

L01: Maternity (General)

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Reviewed:

Introduction

Pregnancy is the process of human growth and development while in utero. It is often identified a few weeks after conception and lasts on average 37 to 40 weeks, which is considered full-term. The process is divided into 3 trimesters - the first trimester ranges from week one to week 12, the second trimester ranges from week 13 to week 28, and the third trimester ranges from week 29 to week 40+. Patients may present with various complaints at any point along the course of the pregnancy.

Essentials

- Pregnancy is a natural process and should be treated as such by health care providers as long as the patient and the unborn child remain stable and have been identified as low risk.
- Labour and delivery:
 - Labour consists of 3 stages:
 - 1st stage: Dilation of cervix by regular and painful contractions. This stage may last up to 12 hours.
 - 2nd stage: Birth of the infant. This stage may last between 2 and 3 hours, but can also be much shorter in subsequent deliveries.
 - 3rd stage: Delivery of the placenta. This stage may last up to 1 hour.
 - Imminent delivery:
 - [→ L02: Normal Labour](#)
 - Trauma in pregnancy:
 - [→ L10: Pregnancy and Trauma](#)

Additional Treatment Information

- When transporting a pregnant patient, particularly during the third trimester, the mother should be positioned appropriately to avoid compression of the inferior vena cava by the uterus, which can compromise venous return and cardiac output. This can be accomplished through left-lateral positioning, the use of a hip wedge or board, or manual uterine displacement. This positioning is unnecessary during delivery, when the patient can be placed supine.
 - If the patient requires spinal motion restriction, she can be packaged and tilted to 15° degrees as an entire unit.
- Multiple clinical and non-clinical factors must be considered in deciding whether to transport or attempt delivery on scene, including high or low risk delivery, the environment for delivery, transport time to next level of care, road, and weather conditions. If in transport and delivery becomes imminent, stop the ambulance if safe to do so.

Referral Information

- All stable pregnant patients should be referred to their primary care provider and may choose to stay at home.
- Any unstable pregnant patients, or presenting with concerning signs and symptoms, such as vaginal bleeding at any point during the pregnancy, should be transported to the emergency department regardless of the gestational age of the embryo or fetus.
- Collaboration between midwives and paramedics:
 - Registered British Columbia midwives can be the primary care provider during maternity and delivery calls. Their scopes of practice with respect to neonatal resuscitation exceed those of ACP providers.
 - Responsibility for maternal resuscitation remains with paramedics. Midwives do, however, have an expanded scope of practice for medications.
 - Patients under the care of a midwife may refuse transportation to a hospital prior to or following a delivery. This is a discussion to have with all parties present with a goal of patient and family centered decision and

care, while keeping in mind the health of the mother and child.

General Information

- Definitions of note:
 - Term: 37 - 40 weeks gestation
 - Pre-term: 24 - < 37 weeks gestation
 - Show: vaginal discharge of mucus and blood
 - Spontaneous rupture of membranes: gush of normally clear or pinkish fluid. Can occur from prior to onset of labor until baby is born.
 - Meconium-stained amniotic fluid: greenish or brown stained amniotic fluid.
 - Imminent birth presentation: active pushing or grunting, rectal pressure (i.e., urge to use bowels or bladder), anal pouting or bulging perineum, strong unstoppable urge to push, presenting part (baby's head) on view or crowning, or mother's statement "I'm going to have the baby" or "it's coming now."
 - Precipitous birth: unusually rapid labor, less than four hours long, with extremely quick birth. The rapid change in pressure from intrauterine life may cause cerebral irritation.
- Women who are pregnant experience a number of physiological changes. Of relevance to paramedics:
 - Cardiovascular
 - Blood pressure experiences minimal changes, though there is an initial decrease in the first and second trimesters, with a return to baseline in the third. Systolic blood pressures above 170 mmHg, and diastolic pressures greater than 110 mmHg are considered significant.
 - Heart rates elevate by 15 to 20 beats per minute. Normal heart rates in pregnancy are between 80 and 110 beats per minute.
 - Cardiac output increases by 30-40%, to a normal volume of 6-7 L per minute during pregnancy
 - Non-specific ST segment changes are sometimes seen on ECG, along with Q waves in lead III and aVF and atrial and ventricular ectopic beats
 - Systemic vascular resistance often decreases due to blood volume and the effects of progesterone
 - Respiratory
 - Respiratory rate increases by 15% (2-3 breaths/minute)
 - Oxygen demand increases by 15-20%
 - Tidal volume and minute ventilation increase by 25-50%
 - Arterial pH rises to 7.40 - 7.45
 - PaO₂ increases by 10 mmHg
 - PaCO₂ decreases to 27 - 32 mmHg
 - Hematological
 - Blood volume increases by 30 - 50%
 - Hemoglobin falls to 100-140 g/L
 - Hematocrit falls to 32 - 42, producing physiological anemia
 - Plasma volume increases by 30 - 50%
 - Health care providers often use the acronym GTPAL to assess pregnant women:
 - G - Gravida: number of previous pregnancies
 - T - Term: number of infants born between 37 and 40 weeks gestation
 - P - Pre-term: number of infants born before 37 weeks gestation
 - A - Abortions: number of abortions (spontaneous or therapeutic)
 - L - Living: number of living children
 - A focused maternal history, in addition to routine history and examination is essential on every maternity or delivery call, and includes the following information:
 - Current pregnancy:
 - Current gestational age?
 - Multiple births expected?
 - Membranes ruptured or intact? If ruptured, color of amniotic fluid?
 - Is the patient currently having contractions? Assess duration, intensity and frequency.

- Does the patient have an urge to push?
- Has the patient felt fetal movements?
- What hospital interventions, if any, have been performed?
- Are there any anticipated problems or complications?
- Has the patient had any prenatal care?
- Any current complaints? Vaginal bleeding, high BP, pain, trauma, etc.
- Previous pregnancies:
 - Any / number of previous pregnancies?
 - Prior caesarean sections / interventions?
 - Complications / problems with previous pregnancies?
 - Length of previous labours?

Interventions

First Responder

- Place patient in position of comfort, attempting to reduce pressure on the inferior vena cava
- Communicate situation to follow-on responders

Emergency Medical Responder – All FR interventions, plus:

- Detailed assessment of the patient, which includes a detailed history of the current and all previous pregnancies.
- Transport the patient in the left lateral position whenever possible to reduce pressure on the inferior vena cava or position of comfort
- Consider asking for additional resources
- Prepare for delivery and potential neonatal resuscitation

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider analgesia
 - → [E08: Pain Management](#)

Evidence Based Practice

[Perinatal Mother Care](#)

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [[Link](#)]
2. Mandy GT. Incidence and mortality of the preterm infant. In UpToDate. 2020. [[Link](#)]
3. Prager S, et al. Pregnancy loss (miscarriage): Risk factors, etiology, clinical manifestations, and diagnostic evaluation. In UpToDate. 2020. [[Link](#)]

L02: Normal Labour and Delivery

Catherine Malette and Matthew Smith

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Introduction

In the prehospital realm, childbirth is defined as the unplanned delivery of a newborn outside of a hospital, which may or may not require resuscitation. "Imminent delivery" is defined as the moment when the head, buttocks, or legs, of the baby become visible at the vaginal opening between contractions. This is also known as crowning, and signals that delivery will occur within minutes.

Childbirth is a natural process, and only a small number of cases will require aggressive intervention. The successful transition from intrauterine to extrauterine life depends on significant physiological changes that occur at birth, and although most newborns make this transition successfully, a small but significant number will require additional support, including resuscitation; paramedics must, therefore, prepare for the case where acute care and intervention are required. It is critical to remember that maternity cases involve at least two patients, and both require assessment.

