THE INSTITUTE FOR JEDI REALIST STUDIES

www.instituteforjedirealiststudies.org

First Aid & Basic Emergency Medicine

A course developed by the Jedi Academy, an affiliate training program of The Institute for Jedi Realist Studies.

http://instituteforjedirealiststudies.org

Table of Contents

Introduction

In this course, we will cover the basic information that the average civilian will need in order to properly respond to an emergency situation and, if necessary, provide basic first aid care to any sick or injured parties. You will learn the process by which to gather the most information about the patient, medical history, and injuries possible; how to effectively and properly communicate the most relevant information to the emergency dispatcher (911); how to treat the most common injuries and conditions; and how to distinguish between injuries that require immediate treatment and those which do not.

By the time we are done here, you will have the knowledge to be able to function as a competent **lay rescuer**, meaning a person who does not practice emergency medicine or provide rescue services by occupation or profession. That definition includes people who are trained in CPR and first aid. In a life-threatening emergency, lay rescuers can make all the difference in patient outcome, by administering the correct emergency treatment to ensure the patient is kept stable (or at least not dead) until the medics can arrive.

The purpose of this course is to educate you, so that if you find yourself faced with a medical emergency you will be able to more appropriately respond than you would if you were lacking any education. However, actual training is better than education alone, and I strongly urge each of you to train in first aid and CPR in the "real world", rather than try to use this course as a substitute or equivalent to offline training. In fact, I became involved in EMS as a direct result of my Jedi training, and the universe told me in no uncertain terms that my Path was leading me to become an EMT. (Hang around the forums with me, or poke around my training journal, and you'll hear the story – it's a good one.)

Most of the lectures will have an assignment at the end, which you'll need to complete and post in the classroom area of the forum. Please create a single thread in the First Aid classroom sub-forum called "First Aid – [your name]" and post each assignment in that thread. Post any questions you may have in that same thread. You need not wait for the instructor to respond before moving on to the next assignment if you like, but I will do my best to respond to each assignment you post within 24 hours.

Finally, I would be remiss if I didn't thank my EMS brother One Winged Angel, who developed the concept and the original outline for this course, and even wrote a few of the sections. In some places, I've kept his drafts nearly word for word, since there was just no way I could improve on the way he said it.

> **The discussion which follows is meant for educational purposes, not as a substitute for offline first aid training or medical expertise. You are encouraged to seek certification in CPR and first aid through a legitimate and properly credentialed instructor or agency. Neither the author nor the web host will be held liable for your use or misuse of any of the information contained within.**

Okay, with that out of the way, let's get started.

Lecture One – Initial Assessment

Don't let the title fool you. While it's tempting to jump right in and start learning how to assess a hypothetical patient, I want to take a moment to see where you are in your knowledge of basic emergency medicine and a few medical concepts.

If you believe that more than one answer is correct, choose the answer that best fits. If you still believe there is more than one best right answer, be prepared to defend your position.

1. What is your first priority at an accident scene?
   - A. Protect the patient from the weather.
   - B. Check for danger to yourself and others.
   - C. Check the patient's medical details and history.
   - D. Check the patient's pulse.

2. Which of the following would be best at reducing the risk of cross infection in an emergency?
   - A. Wiping the patient with disinfectant before starting CPR.
   - B. Wearing gloves and eye protection and using a face shield for CPR.
   - C. Using a clean handkerchief between you and the patient.
   - D. Only use as many fingers to touch the patient as you need to.

3. According to current AHA guidelines, what is the proper ratio of rescue breaths to chest compressions in adult CPR?
   - A. 1 breath to 5 compressions; 20 cycles per minute.
   - B. 30 breaths to 2 compressions; 5 cycles per 2 minutes.
   - C. 30 compressions to 2 breaths; 5 cycles per 2 minutes.
   - D. 15 compressions to 2 breaths; 5 cycles per minute.

4. What is the initial treatment for a burn?
   - A. Cool the burn with running water for up to 20 minutes.
   - B. Put butter on it.
   - C. Put ice on it for 20 minutes.
   - D. Cover it with a non-stick dressing.

5. Urgent medical attention is required for a conscious patient with facial burns because:
   - A. They may have airway burns which can cause their airway to swell and become blocked.
   - B. Facial burns pose a high risk of infection.
   - C. Facial burns carry the potential for facial scars.
   - D. Facial burns are painful.

