

Chapter 16, Respiratory Emergencies

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1. Introduction to Respiratory Emergencies and Anatomy

- **Respiratory emergencies** are significant in all age groups, including infants, children, and adults [2].
- EMTs frequently encounter patients experiencing **dyspnea**, which means difficulty breathing [5].
- The cause of dyspnea can be challenging to identify, but timely care can still be life-saving [5].
- Understanding the respiratory system's anatomy is crucial for managing these emergencies [6].
- The respiratory system includes the **diaphragm**, chest wall muscles, accessory muscles, and nerves from the brain and spinal cord [7].
- The upper airway consists of structures above the larynx, such as the nose, mouth, jaw, oral cavity, pharynx, and larynx [8].

- The larynx serves as the division point between the upper and lower airways [8].

2. Physiology of Respiration and Pathophysiology of Impaired Breathing

- The main function of the lungs is **respiration**, the exchange of oxygen and carbon dioxide [10].
- Air travels through the trachea, bronchi, bronchioles, and finally to the alveoli where gas exchange happens [11].
- Respiration involves two processes: **inspiration** and **expiration** [12].
- Oxygen enters the blood, and carbon dioxide is removed [13].
- In healthy lungs, this exchange occurs rapidly at the alveoli through **diffusion** [13].
- The brain stem monitors carbon dioxide levels in the blood [16].
- High carbon dioxide levels lead to faster, deeper breathing, while low levels slow breathing down [17].
- Gas exchange can be hindered by airway abnormalities, disease, trauma, or issues with pulmonary vessels [19].

Process	Description	Gas Exchange
Inspiration	Oxygen is provided to the blood	Occurs rapidly at the alveoli through diffusion
Expiration	Carbon dioxide is removed from the body	Carbon dioxide returns to the lungs and is exhaled

3. Carbon Dioxide Retention and Hypoxic Drive

- Some patients have consistently high levels of carbon dioxide in their blood [20].
- Over time, this can impair the respiratory center in the brain [20].
- This is often seen in patients with **Chronic Obstructive Pulmonary Disease (COPD)** [20].
- Their ability to exhale carbon dioxide is hindered [21].

- The brain adapts to these high levels [22].
- It switches to a backup system based on low oxygen levels to control breathing [22].
- This backup system is called **hypoxic drive** [22].
- Caution is advised when giving oxygen to these patients [22].

4. Causes and Signs of Dyspnea

- **Dyspnea** can result from many different conditions [23].
- Altered mental status can indicate the brain is **hypoxic** (low oxygen) [23].
- Medical conditions causing difficulty breathing include pulmonary edema, hay fever, pleural effusion, airway obstruction, hyperventilation syndrome, environmental or industrial exposures, carbon monoxide poisoning, or drug overdose [23].
- Situations leading to dyspnea can involve breathing too fast, obstructed gas exchange by fluid, infection, or collapsed alveoli, damaged alveoli, obstructed air passages by spasm, mucus, or weakness, obstructed blood flow to lungs by a blood clot, or a pleural space filled with air or fluid [24].
- Table 16-2 in the book shows signs and symptoms of inadequate breathing [25].
- Dyspnea is common in patients with cardiopulmonary diseases [26].
- Congestive heart failure (CHF) causes the heart to pump poorly, leading to oxygen deprivation [26].
- Severe pain can also cause rapid, shallow breathing without primary lung issues [26].

Condition	Description / Effect on Breathing
Pulmonary Edema	Fluid in the lungs [23]
Hay Fever	Allergic reaction causing cold-like symptoms [23]
Pleural Effusion	Collection of fluid around the lungs [23]
Obstruction of the Airway	Mechanical blockage [23]

Hyperventilation Syndrome	Over breathing leading to low carbon dioxide levels [23]
Environmental/Industrial Exposures	Inhaling harmful substances [23]
Carbon Monoxide Poisoning	Inhaling odorless, poisonous gas [23]
Drug Overdose	Can cause hypoxia or dyspnea [23]
Congestive Heart Failure (CHF)	Heart pumps ineffectively, depriving the body of oxygen [26]
Severe Pain	Can cause rapid, shallow breathing without primary pulmonary dysfunction [26]
Obstruction of Gas Exchange	By fluid, infection, collapsed alveoli, damaged alveoli, mucus, spasm, blood clot, or pleural air/fluid [24]
Breathing Too Fast	Can be a sign of dyspnea [24]

