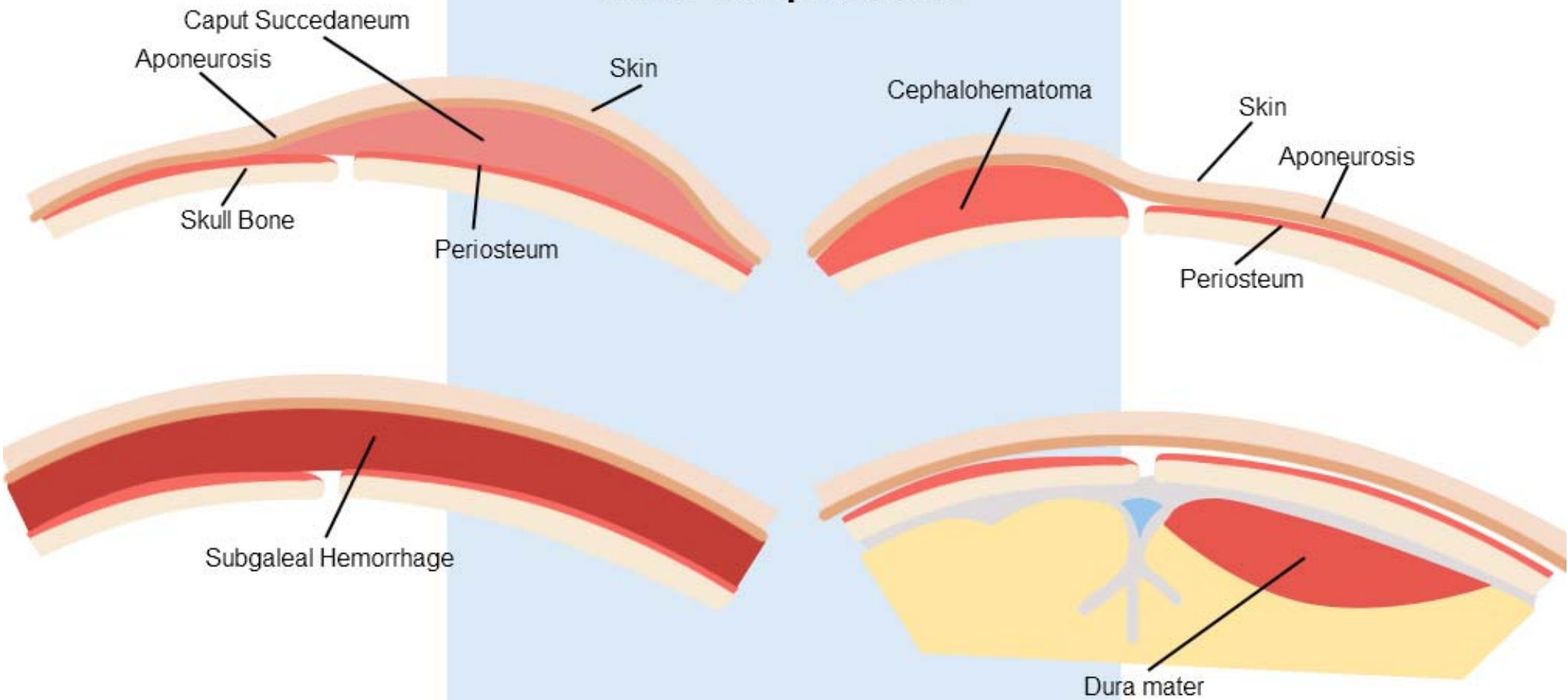
- Shoulder dystocia is more common with vacuum assisted deliveries which are associated with higher occurrence rates of brachial plexus injury [25, 29, 35].
- A prospective study found complications following a vacuum assisted birth presented within the first 10 hours of life; therefore, stressing the importance of communicating the method of delivery to the neonatal care provider [30].

