MODULE IV

MEDICAL / BEHAVIORAL

LEARNING OBJECTIVES

Upon completion of this course, you will be able to:

1. List the structure and function of the respiratory system.
2. State the signs and symptoms of a patient with breathing difficulty.
3. Describe the emergency medical care of the patient with breathing difficulty.
4. Recognize the need for medical direction to assist in the emergency medical care of the patient with breathing difficulty.
5. Describe the emergency medical care of the patient with breathing distress.
6. Establish the relationship between airway management and the patient with breathing difficulty.
7. List signs of adequate air exchange.
8. State the generic name, medication forms, dose, administration, action, indications and contraindications for the prescribed inhaler.
9. Distinguish the emergency medical care of the infant, child, and adult patient with breathing difficulty.
10. Differentiate between upper airway obstruction and lower airway disease in the infant and child.
11. Provide treatment for a patient in respiratory distress.
    - List the signs and symptoms of difficulty breathing.
    - Describe the emergency medical care of the patient with breathing difficulty.
    - Recognize the need for medical direction to assist in the emergency medical care of the patient with breathing difficulty.
    - State the generic name, medication forms, dose, administration, action, indications and contraindications for the prescribed inhaler.
12. Provide care to a patient experiencing chest pain or discomfort.
    - Describe the emergency medical care of the patient experiencing chest pain/discomfort.
    - Discuss the position of comfort for patients with various cardiac emergencies.
    - Recognize the need for medical direction of protocols to assist in the emergency medical care of the patient with chest pain.
    - List the indications for the use of nitroglycerin.
13. Attempt to resuscitate a patient in cardiac arrest.

- Discuss the circumstances that may result in inappropriate shocks.
- Explain the considerations for interruption of CPR when using the automated external defibrillator.
- List the steps in the operation of the automated external defibrillator.
- Discuss the need to complete the Automated Defibrillator: Operator's Shift Checklist.
- Explain the role medical direction plays in the use of automated external defibrillation.

14. Provide care to a patient with an altered mental status.
    - State the steps in the emergency medical care of the patient taking diabetic medicine with an altered mental status and a history of diabetes.
    - Evaluate the need for medical direction in the emergency medical care of the diabetic patient.
15. Provide care of the patient experiencing an allergic reaction.
    - Recognize the patient experiencing an allergic reaction.
    - Describe the emergency medical care of the patient with an allergic reaction.
    - State the generic and trade names, medication forms, dose, administration, action, and contraindications for the epinephrine auto-injector.
    - Evaluate the need for medical direction in the emergency medical care of the patient with an allergic reaction.
    - Differentiate between the general category of those patients having an allergic reaction and those patients having an allergic reaction and requiring immediate medical care, including immediate use of epinephrine auto-injector.
16. Provide care to a suspected poison/overdose patient.
    - Describe the steps in the emergency medical care for the patient with suspected poisoning.
    - Discuss the emergency medical care for the patient with possible overdose.
17. Provide care to a patient experiencing a behavioral problem.
    - Discuss the characteristics of an individual's behavior that suggest the patient is at risk for suicide.
    - Discuss the special considerations for assessing a patient with behavioral problems.
    - Discuss the general principles of an individual's behavior that suggest he is at risk for violence.
    - Discuss methods to calm behavioral emergency patients.

Trauma emergencies hold great attraction for many EMTs, especially early in their careers. But medical emergencies can be very interesting calls—and very rewarding as well. A medical emergency may give you the chance to perform an intervention that produces a swift and positive result. It's a wonderful feeling when the patient can say "You made me feel much better!"

GENERAL PHARMACOLOGY

A brief overview of pharmacology is in order. All ambulances carry oxygen and, in some systems, they may carry other medications as well. Glucose paste is the most common addition, and aspirin is making an appearance. If your system carries others, you should be thoroughly familiar with their use.

Medications

Often patients will have their own medications and, with approval from your medical director, you may assist the patient in taking them. Patients with asthma or chronic obstructive pulmonary disease (COPD) may have prescribed inhalers. Patients with certain heart conditions may have nitroglycerin to treat their chest pain. Patients with severe allergic reactions may carry epinephrine.

Medications may be known by several names. Before a drug is officially listed in the U.S. Pharmacopoeia, it is know by a chemical name. You will seldom see the **chemical name** used. Once it is listed, the medication is given a **generic name**. These are more commonly heard; examples would be epinephrine and nitroglycerin. The manufacturer will use a **trade name** to market the drug, often something shorter and easier to remember; for example, Center Laboratories sells their epinephrine auto-injector under the names EpiPen and EpiPen Jr.

Indications and Contraindications

Every drug is designed to address certain specific situations, or **indications**. Just because a patient has the medication doesn't mean they should use it! Virtually every medication also has **contraindications**. These are situations in which the medication should not be used, even if the indications are there. For instance, some medications may only be given if the patient's vital signs are within a certain range.

Medication Forms

Medications come in many different forms. These variations permit them to enter the bloodstream in the most effective manner for fulfilling their purpose. It is important to be familiar with the various forms, as they affect they way the drug is administered.

Tablets are one of the most familiar forms. They are made by tightly compressing a precise dose of the medication in a powder base. **Injectable liquids** are also familiar. The medication is fully dissolved it the liquid and the dosage remains precise. **Suspensions** are solids mixed in a liquid. These can settle over time and must be shaken to ensure an accurate dose. **Gels** are imilar to suspensions but they are thicker.

Inhalers may come in one of two forms, either a fine powder that is inhaled or a liquid that is vaporized for inhalation. Gases, such as oxygen, are also inhaled. You may also see nitroglycerin as a tablet or spray, both for sublingual use.

Dosage

The dose is how much of the medication is to be given. Some medications come in standard doses that can be taken by any adult. Some depend on body weight. It is very important to know the appropriate dose and to give exactly that. Too much or too little may cause more harm than good.

Administration

Administration is the route by which the medication is given. It is very important to give medications correctly. Incorrect administration can lead to serious side effects, or it may actually inactivate the drug. Drugs may be given orally or sublingually, or they may be injected, inhaled, or used topically.

Action

A drug's **action** refers to what we want it to do. Examples would be to open the airway for better ventilation or to open the blood vessels in order to decrease cardiac (ischemic) chest pain.

Side Effects

Most medications have side effects of some sort. These effects are not related to the reason for giving the medication, but they happen anyway. Some are so common that we expect them. For instance, nitroglycerin almost always gives the patient a headache. Development of side effects may or may not be a contraindication for additional doses, but they should always be noted and documented.

Re-Assessment Strategies

Whenever you do any kind of treatment or intervention, you must re-assess the patient as part of your ongoing assessment. Findings that indicated the treatment should be well documented, as should the medication, dose, and time of administration. As you continue your assessment, be sure to document the patient's response to the treatment.