5. Upper and Lower Airway Infections

- Infectious diseases can cause dyspnea by affecting various parts of the airway [29].
- Inadequate oxygen delivery to tissues is often due to some form of obstruction [31].
- Infectious obstructions can include mucus and secretions in major passages (like colds or diphtheria), or swelling of soft tissues in the upper airway (like epiglottitis or croup) [32].
- Stridor is a sound produced by upper airway infections, often described as a seal bark [36].
- Impaired oxygen exchange in the alveoli (lower airway) is seen in **pneumonia** [36].
- Using protective equipment (PPE) is important when in contact with patients with infectious diseases [37].
- **Croup** is typically seen in children aged 6 months to 3 years, causing inflammation and swelling of the pharynx, larynx, and trachea [38]. Hallmarks

are stridor and a seal bark cough, and it responds well to humidified oxygen [41].

- **Epiglottitis** is inflammation of the epiglottis, usually bacterial and more common in children, though it can occur in adults [44]. Patients, especially children, may sit in a tripod position, drool, and should be handled gently with high-flow oxygen and nothing placed in their mouths [45].
- **RSV** is a common and highly contagious viral illness in children affecting lungs and breathing passages, leading to bronchitis and pneumonia [47]. Assess for dehydration and treat airway/breathing problems [49].
- **Bronchiolitis** is a viral illness often caused by RSV, affecting newborns and toddlers, where bronchioles become inflamed, swell, and fill with mucus [50]. Oxygen therapy and frequent reassessment for respiratory distress are needed [51].
- **Pneumonia** is a lung infection, often secondary to an upper respiratory infection that moves downward [52]. Bacterial pneumonia has a quick onset with high fevers, while viral pneumonia is more gradual and less severe [54]. It especially affects chronically or terminally ill people [57]. Fever is a key sign [58]. Airway support and supplemental oxygen are important [60].
- **Pertussis** (whooping cough) is an airborne bacterial infection mostly affecting children under six, characterized by fever and a "whoop" sound on inspiration after coughing [62]. It's highly contagious via droplets, and suctioning may be needed [62].
- **Influenza Type A** is an animal respiratory disease that mutated to infect humans, transmitted via direct contact with nasal secretions and aerosolized droplets [62]. Symptoms include high fever, cough, sore throat, muscle aches, headache, and fatigue, and it can lead to pneumonia or dehydration [64].
- **COVID-19 (SARS-CoV-2)** is a coronavirus transmitted through droplets, airborne particles, and direct contact [65]. It primarily affects the elderly, those in close quarters, and those with weakened immune systems, but young and healthy adults can also be infected [66]. Symptoms include high fever, cough, inspirational chest pain, vomiting, diarrhea, and loss of smell, with rapid respiratory deterioration possible [68].
- **Tuberculosis (TB)** is a bacterial infection mainly affecting the lungs but can be in other organs [70]. It can be inactive for years [70]. Symptoms include fever, cough, fatigue, night sweats, and weight loss [71]. It's more prevalent in homeless individuals, prison inmates, nursing home residents, IV drug/alcohol abusers, and those with HIV [71]. Minimum PPE includes gloves, eye protection, and an N95 respirator if TB is suspected [72].

6. Other Respiratory Conditions: Pulmonary Edema and COPD

- **Pulmonary edema** occurs when the left side of the heart cannot pump blood from the lungs effectively [72]. Fluid backs up in the alveoli and lung tissue [73].
- It's usually a result of **congestive heart failure (CHF)**, where the heart muscle is too weak to keep up with fluid [74].
- Patients often have dyspnea with rapid, shallow respirations [75].
- Severe cases may show frothy pink sputum from the mouth and nose [76].
- Most patients have a history of chronic CHF, but pulmonary edema can occur without heart disease [77].
- Fluid in the alveoli interferes with oxygen and carbon dioxide exchange [77].
- **Chronic Obstructive Pulmonary Disease (COPD)** is a lung disease with chronic, irreversible airflow obstruction [79].
- It's an umbrella term including **emphysema** and **chronic bronchitis** [79].
- Tobacco smoke often irritates the bronchial tubes, causing chronic bronchitis [79].
- **Chronic bronchitis** involves ongoing irritation of the trachea and bronchi with constant excessive mucus production [80]. This mucus obstructs small airways and alveoli [80].
- Airways are weakened, and protective lung mechanisms are destroyed [80].
- Chronic oxygen problems can lead to right-sided heart failure and fluid retention [80].
- Pneumonia can easily develop [80].
- Repeated irritation and pneumonia can scar the lungs [81].
- **Emphysema** is the loss of elasticity in lung material from chronic stretching of alveoli [81].
- Smoking directly destroys lung tissue elasticity [81].
- Most COPD patients have elements of both chronic bronchitis and emphysema [81].
- COPD affects the alveoli, making gas exchange difficult [82].
- **Wet lung sounds** (bronchi or crackles/rales) are associated with pulmonary edema (fluid) [83].
- **Dry lung sounds** (wheezes) are associated with COPD [85].
- However, not all COPD patients will wheeze, and not all CHF patients will have crackles; treat the patient, not just the lung sounds [87].