Complications with Vacuum

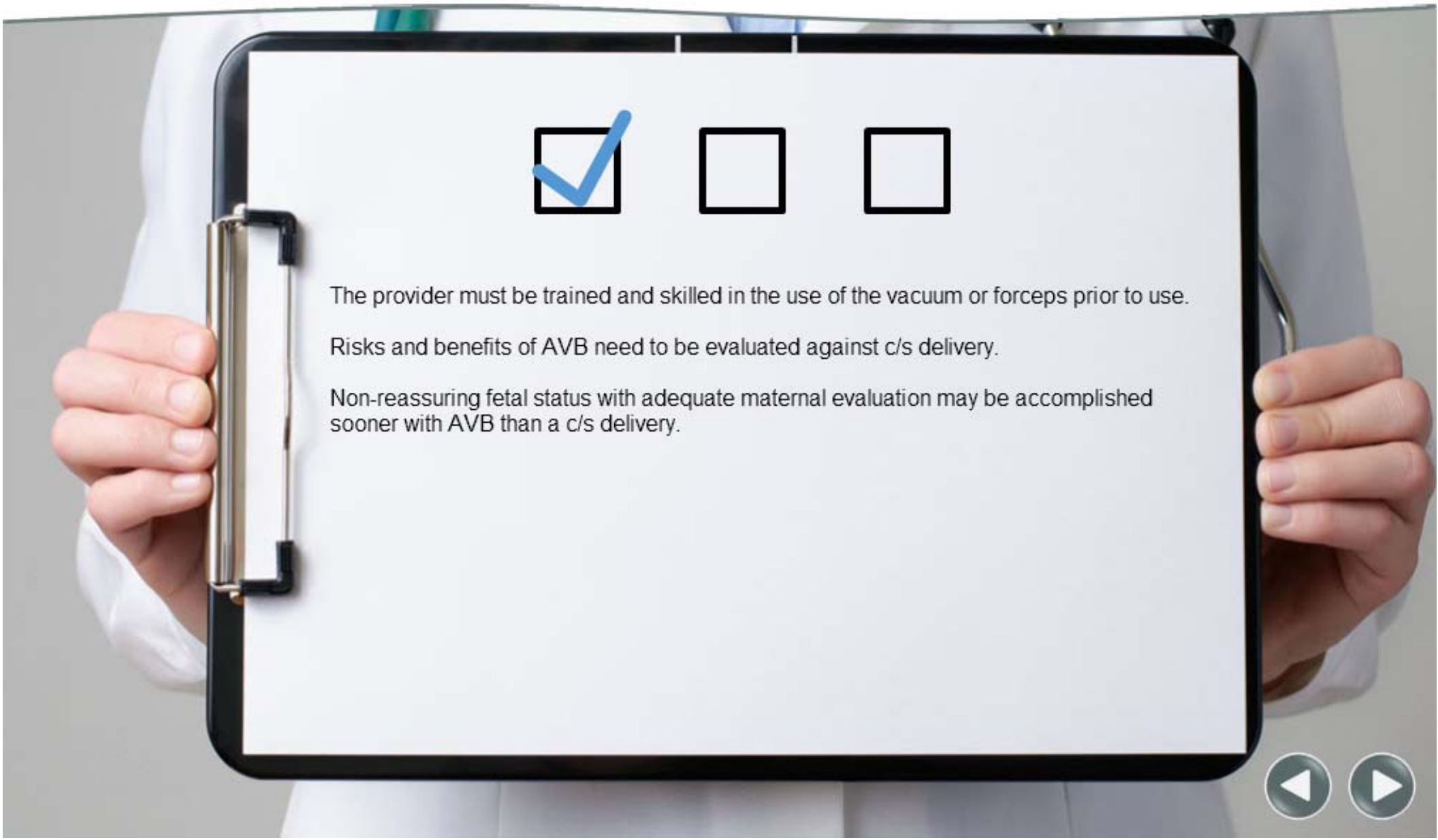
- Fetal complications associated with the use of forceps include:
  - Injury to the skin causing lacerations
  - Forceps markings or bruising
  - External ocular injury/trauma
  - Intracranial hemorrhage
  - Subgaleal hematomas
  - Hyperbilirubinemia
  - Retinal hemorrhage
  - Nerve injury
  - Skull fracture
  - Death [10, 31, 32, 36]
- Long term effects of vacuum or forceps use on the fetus does not demonstrate a difference in child development [24].