RESPIRATORY

SCENARIO

You are called to a residence for a patient having respiratory difficulty. On arrival you find an elderly gentleman who is sitting up, leaning forward, and it appears he is working very hard to breathe. He can only speak one or two words at a time so you turn to his wife, who gives a history of increasing shortness of breath over the past week. He has used his inhaler frequently but gotten little to no relief and has, in fact, used it 5 times in the last 2 hours and is no better at all.

The patient has emphysema but no other medical problems. He uses oxygen (O_2) at home at the rate of 2 liters per minute (lpm) but has turned it up to 5 lpm. His medications include Prednisone, Combivent inhaler, and Xopenex nebulizer treatments.

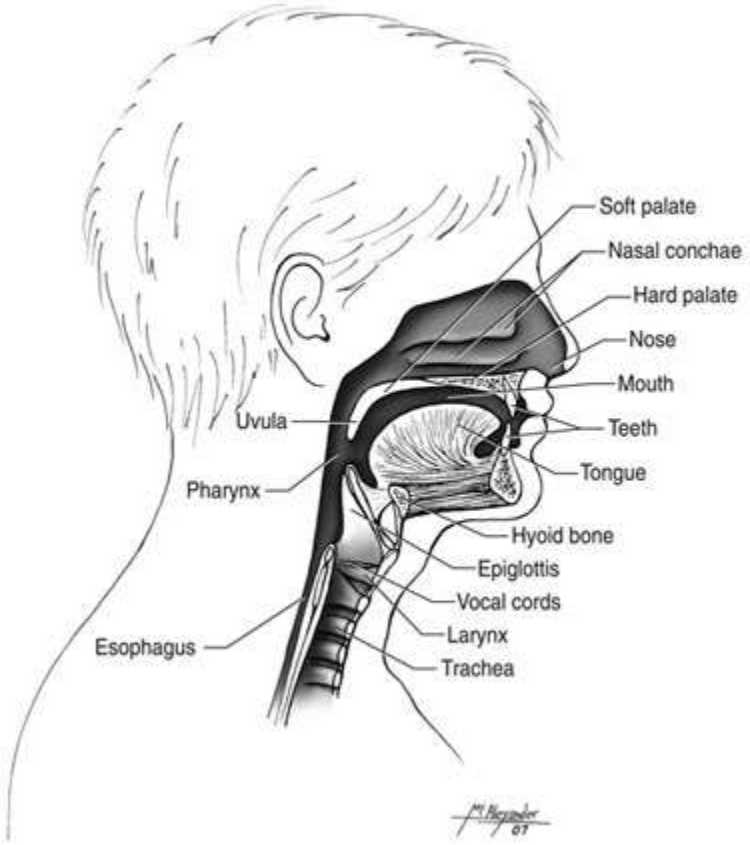
Your assessment shows a tired, ill-appearing elderly man. His skin is gray and his chest appears too large for his body. Vital signs are BP 110/80, pulse 120, respirations 36, shallow and labored, oxygen saturation 89% on 5 lpm O_2. Lung sounds are so faint you can barely hear them. You increase his O_2 to 15 lpm by nonrebreather mask. The directions on his inhaled medication prescribe usage only 4 times a day and the patient has already exceeded that. You decide not to assist him with an additional dose and prepare him for immediate transport.

A repeat assessment shows BP and pulse unchanged, but his respiratory rate is dropping and though he looks at you when you call his name he makes no attempt to talk. You recognize that he can no longer breathe for himself and prepare to assist. You connect a bag valve mask (BVM) to O_2 at 15 lpm as you explain what you are about to do. You cover his nose and mouth with the mask and hold it firmly to his face. You squeeze the bag slowly, allowing the breath to go in over 1 to 2 seconds and allowing 2 to 4 seconds for the patient to exhale. As the two of you establish a rhythm, you notice that the patient's skin color is becoming pink, his oxygen saturation is 95% and his pulse rate has dropped to 100.

After giving your report to the emergency department staff, you carefully complete your documentation. As you return to his room to leave a copy with the nurse, you note that the patient looks considerably better. He is no longer being manually ventilated but is sitting up with a mask strapped tightly to his face and connected to a machine. He can talk to you through the mask and thanks you for your help. The nurse explains that the machine is called Bi-PAP and the patient will probably not need to be on a ventilator.

Airway Anatomy

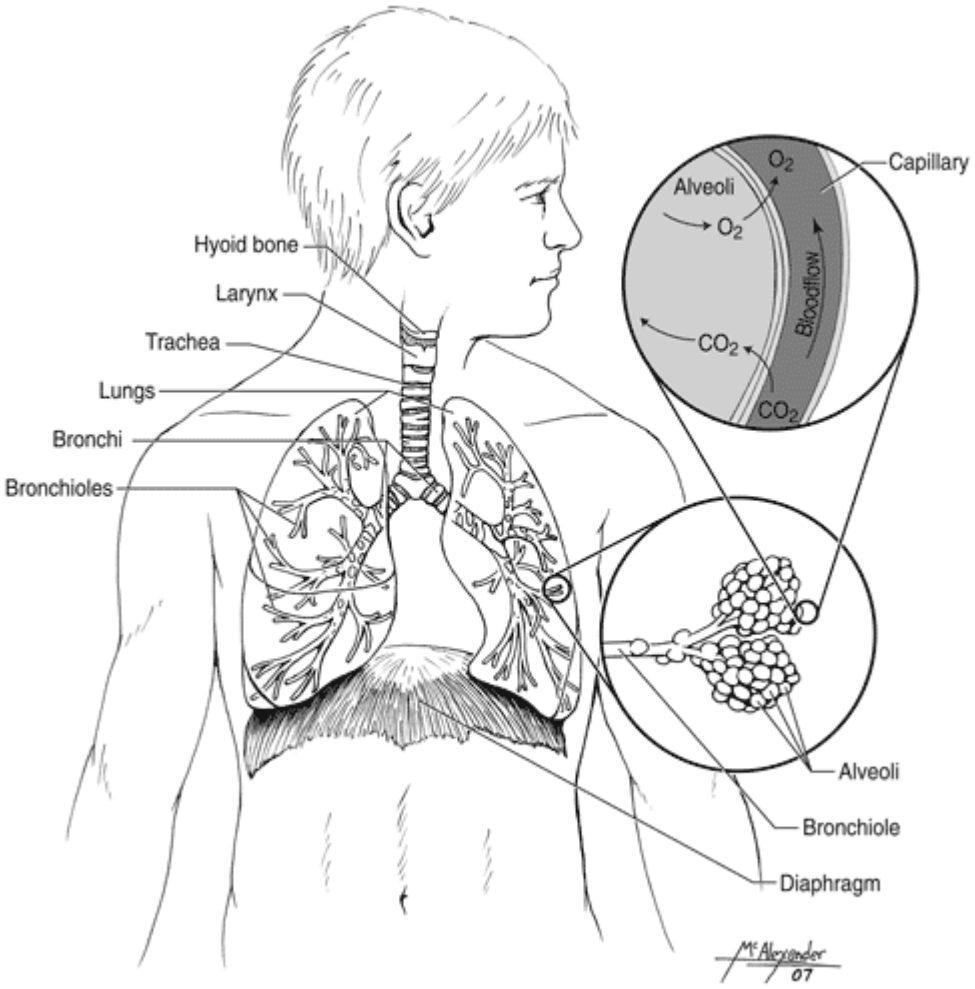
Air enters via the nose and/or the mouth. The air is moistened and filtered by the nasal turbinates and passes through the pharynx. The upper pharynx (behind the nose) is the **nasopharynx**; the lower pharynx (behind the tongue) is the **oropharynx**.