6. What is the best management for heavy bleeding from a deep cut?
   - A. Apply tourniquet above cut to reduce blood flow.
   - B. Clean wound and bandage the entire limb firmly.
   - C. Lie them down and tell them not to panic.
   - D. Apply direct pressure to the wound, elevate the wound, and rest the patient.

7. A patient has slipped and twisted her ankle. There is pain and swelling. What would you do?
   A. Assist the patient to walk around on it as soon as possible.
   B. Elevate the leg and apply a hot pack to ease the pain.
   C. The patient should rest the injured leg. Apply an ice pack, compression bandage, and elevate the limb.
   D. Give the patient pain relief to ease the pain.

8. What would you do for a person having a violent seizure?
   A. Protect the patient from injury, and roll them into recovery position when the seizure stops or diminishes.
   B. Try to minimize movement by restraining limbs so they don't hurt themselves.
   C. Place something in the patient's mouth to prevent them from swallowing their tongue.
   D. Protect the patient from danger, and keep the patient warm.

9. When giving rescue breaths, how do you know you are breathing enough air into the patient?
   A. Watch for their skin to change color.
   B. Just blow as hard as you can.
   C. Breathe just until their chest rises.
   D. Check for increased impulse rate.

10. What would be the appropriate treatment for moderate hypothermia where the patient's level of consciousness is slightly impaired?
   A. Feed the patient warm or hot beverages to assist in raising body temperature.
   B. Apply hot packs to the patient's armpits and groin.
   C. Encourage the patient to move as vigorously as s/he can to stimulate blood flow and raise body temperature.
   D. Alternately apply heat and cold to neck and forehead.

11. As a lay rescuer, what is the best treatment you can provide for a person going into shock?
   A. Keep the patient warm with blankets, whatever the external temperature.
   B. Assist the patient to walk around to stimulate blood flow.
   C. Place something in the patient's mouth to prevent them from swallowing their tongue.
   D. Alternately apply heat and cold to neck and forehead.

Assignment

If you haven't done it already, answer the questions in the pre-test above and post your answers in the appropriate area of the forum. Be prepared to explain why you chose the answer you did, or you can be a total teacher's pet and explain why you chose the answer you did before I ask.

Lecture Two – The Five Phases of EMS Care

If you haven't noticed, before we've even reached the first real lesson, we're already using terms and acronyms with which you may or may not already be familiar. Let's start by talking about the organization of the emergency medical system.

> **Note: most of what follows is of necessity based on the EMS system in use in the United States, because that's the system I'm familiar with. Other nations do things differently. If the system in your nation is different than the system I describe, fill me in on the forum – I would be very interested to know how EMS works in other places.**

Emergency medical services (EMS) is the broad term for the organized system of providing pre-hospital care. We might think of EMS as the ambulance that shows up with EMTs and paramedics to work their magic on a sick or injured patient, but EMS is actually a lot broader than just medics. And at the risk of sounding cheesy, EMS starts with you.

Phase 1: Early Access and Response

If we were laying these phases out on a map, there would be a red dot with the legend, "You are here" on this first phase, because the goal here is to provide you, as the person on the scene when the emergency occurs or is discovered, with the education to serve as a competent lay rescuer and keep the patient stable until the emergency passes into the following phases.

Most medical emergencies outside the hospital don't occur in fire stations or ambulance bays, or really anywhere that trained personnel are standing by. Instead, the majority of EMS calls begin with a civilian or lay rescuer encountering the medical emergency and activating the EMS system by a call to emergency dispatch. That call to dispatch is the most important thing a civilian or lay rescuer can do, because until that call is made and the appropriate care is rolling to the scene, time is ticking by – and in far too many medical emergencies, a handful of seconds can make all the difference in patient outcome. So the second Golden Rule of being a competent lay rescuer is, <u>make that call to dispatch immediately as soon as you determine there is a medical emergency</u>.