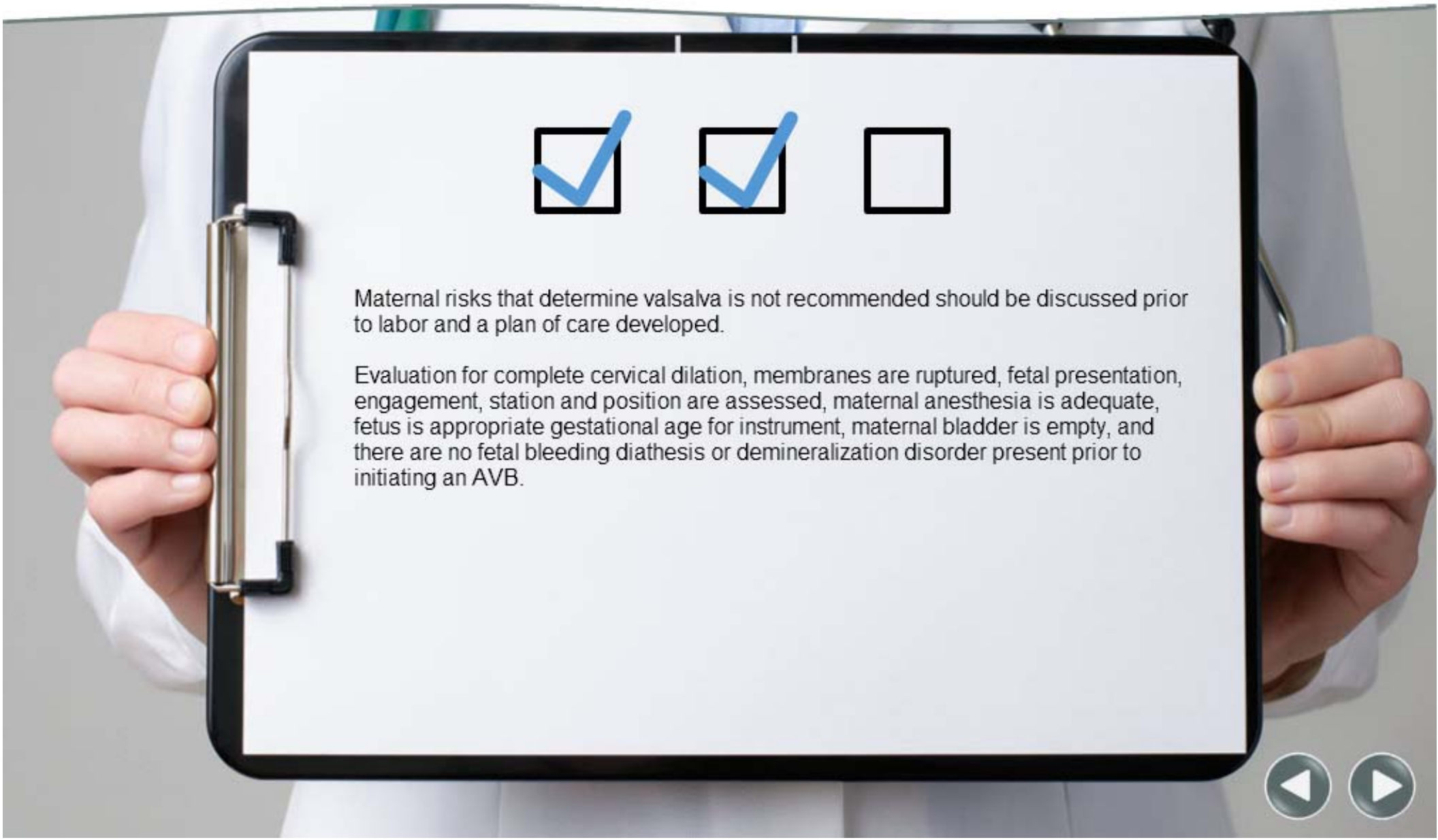
Complications with Forceps

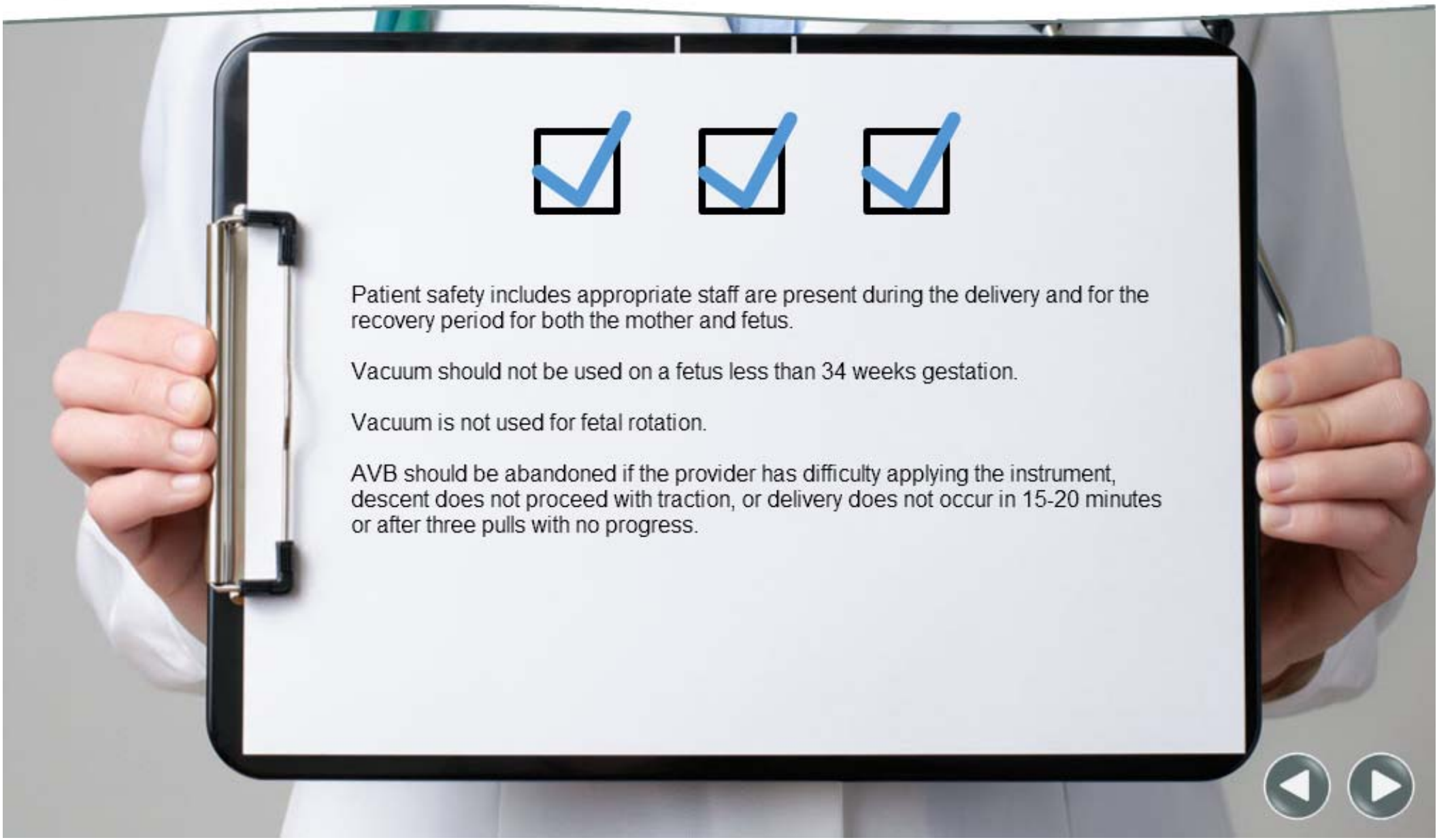
Fetal Complications



Fetal Complications


The provider must be trained and skilled in the use of the vacuum or forceps prior to use.
Risks and benefits of AVB need to be evaluated against c/s delivery.
Non-reassuring fetal status with adequate maternal evaluation may be accomplished sooner with AVB than a c/s delivery.


Maternal risks that determine valsalva is not recommended should be discussed prior to labor and a plan of care developed.
Evaluation for complete cervical dilation, membranes are ruptured, fetal presentation, engagement, station and position are assessed, maternal anesthesia is adequate, fetus is appropriate gestational age for instrument, maternal bladder is empty, and there are no fetal bleeding diathesis or demineralization disorder present prior to initiating an AVB.


MATERNAL911
Patient safety includes appropriate staff are present during the delivery and for the recovery period for both the mother and fetus.
Vacuum should not be used on a fetus less than 34 weeks gestation.
Vacuum is not used for fetal rotation.
AVB should be abandoned if the provider has difficulty applying the instrument, descent does not proceed with traction, or delivery does not occur in 15-20 minutes or after three pulls with no progress.