The upper airway. (Illustration by Jason M. McAlexander, MFA. Copyright © 2007 Wild Iris Medical Education.)

The **epiglottis** is a small structure, similar to a trap door that seals off the airway during swallowing to prevent food and liquid from entering the lower airway. The **larynx** contains the vocal cords and is essential for speech. It is the narrowest part of the airway in an adult and most foreign bodies will lodge there.

The **trachea**, or windpipe, branches into the right and left mainstem bronchi. The **bronchi** further divide into **bronchioles** that lead to the alveoli. Bronchi have rings of cartilage that keep them open, but the bronchioles are soft and can collapse in some disease states. The **alveoli** are microscopic sacs that are wrapped with capillaries. It is here that oxygen is delivered to the blood and carbon dioxide is removed.



The lower airway. (Illustration by Jason M. McAlexander, MFA. Copyright © 2007 Wild Iris Medical Education.)

Airway Functions

The airway connects the lungs to the outside atmosphere. The amount of air that moves with each breath is called **tidal volume** and it is usually measured in milliliters. When this number is multiplied by the number of breaths a patient takes in a minute, the result is **minute volume**. Patients whose airways are narrowed by swelling or a foreign body cannot take in as much air with each breath. This makes them breathe faster so that they can maintain a good minute volume.

Breathing faster allows enough air to move into the alveoli, where **gas exchange** takes place and waste products are eliminated. This gas exchange is vital to all functions of the body so the airway must remain open. Opening a blocked airway is always the utmost priority. Even a partial blockage will reduce the amount of oxygen delivered to the body.

Breathing Difficulty

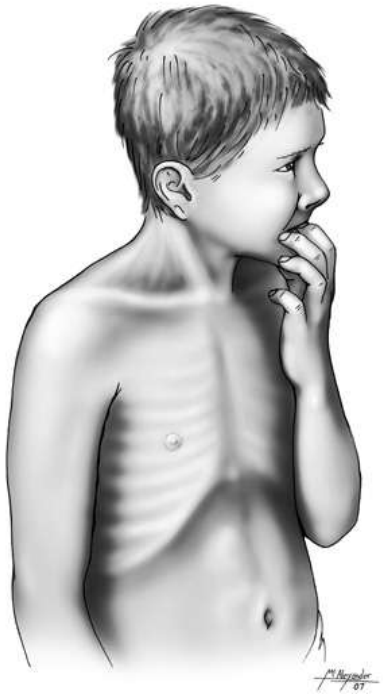
Breathing difficulty can cause serious problems for the patient and it is important that you recognize it right away. If patients can talk, ask them! They will tell you if they are having difficulty breathing, and whether it is normal for them or worse than usual.

Look at your patients. Do they seem to be working hard to breathe? Patients may be restless or irritable, especially children. Pulse rate often increases due to the decreased availability of oxygen and from the use or overuse of their medications. Respiratory rate usually increases. Beware of a decreasing respiratory rate in a patient who seems to be getting worse otherwise. Respiratory arrest will soon follow.

Breathing may be noisy. **Wheezing,** which is a high-pitched whistling sound, may be audible with or without a stethoscope. You may hear gurgling or snoring.

Stridor is a harsh sound from the upper airway that indicates a partial obstruction. **Crowing** is a high-pitched upper airway sound heard in children with partial airway obstruction due to swelling. Patients may have difficulty talking. Document whether they can speak in full sentences and, if not, about how many words they can speak before they take a breath.

Look for **retractions**. These are more common in children. Look above the sternum and between and below the ribs. With a retraction, the tissue seems to cave in as they inhale. They may use muscles in the abdomen or shoulders to breathe. They may not be able to take a full breath. Coughing may be frequent or prolonged. The breathing pattern may be irregular. Patients will usually insist on sitting up.



Child experiencing shortness of breath. Note retractions in the neck and chest. (Illustration by Jason M. McAlexander, MFA. Copyright © 2007 Wild Iris Medical Education.)

Small infants can tolerate a supine position when in respiratory distress but older children and adults cannot. They may lean forward, bracing themselves with their arms. This is called the **tripod position**. The skin may be pale, ashen or gray, or the deep blue-gray called **cyanosis**.

Child assuming tripod position. (Illustration by Jason M. McAlexander, MFA. Copyright © 2007 Wild Iris Medical Education.)

Look for signs of inadequate ventilation. Adults usually breathe 12 to 20 times per minute. Rates less than 10 or greater than 30 may not give adequate minute volume. Irregular respiratory pattern should be noted.

Cycles of decreasing rate and depth followed by a period of apnea indicate serious distress. Lung sounds may be noisy or diminished. Absent breath sounds are a serious finding. The chest may not expand completely or may expand unevenly. This is often a problem with chest trauma. The work of breathing may be greatly increased. The skin may be cool, clammy, and cyanotic. Agonal respirations are slow, gasping, ineffective breaths taken just before the patient becomes apneic. These patients need immediate help.

ASSESSMENT AND MANAGEMENT OF BREATHING DIFFICULTY

Initial management of a patient in respiratory distress is dependent on their level of consciousness and whether they are ventilating adequately. If the patient is in respiratory distress but is conscious and ventilating adequately, administer oxygen and re-assess often. A conscious patient with inadequate ventilation will need assistance with a BVM.

A nasal airway may be used, if indicated, but they are poorly tolerated in a conscious patient. If the patient is unconscious but breathing adequately, make sure they can maintain their own airway. Place an adjunct if indicated. Administer high-flow O_2 with a nonrebreather mask. Re-assess often. Unconscious patients with inadequate ventilation should have an airway adjunct placed and ventilation assisted with a BVM.