Essentials

- Labour consists of 3 stages:
 - 1st stage: Dilation of cervix by regular and painful contractions. This stage may last up to 12 hours.
 - 2nd stage: Birth of the infant. This stage may last between 2 and 3 hours, but can also be much shorter in subsequent deliveries.
 - 3rd stage: Delivery of the placenta. This stage may last up to 1 hour.
- Signs of imminent and inevitable delivery include the following:
 - Delivery imminent when contractions are less than 2 minutes apart and very strong.
 - Delivery is inevitable if the perineum is bulging, the head is crowning or the patient complains of an urge to "push", "bear down", or "have a bowel movement".
- Uncomplicated/normal birth:
 - See Adult Childbirth - Imminent Delivery Algorithm in Additional Treatment section
 - The uncomplicated delivery
 - Term gestation with breathing and crying infant with good tone
 - Infant stays with mother, skin to skin, continued observation and maintain warmth
 - Complicated/high risk birth:
 - → L08: Complications of Delivery (malpresentation, shoulder dystocia, cord prolapse)
 - → L07: Preterm Labour
 - → L09: Postpartum Hemorrhage
- Multiples: Ensure that sufficient resources are assigned to each patient. Note that multiples (twins, triplets, etc) often deliver early. Review [CPG L07: Preterm Labour](#) for additional information.
- Cord clamping: It is now accepted and preferred practice to delay cord clamping at least 30 to 60 seconds, or longer. The practice is appropriate for healthy vigorous infants without birth complications. If resuscitation is required, the cord should be clamped immediately to facilitate the care of the neonate.
- In the event that neonatal resuscitation is required, follow the NRP principles

Additional Treatment Information

- Patient assessment considerations
 - Consider known malpresentation of fetus (e.g., breech, shoulder dystocia).
 - Consider seeking consultation and additional resources as necessary
- Provide supplemental oxygen as required to maintain SpO₂ ≥ 94%
- Consider establishing IV access if further treatment is required

- General principles for managing the delivery of the child:
 - Delivery should be controlled so as to allow a slow controlled delivery of the infant
 - Support the infant’s head as needed
 - Check the umbilical cord around the neck. If it is present, slip it over the head. If unable to free the cord from the neck, double clamp the cord and cut between the clamps.
 - Grasping the head with hands over the ears, gently pull down to allow delivery of the anterior shoulder
 - Gently pull up on the head to allow delivery of the posterior shoulder
 - Slowly deliver the remainder of the infant
 - Clamp the cord 2 inches from the abdomen with 2 clamps and cut the cord between the clamps
 - Calculate and record [APGAR](#) scores at 1 and 5 minutes
- Refer to NRP guidelines for neonatal assessment and resuscitation. See [CPG M09: Neonatal Resuscitation](#) for additional details.
- General principles for care of the mother:
 - The placenta will deliver spontaneously, usually within 5 minutes of the infant. Do not force the placenta to deliver.
 - Massaging the fundus may decrease bleeding by facilitating uterine contractions after delivery of the placenta
 - Consider tranexamic acid in uncontrolled vaginal bleeding
 - Consider manual in utero pressure and packing
 - Consider nitrous oxide for pain control. Narcotics should be reserved as a last resort
 - Midwives may give oxytocin or misoprostol for uncontrolled post-partum bleeding due to uterine atony

Referral Information

- All patients in labour should be transported to the nearest hospital unless delivery is imminent, or the patient’s primary care provider (i.e., midwife) is advising otherwise.
- Patients under the care of a midwife may refuse transportation to a hospital following a delivery. This is a discussion to have with all parties present with a goal of family centered decisions and care.

General Information

- The APGAR score is the tool most commonly used to assess neonates. The APGAR should be performed at 1 and 5 minutes of life.

Strength and regularity of heart rate	
	100 beats/minute or more (2 points)
	Less than 100 (1 point)
	None (0 points)
Lung maturity	
	Regular breathing (2 points)
	Irregular (1 point)

	None (0 points)
Muscle tone and movement	
	Active (2 points)
	Moderate (1 point)
	Limp (0 points)
Skin colour/oxygenation	
	Pink (2 points)
	Bluish extremities (1 point)
	Totally blue (0 points)
Reflex response to irritable stimuli	
	Crying (2 points)
	Whimpering (1 point)
	Silence (0 points)

Interventions

Emergency Medical Responder – All FR interventions, plus:

- If the decision is made to deliver in the field:
 - Assemble equipment, including a resuscitation area
 - Warm the environment, including towels and blankets if able. This should result in the room or space being uncomfortably warm.
 - Position the mother:
 - Supine
 - Sims (lateral with knees to chest)
 - Alternate: will vary based on situation
 - Delivery of the infant (second stage):
 - Allow the mother to push the head out of the vaginal opening - note that paramedics are not trained to do internal vaginal exams to determine if the patient is fully dilated and effaced.
 - Control the delivery of the head by applying gentle pressure with the palm of your hand onto the fetal head and perineum. Feel for nuchal cord.
 - If present, gently lift it over the infant's head. DO NOT pull hard on the cord as avulsion can occur, gentle traction is acceptable. Clamping and cutting the cord may be necessary if it cannot be reduced. Delivery must be completed quickly if the cord is cut.
 - Support the baby's head and guide the delivery of the shoulders. Gentle downward pressure towards

the floor will assist the delivery of the anterior shoulder. After the anterior shoulder is delivered, direct the head upwards to help deliver the posterior shoulder.

- If shoulder dystocia is suspected, see [→L08: Complications of Delivery](#)

Post-delivery care of the infant:

- Once the infant is delivered: clear mouth then nose of secretions if grossly contaminated, dry, stimulate and reposition while ensuring warmth is maintained. Place the infant on the mother's chest (+/- polyethylene bag).
- Routine suctioning of the mouth and nose is no longer recommended.
 - If necessary, a 6 Fr catheter can be used. Suction should be turned down to less than 100 mmHg.
- The use of food grade polyethylene plastic bags to place the newborn in has become an effective method to prevent hypothermia in both term and preterm neonates. Cover the newborn up to the shoulders and do not secure the bag in any way around the neck. Place a hat on the newborn's head and transport in a warm ambulance with the ambient temperature at 22 to 26 degrees Celsius.
- Cord clamping:
 - Should be delayed at least 30 to 60 seconds in term and preterm vigorous infants. Place the clamps approximately 4 cm apart from each other and cut in between.
 - Assess the infant:
 - APGAR at 1 and 5 minutes of life (see APGAR in General Information section)
 - Normal vital signs for a newborn:
 - Temperature target is between 36.1°C and 37°C axillary
 - Heart rate - 120-160 beats per minute (can be felt at the base of the umbilical cord or by auscultation)
 - Respiratory rate - 35-60 breaths per minute (should be counted over a full minute)
 - SpO₂: Target pre-ductal (right hand) SpO₂ after birth:
 - 1 minute: 60-65%
 - 2 minutes: 65-70%
 - 3 minutes: 70-75%
 - 4 minutes: 75-80%
 - 5 minutes: 80-85%
 - 10 minutes: 85-95%
 - Blood pressure can be measured using a neonatal-size blood pressure cuff in infants with suspected cardiovascular or renal abnormalities, but is rarely performed on low risk infants.
 - Blood glucose level - in healthy term newborns, routine blood glucose screening is not indicated
 - Delivery of the placenta (third stage):
 - The placenta should naturally deliver on its own within 30 minutes. Manipulation is often not required. Once delivered, the placenta and cord should be transported along with mother and infant.
 - Up to 500 mL of blood loss from mother is normal with childbirth. Anything in excess of that amount, refer to [L09 Postpartum hemorrhage](#)