If making the call is Rule Two, what's Rule One? <u>Stay calm</u>. As Jedi, we understand that there is no greater enemy to clear perception than fear or panic. There are few greater tests of your mastery of your emotions than when you are faced with a true medical emergency – when someone is seizing, or bleeding, or suddenly rendered unconscious. I have been on many calls where bystanders are, frankly, worse than useless because they give in to fear. A panicked person can't give appropriate information to dispatch, or to me when I get there, and needs to be calmed to prevent them from interfering with patient care, which takes my attention away from that patient care. Understand that witnessing a medical emergency will activate your limbic system, the "freeze/flight/fight" survival response that has been hard-wired into us over tens of thousands of years of evolution. The "freeze" response alone can result in loss of those critical seconds we need to ensure a good patient outcome, if it prevents a bystander from making that call to dispatch.

The critical question is when to make the call. As we go through this course, you will learn in basic terms what constitutes a **life threat**, a situation where the patient could die without rapid and appropriate medical intervention. In simplest terms, any of the following should be considered a life threat until proven otherwise:

- any issue with the ABCs of heartbeat and breathing (see Lecture Four);
- any loss of consciousness (see Lecture Four);
- any uncontrolled bleeding (see Lectures Four and Eight);
- any sign of shock (see Lecture Nine); or
- most environmental emergencies (see Lecture Ten).

To expand on Rule Two, then, you must make that call to dispatch immediately as soon as you determine you are looking at a life threat. (Remember this; you'll see it over and over again throughout the course.)

Phase 2: Emergency Dispatch

Most areas have a system in place to route all emergency calls to a centralized dispatch location; gone are the days when you had to look up phone numbers for police and fire services. In virtually the entire United States, dialing 911 will get you to the correct dispatch center, where the person at the other end of the line can evaluate your report and send appropriate police, fire, rescue, or medical units based on the nature and seriousness of the emergency.

Emergency dispatch systems have evolved greatly in the past forty years. Many areas now rely on **computer-aided dispatch** (CAD) systems that serve a number of functions:

- CAD systems can collect data about the origin of the call, through landline data or GPS, to make sure responding units are dispatched to the correct location.
- Many CAD systems prompt the dispatcher with questions to ask the reporting party to classify and pre-diagnose medical and trauma conditions to determine the seriousness of a call.
- Most CAD systems will also show previous calls to the same location, which will clue the dispatcher in to potential dangers to first responders – dogs with a history of propensity to violence, people with a history of propensity to violence, dangerous substances kept at the scene for industrial use – or to people who may make frequent and/or frivolous emergency calls.

It's important to note that the dispatcher is receiving and transmitting information in at least two directions on every call. The dispatcher is collecting information from the bystander who made the call and forwarding that information to the units responding to the emergency: medical, fire, rescue, or law enforcement. But in most cases, the dispatcher will also be relaying interim instructions to the bystander, from something as simple as, "The paramedics are on the way," to directing an untrained person through simple CPR. So part of Rule One, staying calm through the stress of a medical emergency, is recognizing that the dispatcher has a complex and stressful job. (In other words, give them a break.)

Phase 3: First Responder Care

In many situations, it may be necessary for the dispatcher to have additional units respond to the scene of the emergency either while the EMS personnel are en route or before EMS personnel can begin doing their jobs. Most frequently, this will be law enforcement officers or fire/rescue personnel.

These days, most law enforcement officers have rudimentary training in the most basic life-saving procedures: cardio-pulmonary resuscitation (CPR), use of an automated external defibrillator (AED), and how to control serious bleeding. Sometimes, they get there first because they're faster – frankly, as fast as I might drive in an ambulance with emergency lights and sirens going, a law enforcement officer will undoubtedly drive much faster – or because they are already on patrol and therefore closer to the scene of the emergency, while I'm hanging out at the fire station. Sometimes, law enforcement is already on scene responding to its own call when the officer determines the need for EMS care and asks dispatch to send an ambulance. I've been on a number of calls where I've entered the room and immediately taken over CPR from a police officer, so that s/he can get back to doing what s/he needs to do on scene.

Similarly, many if not most firefighters are also trained as EMTs – most career fire departments require their firefighters to be both – and can keep someone stable until the ambulance arrives to take over patient care.

Rescue techs are usually firefighters who have had additional training to be able to effect rescues in a number of conditions: using ropes, in high places, on the water, from confined spaces, etc. A victim in a motor vehicle accident might have to be extricated from the vehicle before EMS personnel can adequately do their job. The rescue techs will generally try to do a rapid assessment of the patient to determine whether there is a life threat that requires immediate intervention, or whether they have time to cut the car open to get the patient out before treatment begins.