Lung Sound Type	Characteristics	Associated Condition(s)
Wet Lung Sounds	Bronchi, Crackles, Rales [83]	Pulmonary Edema [83], Congestive Heart Failure [83]
Dry Lung Sounds	Wheezes [86]	COPD [85]

7. Allergic Reactions Affecting the Airway: Hay Fever, Asthma, and Anaphylaxis

- **Hay fever, asthma, and anaphylaxis** are grouped together because they result from **allergic reactions** (inhaled, ingested, or injected) [87].
- **Asthma** is an acute spasm of the bronchioles with excessive mucus production and swelling of the airway lining [88].
- It affects all ages but is most prevalent in children aged 5-17 [88].
- Asthma produces characteristic **wheezing** as the patient exhales through narrowed airways [89].
- Acute asthma attacks can be triggered by allergic reactions (food, allergens), emotional distress, exercise, or respiratory infection [90].
- In its most severe form, an allergic reaction can cause **anaphylaxis** [91].
- **Hay fever** causes cold-like symptoms: runny nose, sneezing, congestion, and sinus pressure [92]. Symptoms are from an allergic reaction to outdoor airborne allergens like pollen [92].
- **Anaphylactic reactions** are severe allergic reactions with severe airway swelling and widespread blood vessel dilation [93].
- They may be associated with hives, itching, and signs of shock [93].
- Lung sounds can be similar to asthma [93].
- Airway swelling can completely obstruct the airway [93].
- Treatment includes epinephrine, oxygen, and antihistamines [93].

8. Other Respiratory Conditions: Pneumothorax, Pleural Effusion, and Airway Obstruction

- **Pneumothorax** is the partial or total accumulation of air in the **pleural space** [94].
- It is most often caused by trauma but can also result from medical conditions [95].
- A **spontaneous pneumothorax** occurs suddenly, sometimes in patients with chronic lung infections or young people with weak areas in the lungs [96].
- Normally, vacuum-like pressure in the pleural space keeps the lungs inflated [96]. When the lung surface is disrupted, air enters the pleural cavity, losing the negative pressure [97].
- Patients with spontaneous pneumothorax become dyspneic and may complain of **pleural or pleuritic chest pain** [98].
- Breath sounds are absent or decreased on the affected side [98].
- Pneumothorax has the potential to become life-threatening [98].
- **Pleural effusion** is a collection of fluid around the lung [98].
- This fluid compresses the lung and causes dyspnea [99].
- Causes include irritation, infection, chronic heart failure, or cancer [99].
- Breath sounds are decreased in the area of the effusion [99].
- Patients often feel better sitting upright [99].
- Patients with dyspnea may have a **mechanical obstruction** of the airway [100].
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- In semi-conscious or unconscious patients, obstruction can be caused by vomit, foreign objects, improper head positioning, or the tongue falling back [101].
- If a patient was eating before dyspnea onset, a foreign body airway obstruction should be considered [101].

9. Other Respiratory Conditions: Pulmonary Emboli and Hyperventilation

- A **pulmonary embolus** is anything in the circulatory system that travels and lodges, obstructing blood flow in the pulmonary area [103].
- Circulation can be partially or completely cut off [103].
- Emboli can be blood clot fragments or foreign bodies like air bubbles [104].
- A pulmonary embolus is a blood clot that travels through the venous system and right side of the heart to lodge in the pulmonary artery [105].

