

Module 4 - Airway Management and CPR

This module will allow the learner to gain knowledge with Airway Management and CPR including airway anatomy, tubes, intubation, extubation, suctioning, weaning and correct techniques in CPR

Rationale

Why is it important for you to learn this material?

Registered Respiratory Therapists play a large role in critical care situations such as cardiac arrests and difficult airway management cases. In order to facilitate these roles and many others, all Registered Respiratory Therapists should be familiar with the equipment and techniques utilized in airway management. This knowledge should include the applications and characteristics of the various airways, as well as life-support techniques as per the current standards set by the Canadian Heart and Stroke Foundation.

Learning Outcome

When you complete this module you will be able to

Describe the utilization of various airways and life-support techniques, including airway insertion techniques, equipment, airway management strategies, and life-support standards.

Learning Objectives

Here is what you will be able to do when you complete each objective.

1. Discuss esophageal, nasopharyngeal, laryngeal, oropharyngeal airways.
2. Discuss intubation.
3. Discuss endotracheal tubes.
4. Discuss the methods for assessing tube placement, stability, patency, and cuff pressures.
5. Discuss tracheostomies.
6. Compare tracheostomy with laryngectomy.
7. Discuss the different parameters of tube care.
8. Discuss extubation.
9. Discuss decannulation.
10. Discuss airway techniques utilized in CPR.
11. Discuss the standards of BCLS.

Objective 1

When you complete this objective you will be able to...

Discuss non-tracheal airways (esophageal, nasopharyngeal, laryngeal, and oropharyngeal) in terms of indications, selection criteria, characteristics, insertion techniques, and complications.

Learning Activity

Complete each of the Learning Activities listed below.

Please read and review the following:

1. Egan's Fundamentals of Respiratory Care, 8th Edition:
 - a. Section V – Basic Therapeutics
 - i. Chapter 30 – Airway Management
 1. Heading: Establishing an Artificial Airway
 2. Heading: Alternate Airway Devices
 - ii. Chapter 31 – Emergency Life Support
 1. Heading: Advanced Cardiac Life Support
2. Mosby's Respiratory Care Equipment, 7th Edition:
 - i. Chapter 6 – Airway Management
 1. Heading: Opening the Upper Airway – Displacing the Tongue
 2. Heading: Nasopharyngeal Airways
 3. Heading: Laryngeal Mask Airway (LMA)
 4. Heading: Combitube
3. Essentials of Anesthesiology, 3rd Edition:
 - i. Chapter 13 – Airway Management in Anesthetized Patients
 1. Heading: Simple Airway Management Methods

Objective Checklist:

Concerning pharyngeal airways:

- Can you describe 3 things a pharyngeal airway can do?
- Can you describe 3 main concerns you may have in using an oropharyngeal airway?
- Can you identify for what patient types oropharyngeal airways are contraindicated?
- Can you list the 3 main structural characteristics of an oropharyngeal airway?
- Can you name what anatomical structure an oropharyngeal airway must extend past?
- Can you describe how to estimate the proper size oropharyngeal airway to use with a patient?
- Can you identify the risk of using an oropharyngeal airway that is too small?
- Can you describe 3 methods of oropharyngeal airway insertion?
- Can you describe when a nasopharyngeal tube would be selected over an oropharyngeal tube?
- Can you describe when a nasopharyngeal tube should not be used?

- Can you describe how to estimate the proper length for a nasopharyngeal tube for an adult?
- Can you describe which anatomical structure a nasopharyngeal tube should be parallel to during insertion?
- Can you describe the insertion technique for a nasopharyngeal tube?
- Can you describe the most common complication of nasopharyngeal tube insertion?