Primary Care Paramedic – All FR and EMR interventions, plus:

- Infants at risk of hypoglycemia (<2.6 mmol/L) should have a sample obtained within 4-6 hours, and patients with diabetic mothers <1 hour.
 - Enteral feeding is first line treatment if the baby is able to latch

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

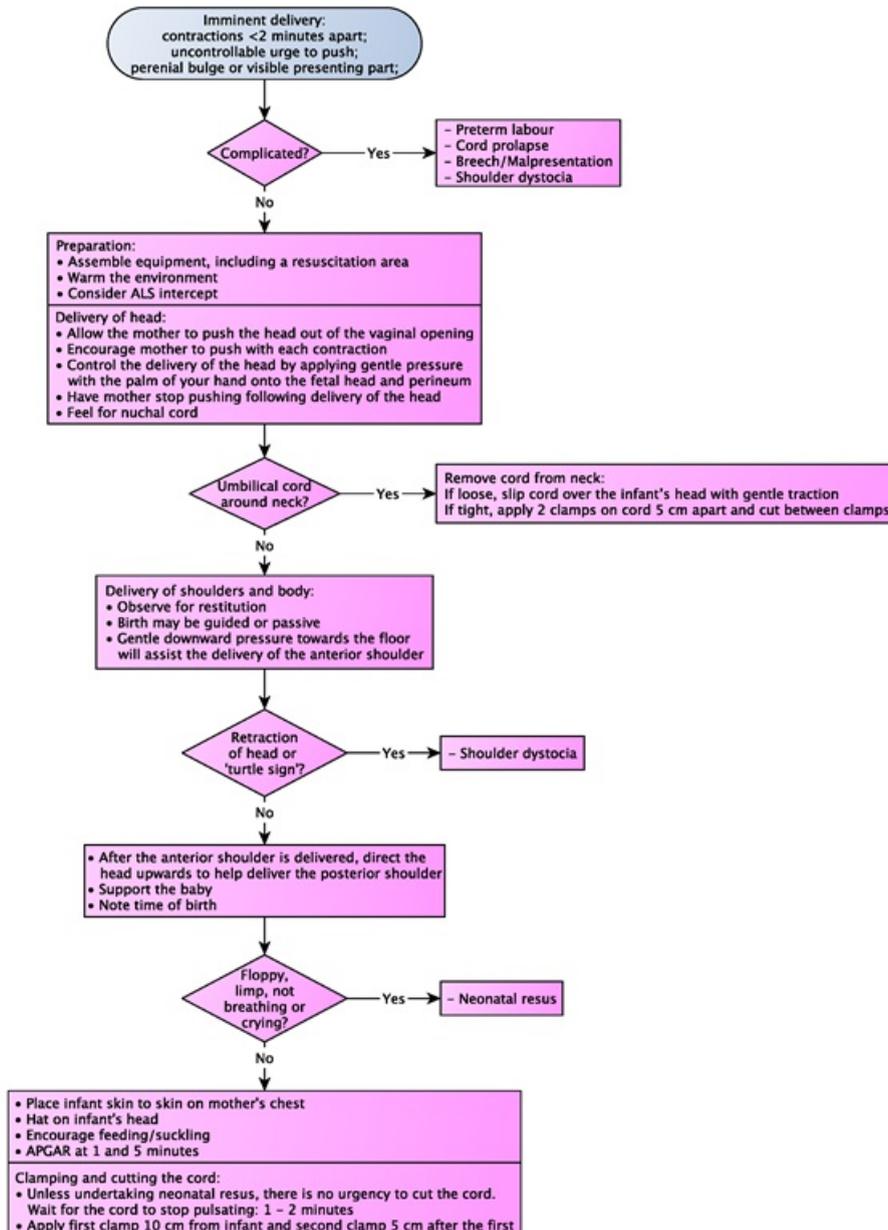
- Consider IV/IO access, when appropriate
 - [→ D03: Vascular Access](#)
- Consider pain management
 - [→ E08: Pain Management](#)
- Consider tranexamic acid for postpartum hemorrhage
 - [→ L09: Postpartum Hemorrhage](#)

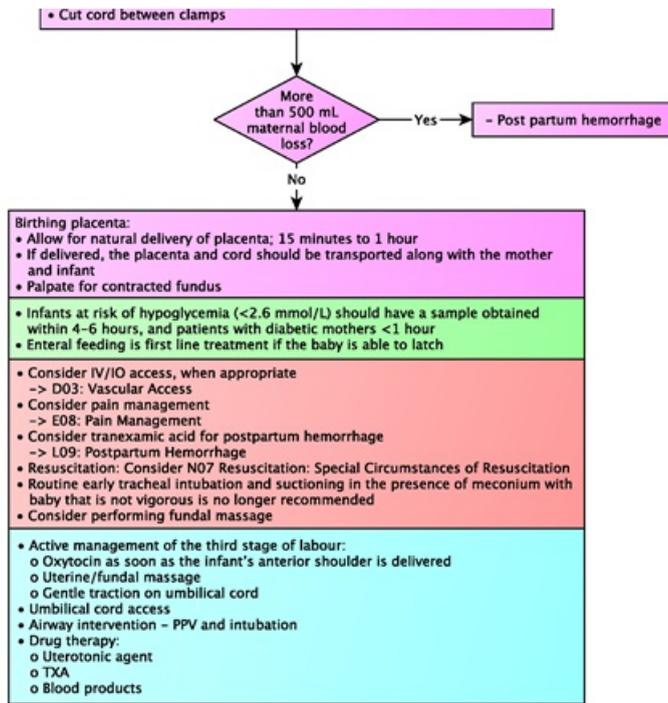
- Routine early tracheal intubation and suctioning in the presence of meconium with baby that is not vigorous is no longer recommended
- Consider performing fundal massage

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Active management of the third stage of labour:
 - Oxytocin as soon as the infant’s anterior shoulder is delivered
 - Uterine/fundal massage
 - Gentle traction on umbilical cord
- Umbilical cord access
- Airway intervention
- Drug therapy:
 - Uterotonic agent
 - TXA
 - Blood products

Algorithm





Evidence Based Practice

[Childbirth](#)

[Childbirth/Post Natal Mother Care](#)

[Newborn Care](#)

References

1. Fernandes CJ. Neonatal resuscitation in the delivery room. In UpToDate. 2020. [\[Link\]](#)
2. McKee-Garrett TM. Overview of the routine management of the healthy newborn infant. In UpToDate. 2020. [\[Link\]](#)

L03: Eclampsia

Alex Kuzmin

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Introduction

Eclampsia is defined as a new onset seizure or coma in a woman with preeclampsia. It is a common cause of maternal and fetal morbidity and mortality. Eclamptic seizures are the result of hypertension in preeclampsia, although the precise mechanism is not well understood.

Essentials

- Risk factors for eclampsia are related to those for preeclampsia. The most common signs and symptoms are hypertension, headache, visual disturbances, and right upper quadrant or epigastric pain, although 25% of women who are affected are asymptomatic.
- Seizures due to eclampsia are commonly associated with an abrupt loss of consciousness. The seizure generally lasts for a few minutes, followed by a gradual return of consciousness over the next 10-20 minutes. Fetal bradycardia is common after a maternal seizure.
- In patients under 20 weeks gestational age, eclampsia and preeclampsia are rare, and other causes of seizures should be investigated. Consider anatomic abnormalities of cerebral origin in women with persistent neurological deficits, and rule out toxins, infection, and electrolyte disturbances.
- Magnesium sulfate is given to prevent a recurrence of seizures, rather than to control the initial episode.
- Delivery is the definitive treatment for eclampsia.