Phase 4: EMT / Paramedic Care

An **emergency medical technician** (EMT) is a provider who has been trained to provide pre-hospital care on scene or in the ambulance en route to the hospital (or both). EMTs are licensed to varying levels, based on the amount of experience and training they have and the level of care that they are licensed to provide. There are slight variations from jurisdiction to jurisdiction, but as a rule, the levels of EMT are:

- EMT-B, often shortened to simply EMT – provides **basic life support** (BLS), including basic airway management, artificial ventilation, oxygen therapy, bleeding control, cardio-pulmonary resuscitation (CPR), automated defibrillation, spinal immobilization, and treatment for shock.
- Advanced EMT or EMT-I – provides **intermediate life support** (ILS), which typically includes all the BLS skills plus intravenous fluid therapy and endotracheal intubation. Depending on the jurisdiction, each of these advanced skills may be an add-on module for an EMT-B; so, for example, a provider could be licensed as an EMT-IV if s/he is qualified to provide BLS care and administer IV fluid therapy.

- Paramedic or EMT-P – provides **advanced life support** (ALS), which adds higher-level skills like manual defibrillation, external heart pacing, EKG interpretation, surgical airways, needle decompressions, and administration of a wide variety of medications for cardiac care and pain management.

The difference in training between these levels is massive, especially when you consider that a paramedic can provide nearly the same level of care in the field as an ER doc. It takes anywhere from three to six months of training to become an EMT, with ten to twenty hours of clinical training in the field and the ED. A paramedic, on the other hand, usually trains for eighteen months full-time in the classroom, putting in roughly a thousand hours (or about ten times the class time of an EMT student), with another 500 hours of clinical experience on top of that. In most jurisdictions, you can't even apply to paramedic school until you've been working as an EMT for a while – where I live, it's at least three years.

No matter the level, though, EMS providers work under the direction of a **medical program director** (MPD), a physician who oversees a particular agency's or county's EMS system. An EMT in the field is in a very real sense practicing medicine under the medical director's license. The medical director is therefore responsible for developing the agency's protocols and conducting periodic reviews of EMS reports with providers to identify care issues and compliance with protocols and applicable regulations.

Protocols are the written standing orders for pre-hospital care providers to follow when providing care in a wide variety of situations. Protocols are typically laid out by **scope of practice**, or what each level of EMT is licensed and authorized to do.

> **Example: a chest pain / suspected cardiac event protocol will likely direct all providers to assess airway, breathing, and circulation; give the patient aspirin; assist them with taking nitroglycerin IF they have a prescription for it; and begin CPR if there is no detectable pulse. The ILS section next will likely direct the ILS provider to obtain IV access and administer nitroglycerin if the patient doesn't have their own prescription. The ALS section will then direct the paramedic to gather and interpret a 12-lead EKG, administer cardiac medications in a specific order at specific dosages, and give a fluid bolus if the patient's systolic blood pressure drops below a certain level.**

It's not at all uncommon to see EMTs of different levels working together on the same crew, or dispatched to the same call as part of a multi-unit response. On a suspected cardiac event like the one in the example protocol just above, my dispatch center will probably send my ambulance, which is most likely staffed by two EMT-Bs, and an ALS ambulance, which will have a paramedic and an EMT-B or AEMT. And we tend to stick to our own scope of practice on a call. It doesn't make any sense for a paramedic to be doing chest compressions when he's the only one in the room who can administer epinephrine; CPR is a BLS skill, so that's my job as an EMT-B.

Phase 5: Emergency Department Care

Sometimes people are surprised to learn that the default end result of any call that activates the EMS system is transportation of the patient to the hospital. To understand this, you

have to know that one of the primary rules of EMS work is, you keep treating your patient until you turn the patient over to someone who can provide a higher level of care than you can (we'll talk about the concept of abandonment in Lecture Twelve) or until someone with appropriate authority tells you to stop. So once that police officer mentioned earlier starts CPR, he has to keep at it until the ambulance arrives. Once I start treating a patient, in the vast majority of cases I'm going to keep treating until I turn the patient over to a paramedic or to an ED nurse or physician.