Concerning laryngeal airways:

- Can you describe when an LMA may be preferred over an ETT?
- Can you describe 4 reasons why the LMA is a useful emergency airway device?
- Can you identify for what patient types LMAs are contraindicated?
- Can you list 3 major drawbacks of the LMA?
- Can you identify the maximum ventilating pressure to use when using an LMA?
- Can you describe what occurs when the maximum ventilatory pressure is exceeded when using an LMA?
- Can you name what an LMA does not protect against?
- Can you describe the 4 major components of an LMA?
- Can you describe LMA sizing for neonates, children, and adults?
- Can you describe the purpose of the Fastrack LMA?
- Can you describe why choosing the correct size LMA is difficult?
- Can you describe how an LMA is prepared for insertion?
- Can you list sequentially the steps required for LMA insertion?
- Can you identify the anatomical structure the tip of the mask rests against when properly placed?
- Can you describe the anatomical structure the LMA cuff makes a seal with laterally?
- Can you describe the purpose of the black line along the length of the LMA?
- Can you describe the final test to ensure proper positioning of an LMA?
- Can you identify what pressure the LMA cuff can be inflated to?

Concerning DLAs – Double Lumen Airways (Combitubes):

- Can you describe when a DLA would be preferred over an ETT?
- Can you describe what a DLA will not protect against?
- Can you describe the 2 cuffs present in the DLA?
- Can you describe the 4 pairs of components present in a DLA?
- Can you describe the anatomical sites sealed by both DLA cuffs when inflated?
- Can you identify the DLA sizes available for adults?
- Can you describe the head position for insertion of a DLA?
- Can you describe the volumes required for inflation of each cuff on a DLA?
- Can you describe two ways in which ventilation is provided through a properly placed DLA?

Objective 2

When you complete this objective you will be able to...

Discuss oral/tracheal intubation in terms of indications/contraindications, accessories/equipment, evaluation of difficulty, techniques, complications (short/long term).

Learning Activity

Complete each of the Learning Activities listed below.

Please read and review the following:

1. Egan's Fundamentals of Respiratory Care, 8th Edition:
 - a. Section V – Basic Therapeutics
 - i. Chapter 30 – Airway Management
 1. Heading: Suctioning
 2. Heading: Establishing an Artificial Airway
 3. Heading: Airway Trauma Associated with Tracheal Tubes
 - ii. Chapter 31 – Emergency Life Support
 1. Heading: Advanced Cardiac Life Support
2. Mosby's Respiratory Care Equipment, 7th Edition:
 - i. Chapter 6 – Airway Management
 1. Heading: Endotracheal tubes
 2. Heading: Confirmation of Tracheal Intubation
3. Essentials of Anesthesiology, 3rd Edition:
 - i. Chapter 12 – Preoperative Assessment and Preparation of the Patient
 1. Heading: Preoperative Assessment
 - ii. Chapter 13 – Airway Management in Anesthetized Patients
 1. Heading: Direct Laryngoscopy and Tracheal Intubation
 - iii. Chapter 15 – Techniques of General Anesthesia
 1. Heading: Induction of Anesthesia

Objective Checklist:

- Can you describe indications for an ETT intubation?
- Can you describe when nasotracheal intubation is preferred over orotracheal intubation?
- Can you describe the indications for an "awake" intubation?
- Can you describe when intubation via fiberoptic laryngoscopy is indicated?
- Can you describe when a rapid sequence induction is indicated?
- Can you describe general contraindications to ETT intubation?
- Can you describe specific contraindications to oral ETT intubation?
- Can you list accessories and equipment that must be assembled before performing an ETT intubation?