Additional Treatment Information

- Initial assessment should focus on airway protection with adequate oxygenation and ventilation. Roll the patient into a left lateral decubitus position and provide high flow supplemental oxygen.
- Transport urgently to the nearest hospital. Consider bypass to a hospital with C-section capabilities.

General Information

While the pathophysiology of seizures in eclampsia is not well understood, it is believed to result from vasogenic or cytotoxic edema and endothelial dysfunction secondary to abnormal cerebral autoregulation. This results in cerebral hyper- or hypoperfusion stemming from the hypertension.

Interventions

First Responder

- Maintain adequate oxygenation
 - → [A07: Oxygen and Medication Administration](#)
 - → [B01: Airway Management](#)

Emergency Medical Responder – All FR interventions, plus:

- Transport patient in left lateral position to minimize compression of the inferior vena cava
- Obtain capillary blood glucose measurement
- Transport urgently to nearest hospital. Consider transport to facility with OB/GYN services if not significantly further.
- Consider ACP intercept

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Obtain vascular access.
 - → [D03: Vascular Access](#)
- **CLINICAL CONSULTATION (1-833-829-4099) IS HIGHLY RECOMMENDED**
- [Magnesium sulfate](#) is the first line treatment for eclampsia. Administer the initial dose of 4 to 6 g intravenously over 20 minutes as a loading dose, followed by 1 to 2 g per hour. Otherwise, 5 g can be given intramuscularly (use bilateral buttocks) followed by 5 g IM every four hours.
 - Cardiac monitoring is required with magnesium administration
 - If seizures persist following the loading dose of magnesium, up to 4 g IV can be given over five minutes. If the patient is still seizing after 20 minutes, consider [MIDAZOLam](#) and other possible causes of seizures.
 - Myasthenia gravis is a contraindication for magnesium sulfate as it can lead to a severe myasthenic crisis
 - During long transports, check respiratory rate, patellar reflexes, and where possible, urine output. Discontinue magnesium if patellar reflex is absent, or if respiratory rate is below 12/minute, or muscle weakness, slurred speech, arrhythmia, or CNS depression develops.
 - Consider [calcium chloride](#) for magnesium overdose if hemodynamic or respiratory instability develops
 - MIDAZOLam crosses the placental barrier, and may cause adverse effects to the fetus. However, prolonged seizures are life threatening to both the mother and the baby, and so MIDAZOLam should remain an option for seizure control in these cases.

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- If seizures persist following magnesium administration:
 - Consider phenytoin IV, 1250 mg IV at a rate of 50 mg/min
- Consider antihypertensive to bring diastolic pressure below 110 mmHg and systolic pressure below 160 mmHg:
 - Labetalol: 20 mg IV over 2 minutes followed by infusion at 1-2 mg/min.
 - Maximum dose of 300 mg. Monitor for hypotension and bradycardia; if bradycardia develops but blood pressure remains high, change to hydralazine.
 - Hydralazine: 5 mg IV over 1-2 minutes followed by 5-10 mg IV every 20 minutes until target blood pressure is reached.
 - Maximum dose of 20 mg

Evidence Based Practice

[Pre Eclampsia/Eclampsia](#)

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [[Link](#)]
2. Demir BC, et al. Comparison of magnesium sulfate and mannitol in treatment of eclamptic women with posterior reversible encephalopathy syndrome. 2012. [[Link](#)]
3. Marra A, et al. Posterior reversible encephalopathy syndrome: The endothelial hypotheses. 2014. [[Link](#)]
4. Norwitz ER. Eclampsia. In UpToDate. 2020. [[Link](#)]

L04: Preeclampsia

Alex Kuzmin

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Introduction

Preeclampsia is a multisystem disorder of pregnancy over 20 weeks of gestation that presents with a new onset of hypertension and proteinuria. Hypertension in women less than 20 weeks gestation is considered pre-existing. Preeclampsia is diagnosed when the systolic blood pressure is greater than 140 mmHg (or the diastolic blood pressure greater than 90 mmHg) on at least two occasions, at least four hours apart, with proteinuria. A systolic blood pressure above 160 mmHg, or a diastolic above 110 mmHg, is considered a severe finding.

There are multiple risk factors for preeclampsia, including prior family or personal history, age (over 40 or below 18), chronic hypertension, obesity, diabetes, multifetal gestation, and renal, autoimmune, or vascular disease.

Essentials

- Hypertension in preeclampsia is caused by placental and maternal vascular dysfunction
- Preeclampsia is associated with increased fetal and maternal morbidity and mortality
- Delivery is the definitive treatment

Additional Treatment Information

- Preeclampsia is an evolving disease with no effective medical treatment other than delivery of the infant and placenta. Magnesium may provide prophylaxis against seizures. Women with severe features of preeclampsia are usually delivered promptly to prevent maternal and fetal complications.
- The administration of fluid must be done conservatively due to the risk of pulmonary edema.

Referral Information

Patients who are pregnant and hypertensive should be preferentially transported to an emergency department associated with a labor and delivery unit. The closest emergency department may, however, be preferred if the patient requires initial resuscitation. Destination decisions should be made with the overall clinical picture in mind, and in consultation with ClinCall where any doubt exists.

General Information

- Preeclampsia is the result of microangiopathy of brain, liver, kidney and placenta, which can lead to pulmonary edema, liver or kidney failure, and cerebral hemorrhage. Early signs and symptoms can include headache, epigastric pain, thrombocytopenia, abnormal liver function, and visual disturbances.
- Though the exact initial cause of preeclampsia is unclear, it is provoked by a placental vascular abnormality, which results in relatively placental hypoperfusion. The placental hypoxia results in an alteration of maternal systemic endothelial function; the end result is hypertension and its downstream effects.
- HELLP syndrome is a form of preeclampsia where patients experience hemolysis, elevated liver enzymes, and low platelets.
- Paramedics should consider bypassing the closest hospital in favour of a facility with advanced obstetrical facilities. Consultation with ClinCall is strongly recommended.

Interventions

First Responder

- Maintain adequate oxygenation.
 - → [A07: Oxygen and Drug Administration](#)

- → [B01: Airway Management](#)

Emergency Medical Responder – All FR interventions, plus:

- Transport patient in left lateral position to minimize compression of the inferior vena cava.
- Treat as eclampsia if any seizures are present.
 - → [L03: Eclampsia](#)

Transport to emergency department with OB/GYN capabilities if transport time does not differ significantly, and the patient does not require immediate intervention or resuscitation. Consult CliniCall if uncertain.

Primary Care Paramedic – All FR and EMR interventions, plus:

- If patient requires IV fluids, CliniCall consultation is encouraged (1-833-829-4099) due to risk of pulmonary edema and potential delay in transport.
 - → [D03: Vascular Access](#)

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider [magnesium sulfate](#) for seizure prophylaxis in consultation with CliniCall
 - See [L03: Eclampsia](#) for further dosing guidance

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider betamethasone for lung maturation

Evidence Based Practice

[Pre Eclampsia/Eclampsia](#)

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [[Link](#)]
2. Lain KY, et al. Contemporary concepts of the pathogenesis and management of preeclampsia. 2002. [[Link](#)]
3. Norwitz ER. Eclampsia. In UpToDate. 2020. [[Link](#)]

L05: Maternal Vaginal Bleeding (< 20 Weeks)

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Introduction

Vaginal bleeding is common in the first trimester (0 to 13+6 weeks), occurring in 20 to 40 percent of pregnant women. It may be any combination of light or heavy, intermittent or constant, painless or painful. The five major sources of non-traumatic bleeding in early pregnancy are: ectopic pregnancy, early pregnancy loss, implantation of the pregnancy, threatened abortion and cervical, vaginal, or uterine pathologies (such as, polyps, inflammation/infection, gestational trophoblastic disease).