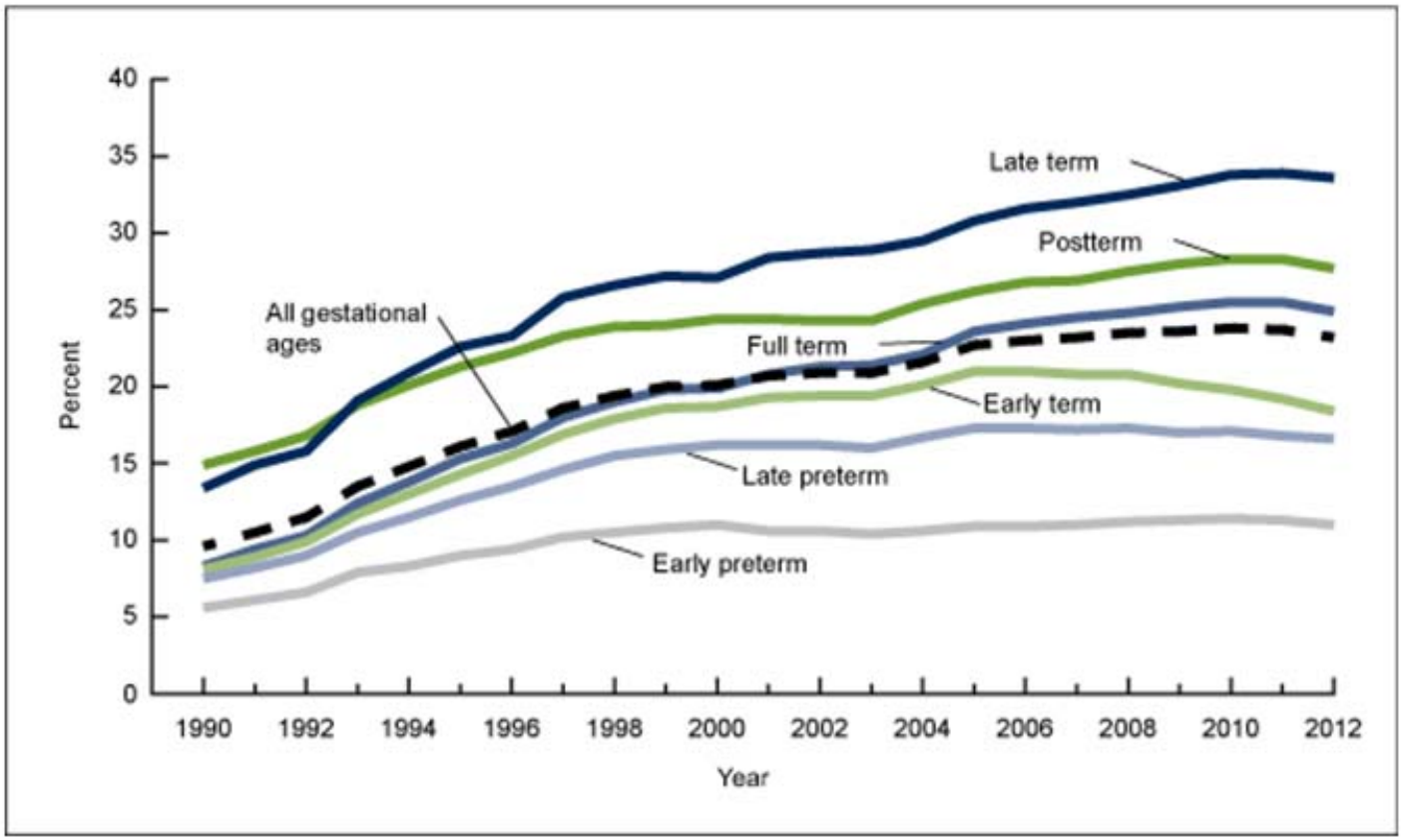
Congratulations!

You have successfully completed this module.

Click on the above 'X' to take the post-test for this course. If you do not attain a passing score after two attempts at the post-test the entire program must be repurchased.