- Can you describe the mnemonic SOAPME?
- Can you describe how and when a malleable stylet is used?
- Can you describe how and when Magill forceps are used?
- Can you describe the suctioning equipment required?
- Can you describe the components of a suction catheter?
- Can you describe how to determine the appropriate catheter size for a given ETT?
- Can you describe appropriate suctioning pressure level ranges for adults, children and infants?
- Can you describe appropriate oropharyngeal suctioning technique?
- Can you describe appropriate nasotracheal suctioning technique?
- Can you describe appropriate endotracheal suctioning technique?
- Can you identify the components of a laryngoscope?
- Can you identify the two basic designs of laryngoscope blades?
- Can you describe how the state of dentition affects the ease of intubation?
- Can you identify four head and neck features that are used in evaluating the ease/difficulty of intubation?
- Can you describe four head and neck features that are used in evaluating the ease/difficulty of intubation?
- Can you describe the Mallampati classification system?
- Can you describe the grading system used when viewing the glottis with a laryngoscope?
- Can you describe the correct position for the head and neck during standard endotracheal intubation?
- Can you describe the sequence in which a laryngoscope is inserted and manipulated?
- In terms of anatomical positioning, can you describe the difference in technique when performing laryngoscopy using a straight versus a curved blade?
- Can you describe which direction a laryngoscope should be manipulated once positioned properly?
- Can you name the anatomical structure where the tip of a curved laryngoscope blade is placed?
- Can you describe the steps required for a standard orotracheal intubation?
- Can you describe how nasotracheal intubation differs from orotracheal intubation?
- Can you describe the differences in performing an "awake" intubation?
- Can you describe the steps required to perform endotracheal intubation via fiberoptic laryngoscopy?
- Can you describe how and when a light wand may be useful?
- Can you describe the steps in a rapid sequence induction intubation?
- Can you describe what BURP means and when it is used?
- Can you describe what cricoid pressure is and when it is used?
- Can you identify 7 short-term complications associated with laryngoscopy and intubation?
- Can you identify some long-term complications associated with intubation?

Objective 3

When you complete this objective you will be able to...

Discuss endotracheal tubes in terms of characteristics, advantages/disadvantages, hazards, and complications.

Learning Activity

Complete each of the Learning Activities listed below.

Please read and review the following:

1. Egan's Fundamentals of Respiratory Care, 8th Edition:
 - a. Section V – Basic Therapeutics
 - i. Chapter 30 - Airway Management
 1. Heading: Establishing an Artificial Airway
 2. Heading: Airway Trauma Associated with Tracheal Tubes
 3. Heading: Airway Maintenance
 - ii. Chapter 31 – Emergency Life Support
 1. Heading: Advanced Cardiac Life Support
2. Mosby's Respiratory Care Equipment, 7th Edition:
 - i. Chapter 6 – Airway Management
 1. Heading: Endotracheal Tubes
 2. Heading: Specialized Endotracheal Tubes

Objective Checklist:

- Can you list 5 physical characteristics of a standard ETT?
- Can you describe what is labelled on a standard ETT?
- Can you describe some disadvantages of conventional ETT?
- Can you identify the advantages of a spiral wired tube?
- Can you identify the advantages of Rae tubes?
- Can you describe the special attributes of ETTs used for laser surgery?
- Can you describe the advantages of an Endotrol?
- Can you describe the advantages double lumen tubes offer?
- Can you identify hazards specific to endotracheal tubes and laser surgery?
- Can you describe complications associated with endotracheal tubes as pertaining to the larynx?
- Can you describe complications associated with endotracheal tubes as pertaining to the trachea?
- Can you describe actions that help prevent these complications?

Objective 4

When you complete this objective you will be able to...

Explain the methods for assessing tube placement, stability, patency, and cuff pressure.

Learning Activity

Complete each of the Learning Activities listed below.

Please read and review the following:

1. Egan's Fundamentals of Respiratory Care, 8th Edition:
 - a. Section V – Basic Therapeutics
 - i. Chapter 30 – Airway Management
 1. Heading: Establishing an Artificial Airway
 2. Heading: Airway Maintenance
2. Mosby's Respiratory Care Equipment, 7th Edition:
 - i. Chapter 6 – Airway Management
 1. Heading: Confirmation of Tracheal Intubation
 2. Heading: Equipment Used to Manage Artificial Airways

Objective Checklist:

- Can you describe methods of confirming ETT placement at the bedside?
- Can you describe the equipment required for ETT placement assessment?
- Can you describe the principle in how an EDD confirms ETT placement?
- Can you describe the expected differences between inspired CO₂ and expired CO₂?
- Can you identify methods used to confirm position?
- Can you identify at what point the airway should be secured?
- Can you identify any other adjuncts to maintain stability or patency of the airway?
- Can you identify various materials/techniques for securing an endotracheal tube?
- Can you identify various materials/techniques for securing a tracheostomy tube?
- Can you describe how neck flexion can affect ETT placement?
- Can you identify humidification methods that prevent secretion thickening?
- Can you describe the open versus closed technique for suctioning?
- Can you describe the maximum cuff pressure recommended?
- Can you identify the importance of cuff pressure?
- Can you differentiate between the “just seal” or “minimal seal” techniques? (These are also known as the minimal occluding volume and minimal leak techniques.)
- Can you describe alternative cuff designs?
- Can you describe how leak aspiration is detected?
- Can you describe how leak aspiration can be minimized?

