

Introduction to Pediatric Endotracheal Intubation Curriculum



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About the Author



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This curriculum and the accompanying simulator will help students learn about intubating a patient.

Curriculum Structure

The Introduction to Pediatric Endotracheal Intubation Curriculum is composed of the following parts. Approximate times are included.

Lesson	Title	Approximate Time
One	FOCUS: Developing Awareness of Patient-Focused Care	10 minutes
One	LEARN: Pediatric Intubation Slide Presentation	20 minutes
One	REVIEW: Practice and Assessment of Pediatric Intubation	30 minutes
	Total	1 hour

Lesson Structure

Each lesson begins with a Lesson Overview, Lesson Objectives, and a Lesson at a Glance table which lists the lesson activities, materials required, suggested preparation steps, and approximate class times.

Lesson Sections

The actual lesson follows the overview, which will contain some of the sections described below.

FOCUS

Every lesson begins with a FOCUS activity intended to capture participants' attention. This may be in the form of a small or large class discussion, a game, a review of previous lesson information, or a demonstration. During this activity, participants are introduced to the topic of the lesson.

LEARN

The LEARN activity in each lesson varies in its presentation mode. It may be a slide presentation, group activity, or demonstration.

REVIEW

The majority of lessons end with a REVIEW activity intended to briefly review the lesson's key messages or main points.

Lesson One – Pediatric Endotracheal Intubation

Lesson Overview

In this lesson, students will learn how to properly intubate a pediatric patient.

Lesson Objectives

After completing this lesson, participants will be able to:

- Utilize proper intubation terminology
- Identify reasons for intubation
- Identify guidelines for safe pediatric intubation
- Demonstrate proper pediatric intubation techniques

Pre-Lesson Knowledge

- Anatomical terminology
- Basic Respiratory Assessment
- Basic Life Support

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• <i>Pediatric Intubation (Focus on Empathy)</i> worksheet • <i>Pediatric Intubation (Focus on Empathy) Instructor Resource</i>	1. Print/photocopy <i>Pediatric Intubation (Focus on Empathy)</i> worksheet (one per participant)	10 minutes
LEARN	• <i>Pediatric Intubation</i> slide presentation • Pediatric manikin • Laryngoscope • Clean gloves • 10-mL syringe • Stethoscope • Bag valve mask • Water-soluble lubricant • Adhesive tape or ET tube holder • Oral airway or bite block	1. Prepare <i>Pediatric Intubation</i> slide presentation for viewing	20 minutes
REVIEW	• <i>Pediatric Intubation Check-Off</i> worksheet • <i>Pediatric Intubation Check-Off (Instructor Resource)</i> • <i>Pediatric Intubation Quiz</i> • <i>Pediatric Intubation Quiz - Answer Key</i> Supplies: • Laryngoscope • Clean gloves • Hand sanitizer • 10-mL syringe • Stethoscope • Bag valve mask and oxygen source • Water-soluble lubricant • Adhesive tape or ET tube holder • Oral airway or bite block • Suction equipment (optional)	1. Print/photocopy <i>Pediatric Intubation Check-Off</i> worksheet and <i>Pediatric Intubation Quiz</i> (one per participant) 2. Get the supplies ready for the lesson	30 minutes

Instructor Note: For REVIEW activities, the instructor may choose to have students complete one or both of the two activities. The FOCUS activity may also be completed prior to class.

Lesson One – Pediatric Endotracheal Intubation

FOCUS: Developing Awareness of Patient-Focused Care

10 minutes

Purpose:

To help students develop an awareness of patient-focused care.

Materials:

- *Pediatric Intubation (Focus on Empathy)* worksheet
- *Pediatric Intubation (Focus on Empathy)* Instructor Resource

Facilitation Steps:

1. Distribute the *Pediatric Intubation (Focus on Empathy)* worksheets prior to or at the start of the class.
2. Have the *Pediatric Intubation (Focus on Empathy)* Instructor Resource available.
3. Have students read through the information and complete the worksheet.
4. Have students pair up upon completion and share answers.

Name: _____ Class: _____

Pediatric Intubation (Focus on Empathy)

READ the following:

It is a Saturday night, and your Emergency Medical Service (EMS) unit dispatches to the location of a stabbing. Dispatch advises you and your partner that the victim has been shot. You arrive at the location, and you see that there is a large crowd of people pointing you towards the house. You find an unconscious 8-year-old male lying on his back with gunshot wounds in his torso and abdomen. You ask the crowd to give you room to work and ask for details about what happened. You hear from multiple people that a fight broke out between the boy's older brother and a group of friends. There were multiple shots fired and the boys fled the scene. The victim is in respiratory arrest. Your partner begins to intubate the victim. There is a lot of blood and the situation does not look promising. People in the crowd begin to ask questions; some of them are crying. Although you are assisting your partner in providing emergency care to the victim, you also need to reassure the crowd.