- Signs and symptoms include dyspnea, **tachycardia** (fast heart rate), **tachypnea** (fast breathing), varying hypoxia degrees, **cyanosis**, and acute chest pain [106].
- A large embolus can cause complete obstruction of blood output from the right heart, resulting in sudden death [107].
- **Hyperventilation** is breathing excessively to the point that arterial carbon dioxide levels fall below normal [107].
- It can indicate a life-threatening illness, possibly the body compensating for acidosis (acid buildup in blood/tissues) [108].
- It can also result in alkalosis (abnormally low bloodstream volume/basic blood) [109].
- Signs and symptoms of **hyperventilation syndrome**, such as a panic attack, include anxiety, dizziness, numbness/tingling in hands/feet, and painful hand/foot spasms (carpal pedal spasm) [111].
- The decision of whether hyperventilation is due to a life-threatening illness or panic attack should not be made outside the hospital [112].

10. Environmental/Industrial Exposure and Carbon Monoxide Poisoning

- Breathing problems can be caused by environmental or industrial exposures [114].
- This includes inhaling substances like pesticides, cleaning solutions, chemicals, and chlorine or other gases accidentally released [114].
- **Carbon monoxide (CO) poisoning** is caused by an odorless, highly poisonous gas [115].
- It is the leading cause of accidental poisoning deaths in the US [115].
- CO is produced by fuel-burning household appliances and is present in smoke [115].
- Symptoms include flu-like complaints and dyspnea [116].
- It is important not to put yourself at risk in these situations [116].
- High flow oxygen via a non-rebreathing mask is the best treatment for conscious patients with CO poisoning [116].

11. Patient Assessment in Respiratory Emergencies

- **Scene size-up** is crucial, always starting with assessing safety [116].

- Using **PPE** is important, especially with infectious respiratory diseases and toxic substances [116].
- If multiple people have dyspnea, consider an airborne hazardous material release [117].
- Determine the **nature of illness** by asking why 9-1-1 was called and questioning the patient, family, or bystanders [118].
- The **primary assessment** focuses on identifying immediate life threats [120].
- Form a general impression of the patient's distress level, noting age and position [120].
- Use the **AVPU scale** (Alert, Verbal, Painful, Unresponsive) to check responsiveness [120].
- Ask about the **chief complaint** [120].
- Evaluate the **ABC's**: ensure an open and adequate airway, assess breathing adequacy, and listen to lung sounds early [121].
- Check breath sounds on both sides of the chest [122].
- Abnormal sounds include wheezing, rales, rhonchi, or stridor [122].
- For circulation (**C**), assess pulse rate, rhythm, and quality, evaluate for shock or bleeding, and check perfusion (skin color, temp, condition) [123].
- Make a **transport decision** (load and go or stay and play) based on whether it's a life threat [125].
- Take a patient history, including history of the illness (investigating the chief complaint and what the patient has done for the problem) and history of the patient [126].
- Use the **SAMPLE** history (Signs/Symptoms, Allergies, Medications, Past Medical History, Last Oral Intake, Events Leading Up) for patients with a history of respiratory distress or if obtaining from bystanders/family [128].
- Use **OPQRST** (Onset, Provocation, Quality, Radiation, Severity, Time) to gather information about the breathing problem, similar to assessing pain [128].
- **PASTE** (Progression, Associated chest pain, Sputum, Talking/Tiredness, Exercise intolerance) is an alternative assessment for shortness of breath/difficulty breathing [128].
- Proceed with a **secondary assessment** only after addressing life threats and using monitoring devices if available [128].

Assessment Step	Key Actions / Focus Areas
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Scene Size-Up	Ensure safety, use PPE, consider airborne hazards with multiple patients [116]
Nature of Illness	Determine why 9-1-1 was activated, question patient/family/bystanders [118]
Primary Assessment	Identify immediate life threats, general impression, level of distress, age, position [120]
Responsiveness	Use AVPU scale [120]
Chief Complaint	Ask the patient [120]
Airway (A)	Evaluate if open and adequate [121]
Breathing (B)	Assess adequacy, listen to lung sounds (early, both sides) [121]
Abnormal Breath Sounds	Wheezing, rales, rhonchi, stridor [122]
Circulation (C)	Assess pulse (rate, rhythm, quality), evaluate for shock/bleeding, check perfusion (skin color, temp, condition) [123]
Transport Decision (D)	Determine if life threat requires rapid transport (load and go) [125]
History of Illness	Investigate chief complaint, what patient has done for the problem [126]
History of Patient	Use SAMPLE for history of respiratory distress, bystanders/family can provide info if patient can't talk [128]
Present Illness	Use OPQRST or PASTE for information about the breathing problem [128]
Secondary Assessment	Conduct after addressing life threats, use monitoring devices [128]

12. Differentiating COPD and Congestive Heart Failure

- Differentiating between COPD and Congestive Heart Failure (CHF) patients is important [129].
- **COPD patients** are usually over 50 years old [130].
- They often have a history of lung problems [131].
- Most are current or former long-term cigarette smokers [132].
- They complain of chest tightness and constant fatigue [133].
- Their chest may have a **barrel-like appearance** [134].
- They often use **accessory muscles** to breathe [135].
- They exhibit abnormal breath sounds [136].
- They often exhale through **pursed lips** [136].
- They may have **digital clubbing**, which are abnormally enlarged fingertips [136].