Objective 5

When you complete this objective you will be able to...

Discuss tracheostomy in terms of indications, equipment/accessories, methods (surgical, percutaneous), and complications (short/long term).

Learning Activity

Complete each of the Learning Activities listed below.

Please read and review the following:

1. Egan's Fundamentals of Respiratory Care, 8th Edition:
 - a. Section V – Basic Therapeutics
 - i. Chapter 30 – Airway Management
 1. Heading: Establishing an Artificial Airway
 2. Heading: Airway Trauma Associated with Tracheal Tubes
 3. Heading: Airway Maintenance
 4. Heading: Extubation/Decannulation
2. Mosby's Respiratory Care Equipment, 7th Edition:
 - i. Chapter 6 – Airway Management
 1. Heading: Tracheostomy Tubes

Objective Checklist:

- Can you identify indications for tracheostomy tubes?
- Can you identify factors to consider in switching from a standard ETT to a tracheostomy tube?
- Can you identify patient selection criteria that would favour a percutaneous tracheostomy procedure?
- Can you describe the components of a tracheostomy tube?
- Can you list the equipment required for tracheostomy and tube care?
- Can you describe the steps required for tracheostomy and tube care?
- Can you describe the extra equipment required if you are changing a tracheostomy tube?
- Can you describe the differences between a fenestrated and non-fenestrated tracheostomy tube?
- Can you describe how a speaking tracheostomy tube functions?
- Can you describe the function of a Passy-Muir valve?
- Can you describe when and how a Passy-Muir valve is properly used?
- Can you describe the function of a trach button?
- Can you describe when and how a trach button is properly used?
- Can you describe the anatomical landmarks of the tracheostomy site for surgical tracheotomies?
- Can you list the procedural steps of a surgical tracheostomy?

- Can you describe the anatomical landmarks of the tracheotomy site for percutaneous tracheotomies?
- Can you list the procedural steps of a percutaneous dilatational tracheotomy?
- Can you identify advantages the percutaneous procedure has to offer over the surgical procedure?
- Can you identify short-term complications associated with tracheostomy tubes?
- Can you identify long-term complications associated with tracheostomy tubes?

Objective 6

When you complete this objective you will be able to...

Compare tracheostomy with laryngectomy.

Learning Activity

Complete each of the Learning Activities listed below.

Please read and review the following:

1. Egan's Fundamentals of Respiratory Care, 8th Edition:
 - a. Section V – Basic Therapeutics
 - i. Chapter 30 –Airway Management
 1. Heading: Establishing an Artificial Airway
 2. Heading: Airway Trauma Associated with Tracheal Tubes
 3. Heading: Airway Maintenance
2. Mosby's Respiratory Care Equipment, 7th Edition:
 - i. Chapter 6 – Airway Management
 1. Heading: Tracheostomy Tubes
3. There is very little information on laryngectomies in standard respiratory therapy textbooks. The fundamental characteristic of a laryngectomy patient is that their pharynx and trachea have been surgically separated and are no longer in communication. In addition, should they have a tube, it is often a short stent similar in size to the hollow cannula seen in Egan's 8th ed. pg. 692.
Airway maintenance and ventilation is through the stoma and/or associated tube only. Patency of this stoma is paramount; this can have major ramifications during resuscitative efforts if prior knowledge of the laryngectomy goes unnoticed. Steps to minimize potential hazards include displaying this information clearly on the patient's chart in their room, and ensuring this information is passed on to the report.

Objective Checklist:

- Can you identify the difference between a patient with a laryngectomy and one with a tracheostomy?
- Can you identify when this may be a hazard to the patient?
- Can you identify steps which may minimize hazards to the patient?

Objective 7

When you complete this objective you will be able to...

Discuss the following in relation to tube care: aspiration, minimal occlusion volume/minimal leak technique, changing tubes, mouth care, cuff pressures, tube positioning, resistance of the tube, securing the tube, and stoma/trach care.