REFLECT on the situation:

What emotions do you think the people in the crowd are feeling?

What emotions do you think EMS personnel feel in situations like this?

What could you say to calm the crowd down?

SHARE your thoughts with a peer:

Pediatric Intubation (Focus on Empathy)

Instructor Resource

READ the following:

It is a Saturday night, and your Emergency Medical Service (EMS) unit dispatches to the location of a stabbing. Dispatch advises you and your partner that the victim has been shot. You arrive at the location, and you see that there is a large crowd of people pointing you towards the house. You find an unconscious 8-year-old male lying on his back with gunshot wounds in his torso and abdomen. You ask the crowd to give you room to work and ask for details about what happened. You hear from multiple people that a fight broke out between the boy's older brother and a group of friends. There were multiple shots fired and the boys fled the scene. The victim is in respiratory arrest. Your partner begins to intubate the victim. There is a lot of blood and the situation does not look promising. People in the crowd begin to ask questions; some of them are crying. Although you are assisting your partner in providing emergency care to the victim, you also need to reassure the crowd.

REFLECT on the situation:

What emotions do you think the people in the crowd are feeling?

Shock, grief, concern, disbelief.

What emotions do you think EMS personnel feel in situations like this?

Nervous yet focused, possibly anxious or stressed.

***Discuss the difference between internal and external portrayal of feelings with your students.*

What could you say to calm the crowd down?

Common phrases:

"We are doing everything we can to help this boy."

"We put a tube in to help him breathe."

Avoid medical jargon and be supportive; deliver information in small parts.

SHARE your thoughts with a peer:

Lesson One – Pediatric Endotracheal Intubation

LEARN: Pediatric Intubation Slide Presentation

20 minutes

Purpose:

Participants will learn about the purpose, indicators, supplies, and proper procedure surrounding intubation.

Materials:

- *Pediatric Intubation* slide presentation
- Pediatric Manikin
- Laryngoscope
- ET tube
- Clean gloves
- 10-mL syringe
- Stethoscope
- Bag valve mask
- Water-soluble lubricant
- Adhesive tape (or ET tube holder)
- Oral airway (or bite block)

Facilitation Steps:

1. Share the following information with students as you show them the *Pediatric Intubation* slide presentation.

Slide 1: Introduction Slide

Slide 2: Endotracheal intubation involves the oral or nasal insertion of a flexible tube through the larynx and into the trachea. The most widely used route is orotracheal, in which an endotracheal tube (also known as an ET tube) is passed through the mouth, epiglottis, and vocal cords into the trachea. In a nasotracheal procedure, an ET is passed through the nose, epiglottis, and vocal cords into the trachea.

Oral ETs are usually made of plastic or rubber. Adult (and some pediatric) sizes of ETs have a cuffed tube. When the cuff is inflated, it seals the airway around the tube to prevent the aspiration of oral secretions or gastric contents into the lungs.

Slide 3: The major purpose of intubation is to maintain an open airway. It is frequently

performed on anesthetized or emergency-admission patients to facilitate ventilation of the lungs and to prevent the possibility of airway obstruction. This procedure is performed by a practitioner or a specially-trained healthcare professional (for example, certified registered nurse anesthetist, respiratory therapist, or rescue personnel). Another purpose is to administer emergency medications. This route allows uninterrupted resuscitation efforts. Although administering some resuscitation drugs via an ET tube is possible, IV or intraosseous administration is the preferred route. Drugs given through an ET tube usually produce lower blood levels of the drug compared to the same dose given intravenously.

Slide 4: The advantages of intubation are that it establishes and maintains a patient airway, protects against aspiration by sealing off the trachea from the digestive tract, permits removal of tracheobronchial secretions in patients who can't cough effectively, and provides a route for mechanical ventilation. The disadvantages are that it bypasses normal respiratory defenses against infection, reduces cough effectiveness, and prevents verbal communication. It is also possible to cause further injury to the patient by accidentally inserting the tube into the wrong area.