An ectopic pregnancy is an extrauterine pregnancy most commonly presenting with at least one missed menstrual cycle, vaginal bleeding, nausea, abdominal pain and/or pre-syncope symptoms.

A ruptured ectopic pregnancy occurs at 6 to 10 weeks gestation and presents with severe or persistent abdominal pain associated with syncope, hypotension, shoulder tip pain (Kehr's sign), rebound tenderness or guarding.

Miscarriage, also called a spontaneous abortion or early pregnancy loss, is defined as a non-viable intrauterine pregnancy up to 20 weeks gestation. The majority of miscarriages occur in the first trimester. Spontaneous abortions are common but distressing complication of pregnancy. Common signs and symptoms associated with the condition are abdominal pain or cramping and vaginal bleeding.

Essentials

- All patients with suspected ectopic pregnancy must be transported to hospital regardless of the severity of their presentation or response to management.
- Women experiencing potential spontaneous abortions may present with the following signs:
 - Abdominal or pelvic pain/cramping. Pain may radiate to lower back, buttocks or genitals.
 - Vaginal bleeding may be present and can range from spotting to life threatening hemorrhage. Depending on gestation and the nature of the miscarriage, the patient may pass the product of conception.
- Rapid transport of unstable patients to surgically capable ED is essential.
- Any woman of childbearing age with any of the following symptoms should be considered a ruptured ectopic pregnancy until proven otherwise
 - abdominal pain
 - vaginal bleeding
 - shock or syncope
- Unstable patients should be managed in accordance with CPG [D01: Shock](#).

Additional Treatment Information

- While there are no tranexamic acid treatment trials in ectopic pregnancies specifically, use of tranexamic acid in this setting is supportable by extrapolation from CRASH2 and WOMAN trials
- Consider analgesia and antiemetics
- Consider using abdominal pads to estimate blood loss en-route to ED
- There is no diagnostic procedure or specific management of miscarriage in the pre-hospital environment. Management should focus on emotional support of the mother and treatment of symptoms such as pain and nausea. Paramedics should always keep a high index of suspicion for life threatening complications, such as major hemorrhage or ectopic pregnancy.

Referral Information

All patients with suspected ectopic pregnancy or spontaneous abortion must be transported to the closest most appropriate facility regardless of the severity of their presentation or response to management.

General Information

- Ectopic pregnancies occur in 1-2% of all pregnancies, and are caused by the developing embryo implanting outside the uterus. The vast majority (over 98%) of ectopic pregnancies are located within the fallopian tubes. Worldwide, the incidence of ectopic pregnancy is rising; this has been attributed to a variety of risk factors, including:
 - In vitro fertilization and fertility treatments
 - Sexually transmitted illnesses (e.g., chlamydia and gonorrhoea)
 - Pelvic inflammatory disease
 - Use of intrauterine devices
 - Advanced maternal age
 - Tubal damage from previous surgeries
 - Endometriosis
- Bleeding in pregnancy should be evaluated based on gestational age of the fetus, and the characteristics of the bleeding (light vs. heavy, painful vs. painless, intermittent vs. constant).
- Patients may pass products of conception which can range in nature from blood clots to a recognizable fetus. In the event of preterm labour in the second trimester, delivery may proceed spontaneously. The fetus may initially make small movements or gasp. While an infant delivered at greater than 20 weeks gestation must be registered as a birth from a legal perspective, there is no prospect for successful resuscitation prior to 23 weeks gestation. It is reasonable for paramedic to withhold resuscitation and this decision should be explained to the parents in a sensitive way.
- Regardless of appearance or gestation, the fetus may be important to the mother. Do not dispose of them. Treat them with respect in accordance with the mother's wishes. If necessary, clamp and cut the umbilical cord. Paramedics should wrap the fetus and transport with the mother. Products of conception are generally sent to pathology for further examination. The mother or other family may wish to hold the infant, especially if it has shown signs of life and a resuscitation attempt is withheld. They should be encouraged appropriately as parents often feel comforted by the fact that the infant was held during the dying process.
- Many women experience a strong sense of loss, sadness, anger, disbelief, disappointment, sense of isolation and often guilt. It is normal to experience a range of feelings. Paramedics should acknowledge the impact of the miscarriage with compassion and understanding. Minimizing the loss of the pregnancy can significantly worsen the patient's experience.

Interventions

First Responder

- Provide supplemental oxygen as required
 - → [A07: Oxygen and Medication Administration](#)

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen as required to maintain SpO₂ > 94%
 - → [A07: Oxygen and Medication Administration](#)
- Keep patient warm and prevent further heat loss
- Transport with early hospital notification
- Consider analgesia as required:
 - → [E08: Pain Management](#)
 - [Nitrous oxide](#)

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access and correct hypoperfusion or hypovolemia if SBP < 90 mmHg
 - → [D03: Vascular Access](#)
 - Consider 2 large bore IVs, initiated while en route

- Provide warm IV fluids if possible
- Consider antifibrinolytic therapy (requires CliniCall consultation (1-833-829-4099))
 - [Tranexamic acid](#)

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Advanced diagnostics if in remote ER setting: (e.g:β-hCG, ultrasound, CBC, lactate)
- Blood products
- Reverse anticoagulants
- Consider OR/Surgery by local GP to temporize if OB/GYN not available.

Evidence Based Practice

[Abdominal Pain](#)

[Hemorrhagic Shock](#)

[Nausea & Vomiting](#)

[PV Bleed/Threatened Abortion](#)

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [\[Link\]](#)
2. Roberts I, et al. The CRASH-2 trial: A randomised controlled trial and economic evaluation of the effects of tranexamic acid on death, vascular occlusive events and transfusion requirement in bleeding trauma patients. 2013. [\[Link\]](#)
3. Stovall TG et al. Emergency department diagnosis of ectopic pregnancy. 1990. [\[Link\]](#)
4. WOMAN Trial Collaborators. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): An international, randomised, double-blind, placebo-controlled trial. 2017. [\[Link\]](#)

L06: Maternal Vaginal Bleeding (> 20 Weeks)

Catherine Malette and Matthew Smith

Updated: December 07, 2020

Reviewed:

Introduction

Vaginal bleeding in a pregnant woman after 20 weeks gestation is also known as antepartum hemorrhage, and specifically refers to bleeding that is unrelated to labor and delivery. In the majority of cases, abruptio placentae (30%) and placenta previa (20%) are the underlying causes, with uterine rupture and vasa previa being comparatively more rare. Antepartum hemorrhage is associated with complications in pregnancy, including preterm labor and birth. Adverse outcomes are more likely with heavy bleeding, or bleeding from non-previa sources.

In assessing women with a suspected antepartum hemorrhage, paramedics must establish whether the patient is hemodynamically unstable and begin appropriate treatment while providing safe and expeditious transport.

Essentials

- Bleeding during pregnancy is worrisome and always warrants further investigation. Patients showing signs of shock should be treated accordingly.
- The 4 major causes of vaginal bleeding after 20 weeks of gestation are placenta previa, abruptio placentae, uterine rupture and vasa previa. All represent a medical emergency for both the mother and the fetus.
- A detailed assessment of the patient and a history of current and past pregnancy must be obtained.