Characteristic	COPD Patients	Congestive Heart Failure (CHF) Patients
Age	Usually older than 50 [130]	Not specified in this document section
History	Often have lung problems [131], long-term active or former cigarette smokers [132]	Not specified in this document section, but associated with pulmonary edema [74]
Complaints	Tightness in chest, constant fatigue [133]	Difficulty breathing, especially when lying flat [191]
Physical Appearance	Barrel-like chest [134], digital clubbing (enlarged fingertips) [136]	Not specified in this document section
Breathing Patterns	Often use accessory muscles [135], often exhale through pursed lips [136]	Rapid, shallow respirations (with pulmonary edema) [75]

Breath Sounds	Exhibit abnormal breath sounds [136]	Wet lung sounds (bronchi, crackles, rales) often present with pulmonary edema [83]
Other	Switch to hypoxic drive due to elevated CO2 levels [22]	Can experience pulmonary edema [73]

13. Management and Treatment of Respiratory Distress

- Repeat the primary assessment to check for changes in condition [138].
- Confirm that interventions are adequate [138].
- Interventions for respiratory problems include providing **high flow oxygen** (15 liters via non-rebreather) [138].
- Positive pressure ventilations may be needed using a bag-valve mask, pocket mask, or flow-restricted, oxygen-powered device [138].
- Airway management techniques like oropharyngeal or nasopharyngeal airway insertion, suctioning, and positioning may be necessary [138].
- Non-invasive ventilatory support with **CPAP** might be provided [138].
- Position the patient in a **high Fowler's position** or position of choice [139].
- Assist the patient with **respiratory medications** [139].
- Communicate relevant information to the receiving facility staff [140].
- Administer oxygen immediately for respiratory distress [141].
- Provide ventilatory support if the patient's mental status is declining, or if distress is moderate/severe, or respiration depth is inadequate [141].
- Monitor the patient's respiratory status and provide emotional support [141].
- If the patient has a metered-dose inhaler or small volume nebulizer, call medical control to see if the medication is indicated [141].
- Ensure there are no contraindications for the medication [142].
- Most respiratory inhalation medicines relax muscles around air passages, causing **bronchial dilation** (airway opening) [142].
- Side effects can include increased pulse, nervousness, and muscle tremors [142].
- Medication from an inhaler is delivered to the lungs via the respiratory tract [143].

- Follow skill drills for assisting patients with self-administration of inhalers and nebulizers [144].

14. Treatment of Specific Respiratory Conditions

- For **upper or lower airway infections**, administer humidified oxygen [145].
- Do not suction or place an OPA in a patient with suspected epiglottitis; position comfortably and transport [146].
- For **pulmonary edema** (fluid in lungs), provide 100% oxygen, suction if needed, position comfortably (usually seated), provide CPAP if indicated/allowed, and transport promptly [148].
- For **COPD**, assist with an inhaler, watching for overuse signs (side effects); position comfortably and transport promptly [153].
- For **asthma**, be ready to suction, assist with an inhaler, provide aggressive airway management, oxygen, and prompt transport [155].
- **Hay fever** is usually not an emergency, manage the airway and give oxygen based on distress level [157].
- **Anaphylaxis** is a true emergency; remove the offending agent, provide aggressive airway management, oxygen, prompt transport, and administer Epi if allowed by protocol [158].
- For **spontaneous pneumothorax**, provide oxygen, transport to the hospital, and monitor carefully [160].
- For **pleural effusions**, fluid removal must be done at the hospital; provide oxygen and transport promptly [161].
- For **airway obstruction**: partial obstruction gets supplemental oxygen only; complete obstruction requires clearing the obstruction then administering oxygen [162]. Transport rapidly to the emergency department [164].
- For **pulmonary emboli**, supplemental oxygen is mandatory; position comfortably; clear the airway immediately if coughing up blood; prompt transport is needed [165].
- For **hyperventilation**, complete primary assessment and gather history; never have the patient breathe in a paper bag; reassure and provide oxygen if necessary; prompt transport [167].
- For **environmental or industrial exposure**, ensure patients are decontaminated; treat with oxygen and adjuncts if needed; suction based on presentation [170].
- For **foreign body airway obstruction**, perform age-specific clearing techniques, provide oxygen, and transport [171].