Slide 5: In emergency situations, do not use an ET if there is an upper airway obstruction due to a foreign body. Also, use an ET with caution if the patient has mandibular or cervical fractures; intubation can make these injuries worse.

Slide 6: In emergency circumstances when difficult intubation isn't anticipated, personnel use rapid sequence intubation to secure the patient's airway. With rapid sequence intubation, the patient is given a rapidly acting sedative and a neuromuscular blocking agent.

This causes the patient to become immediately unconscious and relaxed.

In some emergencies, a patient can be intubated awake with local anesthetic or without being premedicated.

Slide 7: There are some complications associated with intubation. It is possible that teeth can be broken or chipped and that tissue can be damaged during the insertion of a tube. If the tube is placed in the esophagus and not corrected, the inflated cuff will close the airway, causing eventual death. If the tube is in the bronchus, the patient may suffer a pneumothorax, spasms, or low oxygen levels. Mucous or foreign bodies may obstruct the tube, preventing oxygen delivery. After the tube is removed, the patient may experience laryngospasms, infections, and/or a sore throat.

Slide 8: ET tubes are non-toxic, non-allergenic, and flexible. They are made of rubber or plastic. The tubes are able to maintain a curved shape using a stylet and they do not conduct electricity.

The cuff should be inflated with 5 to 10 milliliters of air, thus causing the balloon to indent with thumb pressure.

Show students how to inflate the cuff and location of the stylet. Also, note the measurement marks on the tube.

Slide 9: To select the correct ET tube, consider the diameter of the patient's body size and the size of their nares. Tubes range in size from 2 to 10.5 mm in internal diameter. Normal adult female ET tubes are 7 to 8 millimeters, and normal adult male ET tubes are 8 to 9 millimeters. The length should be the distance from the corner of the mouth to the middle of the sternum.

Slide 10: Broselow tape is a color-coded tape measure. Putting the red end of the tape at the head, measure the length of the child. The color zone that corresponds with the length of the child indicates the size of the emergency equipment needed. This includes ET tube size.

Source: Stkittschris [CC BY-SA 3.0 (<https://creativecommons.org/licenses/by-sa/3.0/>)]

Slide 11: A laryngoscope is a device used to view and examine the larynx. There are two main types of laryngoscope blades: the MacIntosh blade, which is curved, and the Miller blade, which is straight. Although there are more varieties of laryngoscopes, these are the most often used. They are sized based on the patient, with 0 being for neonates and 4 for large adults.

Laryngoscopes have three main components. First is the handle, which comes in small, medium, or large; the "L" type, or right angle, is most commonly used. Second is the battery-operated light component to assist in visualizing the location. The third is the blade that attaches to the handle.

Slide 12: Besides the ET tube and the laryngoscope, other supplies are needed based on whether the intubation is an emergency and/or where the intubation is taking place. These supplies are for basic intubation. In acute care settings, a healthcare provider's order is required for intubation.

- Clean gloves as personal protective equipment (may also use eyewear)
- 10-mL syringe to inflate the cuff
- Stethoscope to verify placement in the trachea
- Bag valve mask and oxygen source to ventilate patient and provide O₂
- Water-soluble lubricant to lubricate the end of the ET tube if available
- Adhesive tape or ET tube holder to hold ET in place
- Oral airway or bite block to prevent the patient from biting ET tube
- Suction equipment and tonsillar tip to suction out any secretions
- Pulse oximetry to monitor O₂ status (vital signs monitor is ideal)

Make sure all the supplies are gathered and placed next to the patient prior to beginning the procedure.

Depending on the type of student, more specific supplies can be discussed.

Slide 13: Before intubating, confirm the patient's identity if the patient is alert. Patient

teaching is also important. Ask the patient when they last ate food, as recent consumption increases the risk of aspiration. Prior to positioning, wash your hands, put on gloves, and assess the patient for any contraindications or conditions that could make intubation difficult. Place the patient in a supine position and attach any monitoring devices, such as a cardiac monitor, at this time. Assess the need for any medications and administer them. Preoxygenate the patient with 100% oxygen using a bag valve mask.

Slide 14: Since children have smaller airway diameters, any airway edema may quickly result in obstruction. Have endotracheal tubes 0.5mm to 1mm larger and smaller on hand.

Infants and toddlers tend to have larger occiputs making it difficult to tilt the head back. Use a roll under the shoulders. For children <8 years, the epiglottis is soft. In this case, use a Miller blade.

Children have smaller lung capacity, leading to faster oxygen desaturation; therefore, it is crucial to pre-oxygenate.