Additional Treatment Information

- Refer to CPG D01 and D02 for additional details on managing shock and bleeding
 - → [D01: Shock](#)
 - → [D02: Bleeding](#)
- The management of pregnant women with vaginal bleeding in the second and third trimesters depends on numerous factors, including the gestational age, the cause of bleeding, the severity of bleeding, and fetal status.

Referral Information

- Every patient presenting with bleeding in the 2nd and 3rd trimester should be assessed and transported to the closest most appropriate facility
- If the patient is presenting with signs of shock, notifying the hospital ahead of time is likely to improve patient outcome

General Information

- A placental abruption (abruptio placentae) occurs when the placenta separates from the uterine wall prior to the delivery of the infant. Risk factors for placental abruptions include trauma, smoking, cocaine use, hypertension, preterm (and pre-labor) rupture of membranes, and a history of prior abruptions.
- Placenta previa is a condition where the placenta implants and grows over the cervical opening. Bleeding occurs when fetal growth, or contractions, disrupts the area over the cervix. Placenta previa should be suspected in any woman with vaginal bleeding in the second half of pregnancy.
- Uterine ruptures are rare causes of vaginal bleeding. It should be considered in the case of any woman with bleeding, and a history of either previous caesarian delivery or other transmyometrial surgery. Rupture usually occurs during labor, or as a result of abdominal trauma, though occasionally it happens without any obvious cause. Abdominal pain, fetal heart rate abnormalities, and hemodynamic instability are common, and are signs of an obstetric emergency.
- Vasa previa occurs when fetal blood vessels are present in the membranes covering the internal cervical os. These membranous vessels may be associated with either the umbilical cord, or may connect lobes of a bi-lobed placenta. Rupture of the vasa previa is an obstetric emergency, and can lead to fetal death from exsanguination.

Interventions

Emergency Medical Responder – All FR interventions, plus:

- Patient assessment - note amount of bleeding
- Rapid transport in left lateral decubitus position

Primary Care Paramedic – All FR and EMR interventions, plus:

- Perform gentle abdominal examination
- Consider IV and fluids, when appropriate
 - → [D03: Vascular Access](#)
- **CONSIDER ANTIFIBRINOLYTIC THERAPY (REQUIRES CLINICAL CONSULTATION (1-833-829-4099))**
 - [Tranexamic acid](#)

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Fetal assessment if a doppler is available, alternatively, a POC US can be used
- No pelvic examination
- Treat for hemorrhagic shock
 - Consider blood products
 - Consider hemodynamic support

Evidence Based Practice

[PV Bleed/Threatened Abortion](#)

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [\[Link\]](#)
2. Norwitz, ER. Overview of the etiology and evaluation of vaginal bleeding in pregnant women. In UpToDate. 2020. [\[Link\]](#)
3. Ornge Base Hospital. Adult Medical Directives. 2016. [\[Link\]](#)

L07: Preterm Labour

Catherine Malette and Matthew Smith

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Reviewed:

Introduction

A preterm birth occurs when an infant is delivered between 20 and 37 weeks of gestation. It may, or may not, be preceded by preterm labor. Up to 80 percent of preterm births are spontaneous, resulting from preterm labor, or premature rupture of membranes; rarely, cervical insufficiency can be responsible for a preterm birth. Other causes involve maternal or fetal issues that jeopardize the health of either (or both), such as pre-eclampsia, placenta previa, abruption placentae, and fetal growth restrictions. The four main factors that lead to preterm labor are intrauterine infection, decidual hemorrhage, excessive uterine stretch, and maternal or fetal stress.

Essentials

- The clinical findings that define true labor are the same regardless of whether the labor occurs at term or not. Signs and symptoms may be present for several hours:
 - Menstrual-like cramping
 - Mild, irregular contractions
 - Low back ache
 - Pressure sensation in the vagina or pelvis
 - Vaginal discharge of mucus, which may be clear, pink, or slightly bloody (ie, mucus plug, bloody show)
 - Spotting, light bleeding
- Preterm premature rupture of membranes (PPROM) presents a significant risk for preterm labour, but does not necessarily signify that delivery is imminent, though most pregnancies with PROM deliver within one week of rupture. Another common complication associated with PPRM is chorioamnionitis, an infection of the membrane and amniotic fluid. This poses a serious threat to both mother and infant.
- Care for preterm infants is challenging at best in the prehospital field. An emphasis must be placed on maintaining warmth while attempting to properly assess the infant. Low APGAR scores are often expected for preterm infants.
- For interfacility transfers: Patients with pain or possible labour should have documentation of duration and severity of contractions, frequency of contractions, progress, cervical dilatation, and fetal fibronectin testing results if available. In general, transport should not be initiated with patients with cervical dilation greater than 4-6 cm; however, the decision to transport is based on labour progression, parity, obstetrical and labour history, gestational age and transport time.

Referral Information

- Any pregnant women presenting with signs of preterm labour should be transported to the closest most appropriate facility. Receiving centre should have NICU capabilities.
- Patients who are more than 34 weeks pregnant and in true labour will likely be admitted for delivery. Patients who are less than 34 weeks pregnant will likely receive care attempting to delay delivery.

General Information

There is a high probability of malpresentation with preterm labour. Consider reviewing CPG [L08: Delivery Complications](#) (breech, limb presentation, cord prolapse and shoulder dystocia).

Interventions

Emergency Medical Responder – All FR interventions, plus:

- Assess the patient - including vital signs and details pregnancy assessment

- Determine if birth is imminent
 - If birth is imminent, seek additional assistance urgently
 - Prepare for delivery and resuscitation

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access when appropriate
 - → [D03: Vascular Access](#)

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider tocolytics
 - For patients in preterm labour, the goal is to avoid delivery during transport. Tocolytics should be strongly considered in order to minimize risk of delivery outside the hospital environment. Indomethacin or niFEDIPine can be considered for the tocolytic.
- Sending facilities may have initiated some or all of the following:
 - Steroids if < 34 +6/7 weeks for lung maturation
 - Magnesium if < 33 +6/7 weeks for neuroprotection
 - Antibiotics for Group B Strep + patients

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [[Link](#)]
2. Lockwood CJ. Preterm labor: Clinical findings, diagnostic evaluation, and initial treatment. In UpToDate. 2020. [[Link](#)]
3. Robinson JN. Preterm birth: Risk factors, interventions for risk reduction, and maternal prognosis. In UpToDate. 2020. [[Link](#)]

L08: Complications of Delivery

Catherine Malette and Matthew Smith

Updated: December 07, 2020

Reviewed:

Introduction

Delivery complications include the following topics: breech delivery, limb presentation, cord prolapse and shoulder dystocia.

Essentials

- Breech presentation: The fetus whose presenting part is the buttocks and/or feet.
 - Most fetuses with persistent breech presentation are delivered by cesarean delivery, which is associated with a clinically significant decrease in perinatal/neonatal mortality and neonatal morbidity compared with vaginal delivery.
 - Breech can be frank, complete, or footling - treatment is the same.
- Single limb presentation: This is a critical presentation which is immediately life threatening to both mother and neonate. Rapid transport is indicated.
- Cord prolapse: The cord is the primary presenting part. This is immediately life threatening to the fetus and requires rapid recognition and transport.
- Shoulder dystocia: The shoulder of the fetus is impacted against the anterior symphysis pubis of the mother.