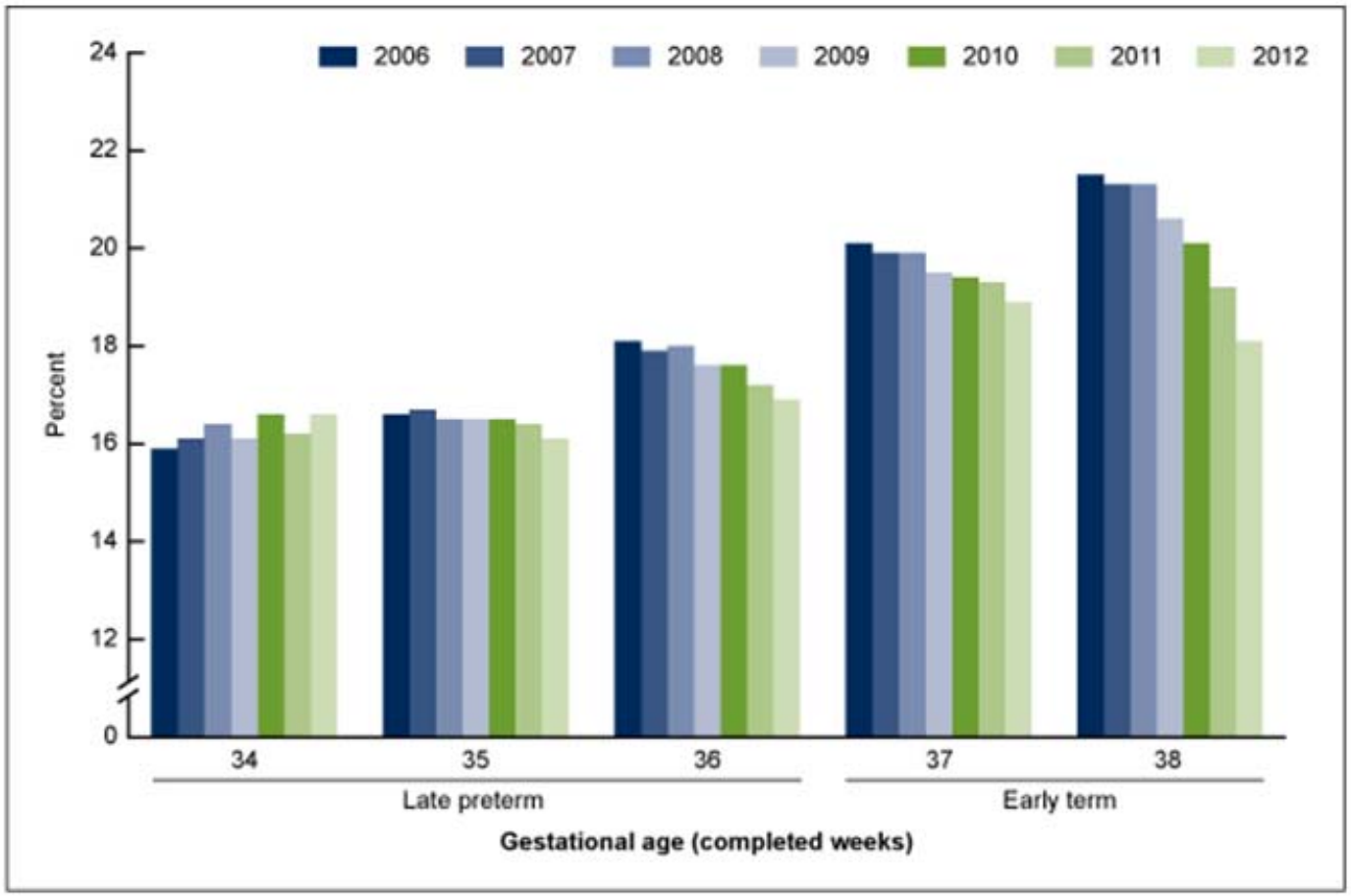
After increasing nearly every year since 1990, the IOL rate for singleton births declined in 2011 and 2012.

Induction of labor, by gestational age: United States, 1990–2012.



NOTES: Singletons only. Early preterm is less than 34 weeks of gestation; late preterm is 34–36 weeks; early term is 37–38 weeks; full term is 39–40 weeks; late term is 41 weeks; post term is 42 weeks or more.
SOURCE: CDC/NCHS, National Vital Statistics System

Figure 2. Induction of labor at each gestational week 34–38: United States, _2006–2012.



NOTES: Singletons only. Thirty-four, 35, and 36 weeks are late preterm; 37 and 38 weeks are early term.
SOURCE: CDC/NCHS, National Vital Statistics System

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