FOCUSED HISTORY AND PHYSICAL EXAM

Once immediate airway and ventilation needs have been addressed, it is essential to complete the focused history and physical exam. The history is very important. Remember, if the patient stops breathing, you may have been the only one of the emergency team who had an opportunity to gather this history. Ask about the onset of symptoms, when they began, and if the onset was sudden or gradual.

Ask about previous episodes. What was the diagnosis? Is this similar? What have they done to treat it? Has it helped? Has the patient ever had to stay overnight in the hospital for breathing problems? Were they in intensive care? Were they ever on a ventilator? Is there any pain associated with their symptoms? Do they have a cough? If so, does it produce sputum and, if so, what color?

The physical exam should focus on signs of adequate versus inadequate ventilation. Patients with **mild** respiratory distress may be hypoxic but will move adequate tidal volume and may improve quickly with oxygen. They are alert and will answer your questions. They will benefit from O_2 and use of their prescribed inhaler.

The patient with **moderate** breathing difficulty may still be moving adequate tidal volume but have trouble speaking and be restless or irritable. They will benefit from O_2 as well but may not be able to inspire deeply enough to use their inhaler. They will probably not let you assist ventilation.

Patients with **severe** respiratory distress will be getting sleepy. They will either not talk at all or say only 1 to 2 words at a time. At this point, you need to assist ventilation with a BVM. If possible, two people should perform this procedure. One seals the mask to the face with their thumbs on the mask and fingers under the jaw while the other delivers ventilation. Ventilation should be delivered over 1 to 2 seconds with 2 to 4 seconds allowed for exhalation. Time them so they are delivered with the patients respiratory efforts as much as possible. Continue with re-assessment.

OXYGEN

Oxygen is necessary for all organ systems in the body to function. Some organ systems, such as skeletal muscle can tolerate hypoxia for several hours. The brain can suffer irreversible damage in minutes if it gets no oxygen. Oxygen is present in the air and is sufficient for most people most of the time. Patients who are compromised due to medical or traumatic problems may benefit greatly from supplemental oxygen and it may,

in fact, be lifesaving. Past concerns about over use of oxygen in infants and patients with COPD have been proven invalid. If the patient needs oxygen, give a high concentration.

Oxygen cylinders come in various sizes. The mathematical formula for calculating the length of time a bottle will last will not be given here. Refer to the table for duration of a full cylinder at 15 lpm.

Cylinder size	Capacity at 2000 psi (liters)	Duration at 15 lpm (minutes)
D	350	19
E	625	33
M	3000	187
G	5300	289
H	6900	376

Oxygen cylinders need to be handled with great care. They contain a gas under pressure and if any component of the cylinder fails, the result could cause serious injury. The regulator should be protected by a cage or protective container and by careful handling. Make sure all tanks are secured at all times on the ambulance. Lay them on their side to prevent falls and do not place them on high surfaces unless they can be secured. Cylinders should be checked at the beginning of every shift and after every use and replaced or refilled when they get low. Every service will have their own policy of when a cylinder is too low and needs to be replaced but it will generally be between 500 and 700 psi.

Filling oxygen cylinders is very dangerous if safety procedures are not followed. If your service performs this task, do not attempt it without formal training. Care must also be taken when replacing an empty cylinder. Remove the regulator from the empty cylinder and secure the cylinder in a safe place. Retrieve a full bottle, remove the protective cover and briefly open the valve. This will blow out any dust or debris that may have collected during storage. Attach the regulator and tighten just enough to give a good seal. Do not over tighten. Turn the valve on to check for leaks, then turn off the valve and bleed the regulator before storing. Pressure in the regulator can weaken seals over time.

When applying oxygen to the patient, open the valve and check to make sure the cylinder is full. Attach the oxygen delivery device to the tank and choose the desired setting. Once the correct flow is achieved, apply the device to the patient. The preferred method for oxygen delivery in the prehospital setting is with a nonrebreather mask. This will deliver high concentrations of oxygen, as much as 90%. They come in adult, child and infant sizes, so be certain you have the correct size for your patient.

Make sure the bag attached to the mask is full before you place it on the patient and watch to make sure it doesn't deflate completely when the patient inhales. A flow rate of 15 lpm will usually accomplish this. Nasal cannulas may also be used in your service. These deliver a much lower concentration of oxygen. They may be used in a patient who will not tolerate the mask or who has copious vomiting. Flow rates should be no more than 6 lpm.

As healthcare moves out of institutions and into the home, you may see patients dependent on machines to breathe. Ventilators are the most familiar. These machines may breathe for the patient or assist their efforts. The patient will almost always have a tracheotomy (a surgical opening in the neck). A tube is inserted through the opening and into the trachea.

Home ventilators are very reliable and seldom fail. If you suspect a failure and the patient seems to be in distress, your first action is to ventilate with a BVM while someone familiar with the machine troubleshoots. Do not attempt to fix the ventilator yourself!

Perform a focused assessment and history. If the airway needs to be suctioned, use sterile technique or let someone familiar with the procedure do it. Home ventilators are small and sturdy. If you need to transport the patient, you can usually leave the patient on the ventilator if it is working well.

Check with your medical director for proper procedure in your system. C-PAP and Bi-PAP machines are becoming more common in the home. C-PAP gives a continuous "push" of air through a tightly fitted mask, while Bi-PAP pushes harder when it detects inspiration. At the present time they are used mostly for sleep apnea, but they are starting to be used by patients with chronic breathing problems to treat acute distress. Consult with your medical director about whether to transport these machines.

MEDICATIONS

Patients with asthma or chronic obstructive pulmonary disease (COPD) usually have prescribed inhalers to treat their condition. Some are considered maintenance inhalers and are used regularly, much like oral medications. Others are considered rescue inhalers and are reserved for respiratory distress. Before you consider assisting a patient with their inhaler, be sure you have a rescue inhaler. The patient should be able to tell you which is which, or the family may know. If you're not sure, do not administer it!

The most common rescue inhaler is **albuterol** and it is sold under the trade names of Proventil or Ventolin. Other rescue inhalers combine albuterol with other medications. Use of the rescue inhaler is indicated if the patient is in respiratory distress **and** has the inhaler prescribed for them **and** you are authorized by your medical director to assist in its administration.

It is contraindicated if patients are unable to use it themselves for any reason, **or** it is not prescribed for them **or** permission cannot be obtained from your medical director **or** they have already met or exceeded the maximum dosage. The action of the medication is to dilate the bronchioles, thus increasing airflow and ventilation and decreasing the work of breathing. Side effects may include increased heart rate, tremors and nervousness. The dose ordered will usually be 1 to 2 inhalations.