Additional Treatment Information

Breech presentation

- If breech, hands off neonate until body has been born to umbilicus. Allow head to deliver spontaneously, gently lift and hold the neonate upwards and backwards while avoiding hyperextension.
- If head does not deliver within 3 minutes of the body, it is an immediate life-threatening emergency.
- Paramedics should initiate rapid transport and attempt the [Mauriceau-Smellie-Veit manoeuvre](#) (M-S-V) repeatedly until neonate delivers or an obstetrical facility is reached.
- Cord prolapse and meconium contamination are more common in breech presentations

Limb presentation

- Do not attempt to deliver, do not delay on scene. Cover the limb using a dry sheet to maintain warmth and initiate rapid transport to a facility capable of performing a C-section. Supportive care to mother.
- Position mother kneeling if possible. Do not touch presenting part.

Shoulder dystocia

- This is an immediate life-threatening situation that occurs when the shoulder of the fetus is impacted against the anterior symphysis pubis of the mother. There are 5-10 minutes to deliver the fetus before mortality greatly increases.
- Declare the emergency explain the situation to gain maximum cooperation from the mother and all staff.
- The newborn is likely to be compromised and in need of resuscitation. Follow [CPG M09: Neonatal Resuscitation](#).
- Shoulder dystocia can be predicted by larger fetal size and a previous history of shoulder dystocia.
- Shoulder dystocia can be diagnosed after delivery of neonatal head by delayed delivery, a failure to progress, or "turtling" where the mother pushes and the neonate advances, then retracts when pushing stops.
- It is suggested to remain on scene for a maximum of 10 minutes or 2 rotations of the HELPER procedure, and then initiate rapid transport.
 - Help: immediately declare emergency and call for help
 - Legs up: position the mother's hips in a hyperflexed (McRobert's) position

- Pressure: apply supra pubic pressure in time with contractions
- Empty bladder: either with an in and out catheter, or encourage urination
- Enter vagina with finger and
- Remove posterior arm
- Roll onto all 4s, and attempt to push

Cord prolapse

- This is a time sensitive critical emergency - early diagnosis, immediate intervention and transport to the appropriate facility are effective in reducing the perinatal mortality rate. Cord prolapse can be predicted by a history of a fetus that is small for gestational age or an unstable lie, or preterm.
- In an umbilical cord prolapse, minimize manipulation of the overtly exposed cord, and protect it from the cold environment with warm saline or water soaked gauze, as this can exacerbate vasospasm-induced perfusion compromise. In the case of cord compression, manual elevation of the fetal head may be required.
- Knees to chest, face down positioning is preferred. Left-lateral position with hip padding is advised. Notify receiving hospital early.

WARNING: THIS POSITION IS UNSAFE DURING TRANSPORT.

- If a cord prolapse is present, the fetal part should be elevated to relieve pressure on the cord. Assist the patient into a knee chest position and insert a sterile gloved hand into the vagina to apply manual digital pressure to the presenting part of the fetus which is maintained until transfer of care in hospital.

Nuchal cord

- If nuchal cord is present and loose, slip cord over the neonate's head. If nuchal cord is tight and cannot be slipped over the neonate's head and neonatal distress is present, clamp and cut the cord and encourage rapid delivery.
- Following delivery of the neonate, the cord should be clamped and cut immediately if neonatal or maternal resuscitation is required. Otherwise, delayed cord clamping (after 2 minutes) is preferred. Clamp the cord in 2 places and cut. Place the neonate on the maternal chest and encourage breastfeeding. Manage postpartum bleeding as required. If placenta has not delivered in 20 minutes, initiate rapid transport.

Referral Information

- All cases of delivery complications must be transported to the closest most appropriate facility, unless birth is imminent. Certain complications are a surgical emergency and require rapid transport with notification, as specialty services may be required.
- Smaller facilities, although ill equipped to handle complex deliveries, can often safely perform c-sections, which can be lifesaving for both the mother and infant
- Immediate transport of limb presentation and cord prolapse patients is indicated
- It is suggested to attempt to deliver breech and shoulder dystocia patients in the field initially, then initiate rapid transit as the timeline to neonatal mortality is less than 10 minutes, and rapid transport without attempting delivery leads to increased neonatal mortality.

Interventions

Emergency Medical Responder – All FR interventions, plus:

- Transport as soon as possible to closest facility
- Consider ACP intercept, or seek additional resources if needed
- See Additional Treatment Information above for managing specific complications

Primary Care Paramedic – All FR and EMR interventions, plus:

- Establish vascular access and consider fluid bolus to correct hypoperfusion or hypotension if clinically indicated
 - → [D03: Vascular Access](#)

Evidence Based Practice

[Childbirth/Post Natal Mother Care](#)

L09: Postpartum Hemorrhage

Alex Kuzmin

Updated: December 07, 2020

Reviewed:

Introduction

Postpartum hemorrhage is defined as a cumulative blood loss greater than 500 mL, or bleeding associated with signs and symptoms of hypovolemia in the first 24 hours following birth. It is an obstetric emergency, and one of the top five causes of maternal mortality; the loss of blood can be significant, as the uterine artery blood flow at term can be as high as 750 mL/minute and can account for up to 15% of cardiac output.

Causes of postpartum hemorrhage include the "Four Ts":

- Tone (uterine atony, the most common cause)
- Trauma (to genital structures)
- Tissue (retention of placenta or membranes)
- Thrombin (coagulopathy)

Patients at higher risk of postpartum hemorrhage include women with multiple pregnancies (more than four), a past history of postpartum or antepartum hemorrhage, and a large baby.

Normally, the fundus will not become firm and contracted until the placenta is delivered. Avoid fundal massage prior to placental delivery, and continue checking for vaginal bleeding while observing vital signs.

Essentials

- Assess for fundus tone, visible blood loss, and perineal or vaginal lacerations.
- Quantify blood loss: use abdominal pads to collect blood and calculate weight difference on hospital arrival. With uterine atony, blood loss can be significantly greater than what is observed externally. Look for signs of hypovolemia closely.
- In an unstable patient, assess vital signs and shock index, and treat as per CPG [D01: Shock](#)

Additional Treatment Information

- Fundus firm: provide high-flow oxygen, correct hypovolemia with up to 40 mL/kg normal saline, and administer tranexamic acid while en route. Manage visible lacerations with direct pressure and dressings.
- Fundus not firm: provide uterine massage (firm pressure in a circular motion with a cupped hand). Consider administration of uterotonic drugs (oxytocin, Hemabate).
 - Encourage mother to empty bladder if possible. A full bladder will impede and prevent contractions of the uterus, which will prevent uterine emptying, exacerbating blood retention, atony, and hemorrhage.
 - Encourage baby to suckle breast
 - Do NOT attempt delivery of placenta due to risk of uterine inversion

Referral Information

Transport rapid to a hospital with obstetrical and surgical facilities is preferred. Contact ClinCall for additional guidance.

General Information

- In most cases, postpartum hemorrhage is a malfunction of one of the body's mechanisms of uterine bleeding control; these include myometrial contraction causing direct compression of the blood vessels, and local hemostatic factors that promote clotting.

- If bleeding remains uncontrolled despite oxytocin, hemabate, and tranexamic acid, surgical intervention is likely to be required.