Learning Activity

Complete each of the Learning Activities listed below.

Please read and review the following:

1. Egan's Fundamentals of Respiratory Care, 8th Edition: Chapter 30, Airway Management.
2. Mosby's Respiratory Care Equipment, 7th Edition: Chapter 6, Airway Management.
3. <http://www.sageproducts.com/education/vlinks.asp> for mouth care in intubated patients.
4. Des Jar dins' Cardiopulmonary Anatomy & Physiology, 4th Edition: Chapter 2, Ventilation for Airway Resistance.

Objective Checklist:

- Can you identify the risks associated with aspiration in the intubated patient?
- Can you identify why cuff pressure measurements are critical?
- Can you describe the procedures involving cuff pressures: minimal occlusion volume/minimal leak technique, and adjusting cuff pressures?
- Can you describe the procedure for assessing and troubleshooting cuff leaks?
- Can you describe the procedure for changing a trach tube?
- Can you describe the importance of appropriate mouth care in intubated patients relating to nosocomial pneumonias?
- Can you identify the importance of tube position, changing tube position, and confirmation of tube placement?
- Can you relate how tube size/resistance of the tube can affect the patient's respiratory status?
- Can you describe how to secure an endotracheal tube?
- Can you describe the procedure of trach/stoma care?

Objective 8

When you complete this objective you will be able to...

Discuss extubation in terms of indications/contraindications, assessing readiness for extubation, complications, and post-extubation monitoring.

Learning Activity

Complete each of the Learning Activities listed below.

Please read and review the following:

1. Egan's Fundamentals of Respiratory Care, 8th Edition: Chapter 30, Airway Management.

Objective Checklist:

- Can you list the indications and contraindications for extubation?
- Can you describe how to assess whether a patient is ready for extubation or not?
- Can you describe the procedure for extubation?
- Can you identify the complications of extubation?
- Can you describe the monitoring that should occur after extubation?

Objective 9

When you complete this objective you will be able to...

Discuss decannulation in terms of indications, assessing readiness for decannulation, complications, and post-decannulation monitoring.

Learning Activity

Complete each of the Learning Activities listed below.

Please read and review the following:

1. Egan's Fundamentals of Respiratory Care, 8th Edition: Chapter 30, Airway Management.

Objective Checklist:

- Can you list the indications and contraindications for decannulation?
- Can you describe how to assess whether a patient is ready for decannulation or not?
- Can you describe the procedure for decannulation?
- Can you identify the complications of decannulation?
- Can you describe the monitoring that should occur after decannulation?

Objective 10

When you complete this objective you will be able to...

Discuss airway techniques utilized in CPR:

- Methods for assessing airway patency.
- Techniques for manually maintaining an airway (head/tilt/chin lift, jaw/modified jaw thrust manoeuvre).
- Oral and nasopharyngeal airways.

Learning Activity

Complete each of the Learning Activities listed below.

Please read and review the following:

1. Heart and Stroke Foundation's Cardiopulmonary Basic Rescuer Handbook.
2. Mosby's Respiratory Care Equipment, 7th Edition: Chapter 6, Airway Management.

Objective Checklist:

- Can you describe the “look, listen, and feel” technique for assessing breathlessness or loss of airway patency in an unconscious or unresponsive patient?
- Can you describe the procedures of manual airway manipulation: head/tilt/chin lift, jaw/modified jaw thrust manoeuvre?
- Can you identify the basic airways that could be used in CPR: the oropharyngeal and nasopharyngeal airways?
- Can you describe the insertion techniques for these airways?

Objective 11

When you complete this objective you will be able to...

Discuss the standards of BCLS.

Learning Activity

Complete each of the Learning Activities listed below.

Please read and review the following:

1. Heart and Stroke Foundation's [Cardiopulmonary Basic Rescuer Handbook](#).

Objective Checklist:

- Can you describe the basics of CPR, including the chain of survival; ABCs; one- and two-rescuer CPR for infant, child, and adult patients; airway obstruction for infant, child, and adult patients; and rescuer responsibilities?