To administer the medication, obtain an order from your medical director. Ensure that the medication is, indeed, a rescue inhaler and that the patient is the one for whom it is

prescribed and that they are alert enough to use it. Ensure that the inhaler is at room temperature or warmer and shake it several times. Attach the spacer if one is available as it will allow more medication to be inhaled. Remove the oxygen adjunct from the patient and have them exhale deeply.

With their lips sealed around the opening, have them inhale slowly and deeply as they depress the inhaler. Have them hold their breath for a few seconds if they can to allow the medication to be absorbed and replace the oxygen delivery device. If a second inhalation is ordered, allow the patient to breathe a few times before it is administered. Document the dose given and the time of the dose and continue re-assessment. Document the patient's response to the dose.

Children may also have chronic respiratory conditions and may present with respiratory distress. Remember that very young infants are obligate nose breathers and may need to have the nose suctioned with a bulb syringe. Retractions are easier to see in children due to the soft chest structure. They may have frequent coughing rather than wheezing. Cyanosis is a late finding and usually is seen around the lips first. Children are likely to be restless and irritable. A quiet child is a child in serious distress! Inhalers are used for children as they are in adults. The use of a spacer is more common. The parents or caregivers will sually assist the small child with their inhaler.

SCENARIO

You are called to a residence for a patient experiencing chest pain. On arrival, you find a 55-year-old male who appears very ill. His skin is gray and sweaty. He is holding his chest and breathing heavily. The expression on his face is one of panic. He tells you that he was watching TV about 15 minutes ago when his symptoms began quite suddenly.

He had symptoms like this last year when he had a heart attack but he doesn't remember the pain being this bad. He had three stents placed at that time and has had no pain since. During the past week, he has often been short of breath. He has nitroglycerin (NTG) tablets but has never used them before. His only other medicines are diltiazem, furosemide, and potassium.

The dispatcher who took the call instructed him to chew an aspirin tablet, which he has done. Your exam shows blood pressure 134/88, pulse rate 110, respirations 20, oxygen saturation (SaO_2) 96% on room air. Lungs are clear and equal. He rates his pain at 10/10. You administer oxygen by nonrebreather mask at 15 lpm.

Once you have ensured that the NTG was prescribed for him and that it has not expired, you obtain an order to assist with administration. You place one tablet under his tongue, instruct him not to swallow, and prepare for immediate transport. Five minutes later, your re-assessment shows blood pressure 88/60, pulse rate 140, respirations 20, and SaO_2 92%. His pain is unchanged. You determine that his vital signs are too unstable for additional

NTG and continue your focused assessment.

A few minutes later the patient gasps once and becomes unresponsive. You quickly determine that he has no pulse and apply an automated external defibrillator (AED). After delivering one shock you immediately begin chest compressions and ventilations at a rate of 30:2. After 2 minutes, he has a palpable pulse but remains unconscious with ineffective breathing. You continue to assist ventilations and continuously re-assess.

CARDIAC EMERGENCIES

There have been many recent changes in the care of the cardiac patient. Much of the information in this section will be different from what you have learned earlier, but it reflects the newest information available and is based on good research. The AED is used differently and will require reprogramming. Be sure to check with your medical director and your service about new procedures and protocols.

Initial assessment of the cardiac patient will depend on whether the patient is responsive. If the patient is not sitting up and talking to you, establish unresponsiveness using the shake and shout method. Open the airway using the head tilt–chin lift method. Check for breathing. If the patient is breathing, treat for altered mental status. If the patient is not breathing, give 2 breaths and check for a pulse.

If the pulse is present, place an airway adjunct and give ventilations. If the pulse cannot be clearly felt, assume it is absent and start compressions. Give 30 compression then 2 ventilations. Unless you witness the patient's collapse or know that the patient has been down for less than 4 minutes or someone has performed good CPR before you arrived, you do CPR for 2 minutes **before** applying the AED.

If your initial assessment shows a responsive patient, perform a focused history and physical exam. Allow the patient to assume a position of comfort. Apply oxygen and assess vital signs. The history should include when the pain began and what the patient was doing when it started.

Ask patients if they have ever had pain like this before and what it turned out to be. Ask about the nature of the pain, whether it is sharp, dull, or squeezing. Ask whether it seems to radiate anywhere and if anything seems to make it better or worse. Have the patient rate the pain on a scale of 1 to 10 with 0/10 being no pain at all and 10/10 the worst pain they've ever had. Ask about any other symptoms such as difficulty breathing, sweating, nausea, or lightheadedness.

If your service has begun to carry aspirin, it should be given as soon as possible. With an order from your medical director, have the patient chew 160 to 325 mg of aspirin. Document the dosage given and the time it was given.

If patients have been prescribed NTG and they have it with them, you may assist the patient in taking it. One NTG tablet is given sublingually. This can be repeated to a total of 3 doses as long as the patient's vital signs remain stable. Re-assess before every dose.

If the patient does not have NTG or it is contraindicated, continue with focused assessment and transport. These patients must be monitored closely. Not every cardiac patient becomes a cardiac arrest—but you should be prepared, just in case.

Automated External Defibrillation (AED)

Out of hospital, cardiac arrest has a poor prognosis. Most people do not survive. A successful resuscitation depends on four factors that are known as the chain of survival.

The first factor, or link in the chain of survival, is early access. The sooner you recognize cardiac arrest and begin care, the better the chance for survival. The second link is early CPR. Immediate CPR after collapse can double the survival rate by itself. The third link is early defibrillation. This will double the survival rate when combined with immediate CPR. The last link is early ACLS, delivered by paramedics or emergency department personnel. The EMT-Basic can make a big difference in the first three of these links by recognizing patients who have suffered cardiac arrest and taking immediate action, and by recognizing patients who are likely to arrest and being ready if it should occur.

Automated external defibrillators (AEDs) come in two types. A fully automated unit requires the rescuer to do no more than apply the electrodes and turn the unit on. A semi-automated unit requires the user to take other steps based on the rhythm it detects and gives instructions either on a screen or with a voice synthesizer. Rhythm analysis is done with a microprocessor. AED analyses are very accurate when the device is used properly. The unit must be in good working order.

Follow the manufacturer's instructions for care and maintenance of your AED. Carry a back-up battery. Batteries must be fully charged and electrodes must be properly applied or the device may fail to deliver a needed shock. Improperly applied electrodes can also interfere with rhythm analysis and the AED may detect a shockable rhythm when none exists. Cardiopulmonary resuscitation, or vehicle movement, can cause artifacts that may be mistaken for shockable rhythms.

There have been several changes in the use of the AED and they will require that the unit be reprogrammed. Check your local protocols, as they should be changing as well.