- For **tracheostomy dysfunction**, position comfortably, suction to clear obstruction, then oxygenate [172].
- For **asthma in children**, give blow-by oxygen and use metered-dose inhalers as with older patients [173]. Asthma can be life-threatening in older adults [173].
- **Cystic fibrosis** is a genetic disorder affecting lungs/digestive system, predisposing children to lung infections [174]. Symptoms vary; suction and oxygenate these patients [174].

Condition	Treatment Approach
Upper/Lower Airway Infection	Administer humidified oxygen [145]
Suspected Epiglottitis	Do not suction or place OPA, position comfortably, transport [146]
Pulmonary Edema	100% oxygen, suction if needed, position comfortably (seated), CPAP if indicated/allowed, prompt transport [148]
COPD	Assist with inhaler (watch for overuse), position comfortably, prompt transport [153]
Asthma	Prepare to suction, assist with inhaler, aggressive airway management, oxygen, prompt transport [155]
Hay Fever	Manage airway, oxygen based on distress (usually not emergency) [157]
Anaphylaxis	Remove agent, aggressive airway management, oxygen, prompt transport, administer Epi (if protocol allows) [158]
Spontaneous Pneumothorax	Provide oxygen, transport to hospital, monitor carefully [160]
Pleural Effusions	Provide oxygen, transport promptly (fluid removal at hospital) [161]

Partial Airway Obstruction	Provide supplemental oxygen [162]
Complete Airway Obstruction	Clear obstruction, administer oxygen, rapid transport [162]
Pulmonary Emboli	Mandatory supplemental oxygen, position comfortably, clear airway if coughing blood, prompt transport [165]
Hyperventilation	Primary assessment, history, reassure, oxygen if necessary, prompt transport (no paper bag) [167]
Environmental/Industrial Exposure	Decontaminate, treat with oxygen/adjuncts, suction as needed [170]
Foreign Body Airway Obstruction	Age-specific clearing technique, oxygen, transport [171]
Tracheostomy Dysfunction	Position comfortably, suction to clear obstruction, oxygenate [172]
Asthma in Children	Blow-by oxygen, use MDI [173]
Cystic Fibrosis	Suction, oxygenate [174]

15. Review of Key Concepts

- The process of oxygen and carbon dioxide exchange in the lungs is called **respiration** [176]. Respiration is the exchange of gases between the body and its environment [176].
- **Asthma** is a respiratory disease causing obstruction of the lower airway (bronchioles) [177]. Croup and epiglottitis are upper airway infections [177].
- **Tuberculosis** is a potentially drug-resistant bacterial infection transmitted by coughing [178]. It is dangerous and resistant to antibiotics [179].
- Causes of acute dyspnea include asthma, pneumothorax, and pulmonary emboli [180]. **Emphysema** is a chronic respiratory disease, not an acute cause of dyspnea [182].

- **Bronchospasm** (narrowing/spasming of airways) is most often associated with **asthma** [183]. Asthma is a reactive disease caused by bronchiole spasms [183].
- Sudden onset of difficulty breathing with sharp chest pain and cyanosis despite oxygen is indicative of a **pulmonary embolus** [184]. Pneumonia is slower, and MI can cause chest pain but this presentation is classic for emboli [184]. A pulmonary embolus is a blockage causing pleuritic chest pain [185].
- Albuterol (a beta-2 antagonist/agonist) is the generic name for **Ventolin** or Proventil [188].
- An acute bacterial infection causing swelling of the flap covering the larynx during swallowing (the epiglottis) is **epiglottitis** [189]. It is potentially life-threatening and caused by bacterial infection of the epiglottis [190].
- Difficulty breathing, especially when lying flat, in a patient who recently had a heart attack suggests **pulmonary edema** from left-sided heart failure [191]. Lying flat allows fluid to cover more lung surface, while sitting up concentrates it lower [192].
- A 29-year-old conscious and alert patient with 20 respirations is breathing **adequately** [194].