Slide 15: Parent education is imperative. If the intubation is planned, such as in surgery, informed consent needs to be obtained by the parent or guardian. Consent can be given by a doctor in cases of emergency. Intubation can be a scary topic for parents, so it is important to provide support and compassion.

Slide 16: Standing at the head of the bed, tilt the head back (as if the patient is sniffing the air) in order to enable visualization of the oral cavity. Suction may be needed to clear secretions. Hold the laryngoscope handle in the left hand and gently slide the blade into the right side of the patient's mouth. Use the blade to push the tongue to the left. Lift up on the blade carefully to visualize the epiglottis. Advance the blade and lift to see vocal cords. Be careful not to hit the teeth during lifting.

Demonstrate for students on the model.

Slide 17: *Point out parts to students on the model.*

Slide 18: With the right hand, carefully advance the tip of the ET tube between the vocal cords until the upper part of the cuff is below the level of the vocal cords. Hold the tube firmly while gently removing the laryngoscope and stylet from the ET tube. Inflate the cuff with 5 to 10 mL of air to secure the tube and remove the syringe. Verify placement by connecting ET tube to bag valve mask, oxygenate patient, and listen bilaterally for lung sounds. Watch for chest expansion and listen over the epigastrium (where breath sounds shouldn't be heard). The preferred technique to confirm placement is continuous capnography (monitoring of the concentration or partial pressure of carbon dioxide). Insert a bite block into the oral cavity.

Slide 19: Secure the ET tube with tape or an ET tube holder. Note the measurement markings where the tube exits at the lips and document it; this will allow the detection of tube displacement. After the procedure, remove the gloves, wash your hands, and document the procedure.

Slide 20: Intubation performed during cardiac arrest shouldn't delay initial CPR and defibrillation. Each intubation attempt should be less than 30 seconds to prevent hypoxia. Each attempt should be limited to 10 seconds during CPR. Hyperoxygenate the patient between attempts. Chest x-rays can also confirm placement.

Slide 21: Record the date and time of intubation, patient assessment data, ET tube type and size, external length measurement from the patient's lip, volume of air to inflate the cuff, medications administered, oxygen initiated, techniques used to confirm tube placement, and complications (as well as interventions taken in response to those complications) along with patient response.

Slide 22: Closing slide.

Lesson One – Pediatric Endotracheal Intubation

REVIEW: Practice and Assessment of Pediatric Intubation

30 minutes

Purpose:

Participants will practice intubation on the Pediatric Manikin and then complete a quiz to assess mastery.

Materials:

- Pediatric Manikin
- *Pediatric Intubation Check-Off* worksheet
- *Pediatric Intubation Check-Off (Instructor Resource)*
- *Pediatric Intubation Quiz*
- *Pediatric Intubation Quiz – Answer Key*

Supplies:

- Laryngoscope
- ET tube
- Clean gloves
- Hand sanitizer
- 10-mL syringe
- Stethoscope
- Bag valve mask and oxygen source
- Water-soluble lubricant
- Adhesive tape or ET tube holder
- Oral airway or bite block
- Suction equipment (optional)

Facilitation Steps:

1. Give students the *Pediatric Intubation Check-Off* worksheet.
2. Access the *Pediatric Intubation Check-Off (Instructor Resource)*. Follow the steps on the check-off page to demonstrate intubation on the Pediatric Manikin.
3. Have students follow the steps on their *Pediatric Intubation Check-Off* worksheet to practice intubation on the Pediatric Manikin

4. Hand out the *Pediatric Intubation Quiz* to students. Give them a couple of minutes to complete it.
5. Have students self-check or peer-check their answers as you share the correct answers from the *Pediatric Intubation Quiz – Answer Key*.

Pediatric Intubation Check-Off

Practice intubation on the Pediatric Manikin using the following steps:

Verify order for intubation from healthcare provider
Wash your hands and stethoscope
State that you will assess the patient for spinal cord injury, cranial surgery, or other factors that may increase the risk of difficult intubation
Determine when the patient last ate, level of anxiety, and respiratory status
Gather supplies
Raise the bed to waist level and stand at the head of the patient
Wash your hands and put on clean gloves
Confirm correct ET tube size
Attach a syringe to the ET tube and lubricate the distal end of the tube
Assess the oral cavity for loose teeth or dentures
State attachment of monitoring equipment
State administration of anesthetic, sedative, and/or neuromuscular blocking drug if indicated
Remove gloves and wash your hands; put on new gloves and other PPE if needed
Tilt head back
Preoxygenate using a bag valve mask
Suction the pharynx
With laryngoscope in the left hand, slide the blade into the right side of the mouth, pushing the tongue to the left
Lift up on blade, visualizing the epiglottis
Advance the blade and lift to see the vocal cords without hitting teeth
With right hand, place ET tube between vocal cords until the upper part of the cuff is below the cords
Hold ET tube while removing laryngoscope and then stylet
Inflate cuff with 5-10 mL of air using a syringe and then disconnect the syringe
Connect ET tube to bag valve mask and oxygenate
Listen for lung sounds bilaterally, then state checking for chest expansion and sounds over epigastric region
Insert bite block and connect to the oxygen source
Secure tube with tape or ET tube holder
Check measurement markings where the tube exits at the lips
Lower bed to original position
Remove gloves and wash hands/stethoscope
Document the procedure

Pediatric Intubation Check-Off (Instructor Resource)

PREPARATION:

Supplies:

- Laryngoscope
- ET tube
- Clean gloves
- Hand sanitizer
- 10-mL syringe
- Stethoscope
- Bag valve mask and oxygen source
- Water-soluble lubricant
- Adhesive tape or ET tube holder
- Oral airway or bite block
- Suction equipment (optional)

After the demonstration, have students practice intubation on the Pediatric Manikin using the following steps:

Optional: Evaluate the student's ability to complete intubation using the following steps (you may score via points or "satisfactory/unsatisfactory"). Broselow tape may be used to determine ET tube size.

1.	Verify order for intubation from healthcare provider	
2.	Wash your hands and stethoscope	
3.	State that you will assess the patient for spinal cord injury, cranial surgery, or other factors that may increase the risk of difficult intubation	
4.	Determine when the patient last ate, level of anxiety, and respiratory status	
5.	Gather supplies	
6.	Raise the bed to waist level and stand at the head of the patient	
7.	Wash your hands and put on clean gloves	
8.	Confirm correct ET tube size	
9.	Attach a syringe to the ET tube and lubricate the distal end of the tube	
10.	Assess the oral cavity for loose teeth or dentures	
11.	State attachment of monitoring equipment	
12.	State administration of anesthetic, sedative, and/or neuromuscular blocking drug if indicated	
13.	Remove gloves and wash your hands; put on new gloves and other PPE if needed	
14.	Tilt head back	

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15.	Preoxygenate using a bag valve mask	
16.	Suction the pharynx	
17.	With laryngoscope in the left hand, slide the blade into the right side of the mouth, pushing the tongue to the left	
18.	Lift up on blade, visualizing the epiglottis	
19.	Advance the blade and lift to see the vocal cords without hitting teeth	
20.	With right hand, place ET tube between vocal cords until the upper part of the cuff is below the cords	
21.	Hold ET tube while removing laryngoscope and then stylet	
22.	Inflate cuff with 5-10 mL of air using a syringe and then disconnect the syringe	
23.	Connect ET tube to bag valve mask and oxygenate	
24.	Listen for lung sounds bilaterally, then state checking for chest expansion and sounds over epigastric region	
25.	Insert bite block and connect to the oxygen source	
26.	Secure tube with tape or ET tube holder	
27.	Check measurement markings where the tube exits at the lips	
28.	Lower bed to original position	
29.	Remove gloves and wash hands/stethoscope	
30.	Document the procedure	
	Total	

Name: _____ Class: _____

Pediatric Intubation Quiz

Fill in the blanks with the correct answer.

1. Because of a soft epiglottis, a _____ blade should be used when intubating young children.
2. To select the correct ET tube size for a child, use a _____ tape.
3. Each intubation attempt should be less than _____ seconds to prevent hypoxia.
4. In some emergencies, a patient can be intubated awake with local _____ or without being premedicated.
5. In emergency situations, do not use an ET if there is upper airway _____ due to a foreign body.

Pediatric Intubation Quiz – Answer Key

Fill in the blanks with the correct answer.

1. Because of a soft epiglottis, a _____ blade should be used when intubating young children.

Answer: Miller

2. To select the correct ET tube size for a child, use a _____ tape.

Answer: Broselow

3. Each intubation attempt should be less than _____ seconds to prevent hypoxia.

Answer: 30

4. In some emergencies, a patient can be intubated awake with local _____ or without being premedicated.

Answer: Anesthetic

5. In emergency situations, do not use an ET if there is upper airway _____ due to a foreign body.

Answer: Obstruction

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