The first change in use of your AED is in when to apply the AED. If you arrive to find a pulseless, apneic patient who has been down without CPR for more than 4 minutes, start with 2 minutes of CPR. If you witnessed the collapse or the patient had immediate bystander CPR, apply the AED right away without interrupting compressions.

Clip away excessive hair and wipe the chest dry if needed. If the patient has a pacemaker or implanted defibrillator, be sure the electrodes are 4 to 5 inches from the device. If the

patient has a NTG patch, remove it and wipe the skin thoroughly. Apply the electrodes as pictured on the packaging. For patients between 1 and 8 years old, use pediatric electrodes. Turn the unit on, and **only then** stop CPR.

Clear the patient and initiate analysis of the rhythm. If a shock is advised, clear the patient again and deliver the shock. Once the shock is delivered, resume CPR immediately beginning with compressions, do not check for a pulse. Continue CPR for 2 minutes. **Only then** do you check for a pulse.

If pulse is absent, analyze the rhythm and deliver another shock, if indicated. Do not attempt a pulse check while the unit is analyzing. Again, if a shock is delivered, resume compressions immediately—no pulse check yet!

If no shock is indicated, and no pulse is found, resume CPR beginning with compressions for 2 minutes and analyze again. If a pulse is clearly felt, check breathing. If the patient is breathing adequately, give oxygen by nonrebreather mask. If breathing is absent or inadequate, assist ventilations with high-concentration oxygen. Monitor patients closely, as they may re-arrest. If there will be no advanced life support (ALS) response, transport either when the patient has a pulse, when 3 shocks have been delivered, or when no shock is advised.

Remember that analysis of the rhythm and delivery of shocks cannot take place while the transporting vehicle is in motion. Follow local protocol as to whether to transport only or stop for additional shocks. An unresponsive patient who had a pulse and suddenly becomes pulseless will benefit from immediate defibrillation. Stop the unit for proper rhythm analysis and delivery of shock if indicated. Your medical director should review every use of the AED. Be sure you thoroughly document all of your findings, treatments, and patient responses.

MEDICATIONS

Aspirin

Aspirin is a common pain reliever that has become very important in the care of cardiac patients. It generally does nothing perceptible for the patient's pain, but it does affect the blood clotting process. Reducing clot formation may limit the amount of damage to the heart. Aspirin is available in the form of a tablet, either an 81-mg "baby" aspirin or 325-mg "adult" aspirin. Aspirin is indicated if the patient has chest pain presumed to be cardiac and you are specifically authorized by your medical director to administer it.

Aspirin is contraindicated if the patient has had a recent bleeding ulcer or has a true allergy to aspirin, (hives or breathing difficulty). It may also be deferred if the patient has taken aspirin before you arrived. The recommended dose is 160 to 325 mg. Your medical director will advise you on the exact amount. Have the patient chew the tablets rather than swallow them whole. Document the time and the dose and continue to re-assess.

Nitroglycerin

Nitroglycerin is used to treat chest pain arising from a heart condition. It relaxes the blood vessels, which increases blood flow to the heart muscle and reduces the workload on the heart. Nitroglycerin is sold under the names Nitro-stat and Nitro-qwik. It comes in several forms but only two are used for acute chest pain. These two are a tablet and an aerosol spray, both of which are administered sublingually.

Nitroglycerin is indicated for chest pain that is presumed to be caused by a heart condition. It is contraindicated if blood pressure is below 100 mm Hg systolic, and if the heart rate is less than 50 or over 140. It is also contraindicated if the patient has taken Viagra or Levitra within the last 24 hours or if they have taken Cialis within the last 48 hours. This may be an embarrassing question to ask but it is very important! **When taken with one of these medicines, NTG can drop the blood pressure enough to cause death.**

Nitroglycerin is also contraindicated if the patient has already taken 3 doses. One tablet or one spray contains 0.4 mg of nitroglycerin and the dose may be repeated to a total of 3. Headache is a very common side effect. Nitroglycerin can also cause a sudden drop in blood pressure or changes in the heart rate.

Before administering NTG perform a focused exam, history, and vital signs. Obtain an order from your medical director. Check that the medication is prescribed for your patient and has not expired. If you are administering a tablet, have the patient lift the tongue and place it under the tongue. Instruct them not to swallow but to let it dissolve.

If you are administering a nitroglycerin spray, do not shake the canister. Check the direction in which the nozzle is pointing. Have the patient lift the tongue and hold the breath, and spray once under the tongue. Record the time and dose. Re-assess vital signs and pain scale before administering additional doses.

EMERGENCY CARE OF A PATIENT WITH ALTERED MENTAL STATUS

SCENARIO

You are called to a local restaurant for a patient who is becoming lethargic and confused. You arrive to find a 45-year-old female who is slumped in a chair. She looks at you but only mumbles a few words when you ask questions. Her friends say she seemed fine a few minutes ago, although she was unduly worried about how long they had to wait for a table.

The patient has blood pressure 138/70, pulse 110, and respirations 20 and unlabored. Her skin is pale and very sweaty. He husband arrives and tells you she is a diabetic; she took her insulin just before she left the house to meet her friends. She has no other medical problems and takes no other

medications. You recognize hypoglycemia, or insulin shock, and administer glucose paste. Over the next 10 minutes, the patient becomes more alert and is soon oriented to person, place, and time.

There are a lot of conditions that can cause altered mental status. The more common ones that you will see include alterations in blood sugar level—either hypoglycemia (low blood sugar) or hyperglycemia (high blood sugar). A patient who has just had a seizure may be sleepy or they may be deeply unconscious. Poisonings, infections, and fevers can cause altered mental status, as can strokes, head injuries, and low oxygen levels. No matter what the cause, the initial care is the same.

Ensure that the airway is patent (open) and be prepared to suction if needed or to assist ventilations. Administer oxygen. Perform a focused history and exam. Be sure to look for evidence of trauma and take spinal precautions if indicated. Transport and continue to re-assess.

If the patient is a known diabetic, consider the possibility of hypoglycemia. Ask about the onset of symptoms. Hypoglycemia usually has a sudden onset and rapid progression. Pale, sweaty skin is a common finding. Many patients can tell early on that their blood sugar is dropping and may have told someone. There may be a history of skipped or late meals. Look for medic alert bracelets or necklaces. If your system allows you to determine a finger stick blood glucose, do so, or if family member is familiar with the use of the patient's machine, allow them to do so. If indicated and an order is obtained from your medical director, administer glucose paste. Record the dose and time. Re-assess and record the response to the dose.