Interventions

First Responder

- Provide supplemental oxygen
 - → [A07: Oxygen and Medication Administration](#)

Emergency Medical Responder – All FR interventions, plus:

- Keep patient warm and prevent heat loss
- Notify hospital while en route
- Provide analgesia if required:
 - → [E08: Pain Management](#)
 - [Nitrous oxide](#)
- Consider ACP intercept

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access and correct hypoperfusion:
 - → [D03: Vascular Access](#)
 - 2 large-bore IVs preferred
 - Resuscitate to perfusion or mentation with warmed IV fluids where possible
- Antifibrinolysis:
 - [Tranexamic acid](#)

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider advanced airway management only if necessary
- Consider analgesia
 - → [E08: Pain Management](#)

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consult OB/GYN for choice of uterotonic medications and further treatment
- Advanced diagnostics if in remote ER setting (ultrasound, CBC, type and screen, lactate)
- Consider blood products
- Reverse anticoagulation
- Insert Foley catheter
- Consider laparotomy by local surgeon as a temporizing measure if OB/GYN not available

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [[Link](#)]
2. Roberts I, et al. The CRASH-2 trial: A randomised controlled trial and economic evaluation of the effects of tranexamic acid on death, vascular occlusive events and transfusion requirement in bleeding trauma patients. 2013. [[Link](#)]
3. WOMAN Trial Collaborators. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): An international, randomised, double-blind, placebo-controlled trial. 2017. [[Link](#)]

L10: Pregnancy and Trauma

Catherine Malette and Matthew Smith

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Reviewed:

Introduction

Evaluation of the pregnant patient with major trauma presents a unique challenge for paramedics, since the presence of a fetus means that two patients are potentially at risk. Most cases of maternal major trauma are the result of motor vehicle collisions and domestic or intimate partner violence, but falls, burns, homicide, penetrating trauma, and toxic exposure can also be responsible. Compression of a pregnant woman's abdomen as a result of a fall, intentional violence, or a low-speed motor vehicle collision can be considered major trauma.

Essentials

- Paramedics can quickly make a rough estimate of the gestational age by feeling for the uterine fundus: if the fundus is below the mother's umbilicus, the pregnancy is likely less than 20 weeks.
- Pregnancy causes significant physiological changes, and as a result traumatically injured pregnant women may take longer to show signs of shock.

Additional Treatment Information

- Paramedics can quickly make a rough estimate of the gestational age by feeling for the uterine fundus: if the fundus is below the mother's umbilicus, the pregnancy is likely less than 20 weeks.
- Pregnancy causes significant physiological changes, and as a result traumatically injured pregnant women may take longer to show signs of shock.

General Information

- Every female of reproductive age with significant injuries should be considered pregnant until proven otherwise by a definitive pregnancy test or ultrasound scan. (III-C)
- A nasogastric tube should be inserted in a semiconscious or unconscious injured pregnant woman to prevent aspiration of acidic gastric content. (III-C)
- Oxygen supplementation should be given to maintain maternal oxygen saturation > 95% to ensure adequate fetal oxygenation. (II-1B)
- If needed, a thoracostomy tube should be inserted in an injured pregnant woman 1 or 2 intercostal spaces higher than usual. (III-C)
- Two large bore (14 to 16 gauge) intravenous lines should be placed in a seriously injured pregnant woman. (III-C)
- Because of their adverse effect on uteroplacental perfusion, vasopressors in pregnant women should be used only for intractable hypotension that is unresponsive to fluid resuscitation. (II-3B)
- After mid-pregnancy, the gravid uterus should be moved off the inferior vena cava to increase venous return and cardiac output in the acutely injured pregnant woman. This may be achieved by manual displacement of the uterus or left lateral tilt. Care should be taken to secure the spinal cord when using left lateral tilt. (II-1B)
- To avoid rhesus D (Rh) alloimmunization in Rh-negative mothers, O-negative blood should be transfused when needed until cross-matched blood becomes available. (I-A)
- In Traumatic Maternal Cardiac arrest, consider rapid transport to hospital. A Caesarean section should be performed for viable pregnancies (≥ 23 weeks) no later than 4 minutes (when possible) following maternal cardiac arrest to aid with maternal resuscitation and fetal salvage. Transfer to health care facility.
- Transfer or transport to a maternity facility (triage of a labour and delivery unit) is advocated when injuries are neither life nor limb-threatening and the fetus is viable (≥ 23 weeks), and to the emergency room when the fetus is under 23 weeks' gestational age or considered to be non-viable. When the injury is major, the patient should be transferred or transported to the trauma unit or emergency room, regardless of gestational age. (III-B)
- When the severity of injury is undetermined or when the gestational age is uncertain, the patient should be

evaluated in the trauma unit or emergency room to rule out major injuries. (III-C)

- Women who are pregnant experience a number of physiological changes. Of relevance to paramedics:
 - Cardiovascular
 - Blood pressure experiences minimal changes, though there is an initial decrease in the first and second trimesters, with a return to baseline in the third. Systolic blood pressures above 170 mmHg, and diastolic pressures greater than 110 mmHg are considered significant.
 - Heart rates elevate by 15 to 20 beats per minute. Normal heart rates in pregnancy are between 80 and 110 beats per minute.
 - Cardiac output increases by 30-40%, to a normal volume of 6-7 L per minute during pregnancy
 - Non-specific ST segment changes are sometimes seen on ECG, along with Q waves in lead III and aVF and atrial and ventricular ectopic beats
 - Systemic vascular resistance often decreases due to blood volume and the effects of progesterone
 - Respiratory
 - Respiratory rate increases by 15% (2-3 breaths/minute)
 - Oxygen demand increases by 15-20%
 - Tidal volume and minute ventilation increase by 25-50%
 - Arterial pH rises to 7.40-7.45
 - PaO₂ increases by 10 mmHg
 - PaCO₂ decreases to 27-32 mmHg
 - Hematological
 - Blood volume increases by 30-50%
 - Hemoglobin falls to 100-140 g/L
 - Hematocrit falls to 32-42, producing physiological anemia
 - Plasma volume increases by 30-50%
 - Platelet count experiences a small reduction
 - Pregnancy is a pro-coagulant state. A variety of changes occur in pro- and anti-coagulant pathways, which on the whole increases the coagulation potential while reducing anticoagulation and fibrinolysis.
 - Gastrointestinal: pregnant women are at high risk of gastric aspiration, most likely related to decreased lower esophageal sphincter tone and increased intra-abdominal pressure. Gastric emptying is not affected by pregnancy, though it is slowed by labor and opioid analgesics.
 - Renal: the glomerular filtration rate and renal blood flow rise markedly during pregnancy. Serum creatinine concentration falls accordingly.
 - The pelvic vasculature is dilated in pregnancy. Injury to the pelvis can result in rapid exsanguination. Uterine blood flow is as high as 600 mL/minute in the third trimester, and is not subject to autoregulation: a decrease in maternal systolic blood pressure can cause a significant fall in blood flow and, in turn, fetal oxygenation.
- Always consider the possibility of an abrupted placenta in any pregnant woman being assessed following a traumatic injury

Interventions

First Responder

- Provide airway management and supplemental oxygen as required
 - → [B01: Airway Management](#)
 - → [A07: Oxygen and Medication Administration](#)

Emergency Medical Responder – All FR interventions, plus:

- Apply spinal motion restriction as indicated. Package patients with left lateral tilt to prevent occlusion of the inferior vena cava.
- Consider ACP intercept
- Transport following local trauma destination guidelines. If destination choice is unclear, consult with ClinICall.

Primary Care Paramedic – All FR and EMR interventions, plus:

- Establish vascular access, and consider fluid bolus to correct hypoperfusion or hypotension if clinically indicated.
 - → [D03: Vascular Access](#)
- Consider [tranexamic acid](#) in cases of shock secondary to blood loss, and hypovolemia secondary to occult bleeding. Consultation with CliniCall highly recommended.

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Airway management
 - Early intubation is warranted if unable to achieve adequate oxygenation

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Treat for shock
 - Consider blood products in consultation with EPOS
- Perimortem c-section?

References

Society of Obstetricians and Gynaecologists of Canada. Guidelines for the Management of a Pregnant Trauma Patient. 2015. [[Link](#)]