MEDICATION

Glucose is a simple sugar that is rapidly absorbed by the body through the mucosa in the mouth and the stomach; it raises blood sugar levels. It is packaged in a gel form under the names Insta-Glucose or Gluctose. The dosage is the contents of one tube, usually about 30 grams. Side effects are few. It can raise the blood sugar to high levels but this usually corrects itself quickly. Be aware that if the patient is not awake enough to swallow, the dose may be aspirated and potentially cause aspiration pneumonia. Oral glucose is indicated for patients with a history of diabetes and suspected or documented hypoglycemia. It is contraindicated if the patient is unresponsive or unable to swallow, or if normal or high blood sugar is documented.

To administer oral glucose, obtain an order from your medical director. Ensure that the patient is conscious enough to swallow and can protect their airway. Open the tube and squeeze the paste between the cheek and gum. Allow the patient time to ingest it and repeat until the tube is empty. Discontinue immediately if the patient becomes less responsive, coughs, or has a seizure. Record the time of the dose and the patient's response.

EMERGENCY CARE OF ALLERGIC REACTIONS

SCENARIO

A patient has complained of difficulty breathing. You arrive to find an individual who is in visible distress, flushed, and wheezing audibly. Symptoms began shortly after eating a cookie. The patient has a known allergy to nuts and it seems that the cookie contained pistachios. Your assessment shows a scared-looking patient whose skin is blotchy and red. You apply oxygen and begin your focused exam: blood pressure 110/60, pulse 100, respirations 26 and labored, with wheezing in all lung fields.

The patient has no other health problem and no medications except an injector for allergic reactions that he has never used. He produces the injector and you determine that it is prescribed for him and it has not expired. After getting an order from your medical director, you assist the patient with the device and transport right away. Re-assessment 2 minutes later shows reduced respiratory work and only faint expiratory wheezing in the lung bases. The patient remains stable during transport.

Allergic reactions can range in severity from minor to deadly. A patient may have no more than a blotchy red rash (hives). Some may have nausea, vomiting, and abdominal cramps. More severe reactions may involve the respiratory system. The patient may feel that their mouth or throat is swelling shut and they may have difficulty breathing. Wheezing may be heard. Very severe reactions will show signs and symptoms of shock.

Exposure to an allergy-causing substance (allergen) can happen in several ways. Insects inject their venom through the skin. Some allergies are from direct contact; other allergens are inhaled or ingested orally. Symptoms may occur just seconds after exposure, especially with injected allergens. An allergen that is eaten may take longer to have an effect.

Sometimes the patient will know what caused the reaction because of earlier exposures. But remember, there is a first time for everything and the allergen may be something that the patient has been exposed to in the past without any problems. A patient may have had a mild reaction with prior exposures but a serious reaction this time.

As with any patient, begin with an initial assessment and administer oxygen if needed. A focused history should include any incidence of past allergic reactions, what the patient may have been exposed to, and how they were exposed. Ask when the symptoms started, how they have progressed, and what if any intervention has been taken. Obtain baseline vital signs and listen to lung sounds.

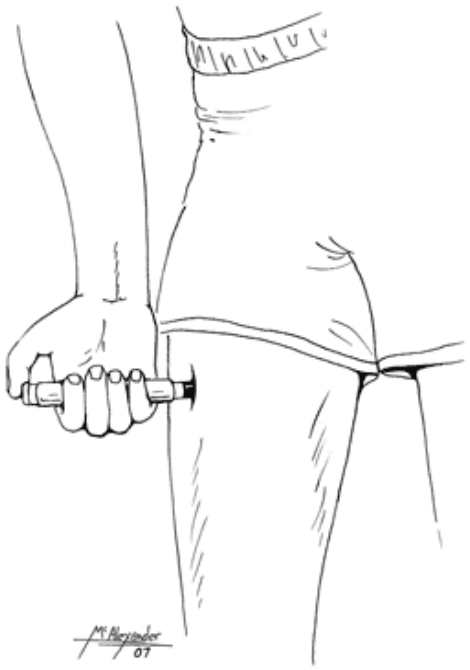
Transport immediately if there are signs of shock. If patients have difficulty breathing or signs of shock and have an epinephrine injector prescribed for them that is readily

available, you may obtain an order to assist with its administration. Be sure to document exam findings that indicate administration, the time the dose was given, and findings on re-assessment. If epinephrine is not indicated or not available, transport immediately and continue to re-assess.

MEDICATIONS

Epinephrine or adrenaline is sold under the name EpiPen or EpiPen Jr. The liquid form is packaged in an auto injector designed to inject the medication under the skin. The drugs work by dilating the bronchioles to increase airflow to the lungs and constricting the blood vessels to alleviate shock symptoms. Side effects may include rapid heart rate and blood pressure, dizziness, chest pain, or pallor. The patient may become nervous or excited. These drugs are indicated for patients who have signs of an allergic reaction with breathing difficulty or shock, and have the medication prescribed for them, and an order has been obtained from your medical director.

EpiPen provides an adult dose and EpiPen Jr provides a child's dose. To administer the dose, obtain an order from your medical director. Ensure that the medication is prescribed for the patient and has not expired or discolored. Remove the cap and place the tip on the outside of the thigh, midway between the knee and waist. Press the injector firmly against the thigh and hold it in place for 10 seconds to allow the full dose to be administered. Record the time and dose. Re-assess after 2 minutes and record findings. Dispose of the injector in a biohazard container. Transport and continue to monitor airway breathing and circulation. If the patient continues to worsen, treat for shock and be prepared to start CPR if indicated.



Patient self-administering epinephrine using a pen-type device. (Illustration by Jason M. McAlexander, MFA. Copyright © 2007 Wild Iris Medical Education.)

EMERGENCY CARE OF POISONING AND OVERDOSE

SCENARIO

You are called to the scene of an intentional overdose. When you are about four blocks from the address given, you turn off your emergency warning equipment and park out of traffic. A few minutes later, your dispatcher informs you that the police department has made contact with the patient and the scene is safe for you to enter. You arrive to find an agitated 24-year-old female who says she took all of her pills about a half-hour ago. She produces an empty pill bottle. The label indicates that it was filled yesterday and there were sixty 20-mg tablets Prozac dispensed.

You exam shows an agitated patient who denies any symptoms other that being upset about her recent divorce. Vital signs are: blood pressure 134/80, pulse 92, respirations 20 and unlabored, with skin pink, warm, and dry. The patient adamantly refuses transport, saying she wants to stay home and die. You calmly explain that she can no longer make that choice and that she will receive help both for her overdose and her depression. The patient throws a chair at you and says she's going to get a gun.

The police officers intervene at this point and the patient is gently but forcibly restrained and placed on your cot. Wrist and ankle restraints are applied and you transport her to the hospital. While en route, the patient is tearful and will not look at you or converse with you. Every few minutes you check and record circulatory status in the hands and feet.

Poisonings and overdoses can take as many forms as there are agents with which to be poisoned. They may be intentional or unintentional. Intentional overdoses may be complicated by behavioral problems. Poisons may be ingested, inhaled, injected, or absorbed through the skin or mucus membranes. Symptoms of poisoning will depend entirely on what the substance was and how it entered the body and there may be no symptoms at all.

Symptoms of ingested poisons often involve the gastrointestinal (GI) tract. Nausea, vomiting, diarrhea, or abdominal cramps may be present. The patient may have altered mental status. The ingested substance may be seen or smelled on the patient. Children especially tend to wear what they have tried to eat! Caustic substances may leave burns in or around the mouth. The patient or bystanders may be able to tell you what was ingested, how much and when. Care of the patient includes initial assessment and focused examined treatment of any problems found. Do not do anything to cause vomiting but be ready to suction the patient in case it does occur. Take any bottles or containers along with the patient to the hospital.

Toxic injections have many possible symptoms, but altered mental status is very common. Weakness, dizziness, nausea, and vomiting may also occur. Monitor the airway and give oxygen as needed. Be prepared for vomiting and bring the containers with you. Be cautious of syringes at the scene. Don't handle them unless you can do so safely and do not try to re-cap a used needle.

Medical Director Comment
Some of the most lethal ingestions, such as acetaminophen (Tylenol) or iron, will have no initial symptoms. But in order to save these patients, aggressive treatment needs to start long before any of the clinical symptoms become apparent. Therefore, even if the patient appears asymptomatic, it is important to gather all available pill bottles and transport the patient as rapidly as possible for definitive care.

Scenes where inhaled or absorbed poisons have been reported or suspected should be considered unsafe until proven otherwise by trained personnel. Call for a hazardous response crew and do not enter the scene until it is safe. Ideally, the patient should be brought to you after they have been properly decontaminated.

Inhaled poisons most often produce respiratory symptoms. Difficulty breathing, wheezing, cough, or hoarseness may be present. The patient may have chest pain, altered mental status, seizures, or coma. Administer oxygen and be prepared to manage the airway.

Absorbed poisons usually show symptoms on the skin. You may see hives, itching, rash, or burns. If the patient has not already been decontaminated, put on protective gear. Brush powder from the skin. Wear a mask so as not to inhale the powder. Remove contaminated clothing from the patient and flush with copious amounts of water, for 20 minutes if possible. If the poison is in the eye, flush with water or sterile saline for 20 minutes, taking care not to contaminate the other eye. Again, decontamination of very hazardous agents should be done by trained personnel only.

BEHAVIORAL EMERGENCIES

Assessment for Suicide Risk

Suicide is the eighth leading cause of death in the United States. For teenagers and young adults, it is one of the top three causes of death (Soreff, 2006). Identifying patients at risk is tricky because there is so much at stake. Any self-harm should be treated as a serious suicide attempt.

Depression is very common. Depressed patients may be sad and cry easily. They may express thoughts of death and feel that the world would be better off without them. They may speak in a flat tone of voice and fail to make eye contact. Other mental illness, such as schizophrenia or anxiety disorders, carry a high risk of suicide, as do delirium and dementia (Soreff, 2006).

Suicidal patients will usually have had a recent event that caused great stress for them, such as a death of someone close to them, loss of their job, arrest or imprisonment, divorce or break-up of a relationship, or serious money problems. There may be a history of alcoholism or other addiction. They may have a plan and have collected items to carry out the plan. Women attempt suicide more often but men are more likely to die from a completed suicide. There may have been prior suicide attempts. There may be reports of self-destructive behavior prior to your arrival.

Emergency Medical Care

Care for a patient with behavioral problems begins with your own safety. Never enter a scene involving suicide or other behavioral problems until law enforcement has responded and the scene is known to be safe. Be especially careful if the patient has a history of aggression or violence. Look for a threatening posture, tense muscle, weapons, or objects that could be used as weapons. Be aware of yelling or verbal threats.

Once you can safely approach the patient, identify yourself and reassure the patient that you are there to help. Keep a distance from the patient that is comfortable for them but lets you do what you need to do. Let the patient know what you're doing. Even if others have told you what has been going on, ask the patient for their side of the story. Listen to the patient and acknowledge their feelings. Answer their questions honestly and do not make empty promises.

Keep your composure and remember, you are the professional. Never argue or challenge troubled patients. Stay calm and speak in a low, quiet voice. Pay attention to their appearance, speech patterns, behavior, and activities. Are they oriented to person, place, and time? Assess for any medical needs or traumatic injury. Do not leave the patient alone at any time and restrain only if needed. If the patient has taken an overdose, bring any containers with you.

Medical/Legal Considerations

If an emotionally disturbed patient consents to care and transport, legal problems are greatly reduced. But often, this is not the case. Be familiar with the laws and procedures in your area. In most cases, patients who have indicated that they plan to harm themselves must be transported for further evaluation and care. Patients may try to resist treatment but with a calm, reassuring manner you may be able to persuade them to go voluntarily. Enlist the help of friends, family, and law enforcement if needed, because patients who you believe will harm themselves or others should be transported to a medical facility for care even if it is done without their consent.

Medical Director Comment
In this setting, medical personnel often fear getting sued if they act against patients' wishes and "force" them to come in. Many patients who are angry about being transported against their will may even verbalize that they intend to sue you.

It is important for you to understand that you can be sued for anything at any time; however, the suit is unlikely to be successful if you documented that you had good reason to believe the patient was capable of harming self or others, and you acted in the patient's best interest by trying to protect them from themselves.

In fact, you are much more likely to be sued successfully by the patient's family if you allow a patient to stay in a potentially dangerous situation in which they later harm themselves.

Avoiding Unreasonable Force

If patients are an immediate danger to themselves or someone else, reasonable force may be used to restrain them. The term *reasonable* is vague and open to interpretation. What is reasonable in one situation may not be in another situation. It depends on the nature of the threat, the size and strength of the patient, and those who are applying the restraint. It depends on the type of behavior the patient has displayed and on mental state. It depends on just what method was used.

Avoid anything that may cause harm to the patient. Involve your medical director and law enforcement early on. Have a plan and be sure everyone knows their role. Be aware that a patient who was aggressive and then became calm may become aggressive again without warning. Once restraints are in place, do not remove them until you reach the receiving facility. Check pulse movement and sensation frequently and document your findings. Emotionally disturbed patients often make false accusations of excessive force or sexual misconduct. It is important to document all behavior completely and accurately. When possible, have an attendant of the same sex treat the patient and have witnesses.