The **emergency department** (ED) is a specialized unit of a hospital designed to provide immediate emergency care of acute medical and trauma patients. The big sliding glass doors that open into an ambulance bay (usually marked by a giant red sign that says AMBULANCE, so even the rookies can figure out where to park)? That's the ED. It's jammed full of nurses, x-ray machines, labs, and usually a physician or two.

ED care starts well before we land in that ambulance bay. Every ambulance I've ever been in has a cell phone in the cab with the ED number on speed dial (the hospitals in my area each have a special dedicated phone number for EMS personnel to call straight into the ED, for the en route heads-up call as well as for on-line medical control, which I'll talk about in a minute). While we're on the way to the hospital, at some point, we are going to call ahead and give the ED a heads-up about what we're bringing in:

> **Example: "Hi, this is Rick on Medic six-one. We're five minutes out with a 72-year-old male, conscious and breathing, complains of chest pain and shortness of breath. He is diaphoretic. Onset fifteen minutes ago while mowing the lawn; pain is radiating into his left shoulder and arm. BP 108 over 68; pulse is 88 and thready; respirations 26 and shallow; pulse ox was 85 on room air, 95 on 10 liters by mask. Patient denies any history of cardiac problems, but says he is taking HCTZ and lisinopril for hypertension. 12-lead shows what look like ST-segment elevations. We gave him 324 milligrams of aspirin in the field and scooped him up for transport."**

Some really high-tech systems even have telemetry that can, for example, forward the EKG strip ahead so the doc can look at it before we even get there. But the goal is to give the ED staff enough time and information so that they can get everything in place to hit the ground running on patient care as soon as we get a critical patient in the door. For that cardiac patient, ED staff will want to ready a bed with a cardiac monitor, alert the cath lab in case the patient needs emergency catheterization to clear a blocked artery, enter orders for cardiac enzyme labs and imaging, and get an advanced cardiac life support (ACLS) cart in place with the medications that will be needed if the patient's heart stops beating.

So when does an EMS call not end with the patient transported to the hospital? Really, only under a very limited set of circumstances. Examples would be:

- The patient refuses to go. We'll talk about the concepts of consent and refusal of treatment in Lecture Twelve, but for now what you need to know is that if a competent patient says s/he doesn't want to go the hospital and I toss her on a stretcher and transport her anyway, what I've just done is called kidnapping.

- The patient goes to the hospital by herself or with a family member. We call this being transported POV (privately-owned vehicle). Frankly, in situations that aren't a truly life-threatening emergency, we might give the patient the option of avoiding the ambulance ride – and the bill that goes along with it – if we can ensure they get there. Yes, I have followed patients driving to the hospital in their own cars to make sure they arrive safely.
- The patient doesn't need emergency medical treatment. We have strict protocols to cover this type of situation. A typical case is where a patient slips while transferring from bed to wheelchair and lands on the floor – she's not injured, but she can't get up without assistance. We show up, assess the patient to make sure she's not hurt, help her back to bed or into her chair, and have her sign a refusal of transport form. It happens a lot, and in some jurisdictions it's considered a drain on the EMS system. (I have my own feelings on the subject, which are more complicated than the norm.)
- The patient is irreparably dead. Yes, we have protocols for this, too. As an EMT-B, if I show up to find a dead patient, I have to begin resuscitation; a paramedic has more flexibility to "call it" on an unattended death. But there are exceptions, which we remember with the three Ds: decapitation, decomposition, and dependent lividity (the patient has been dead so long that the blood has pooled to the lowest areas of the body, causing distinctive purpling), as well as incineration or rigor mortis. Barring the presence of one of these, we start resuscitation. Once we start trying to bring the patient back, we can only be called off by a paramedic (following her own protocols) or by on-line **medical control**, which is a call to the hospital on the EMS line to an emergency physician, who has the authority to tell us to stop resuscitation and call the patient as deceased.

Points to Remember

- **The first phase in emergency medical care is the civilian or lay rescuer who encounters the medical emergency and activates the EMS system by calling for help.**
- **The most important thing you can do as a lay rescuer is stay calm and make the call to dispatch as soon as you determine there is a life threat, because in many emergencies, a few seconds make all the difference in patient outcome.**
- **With computer-aided dispatch systems, dispatchers can determine the origin of a call, gather necessary information from a reporting party, dispatch appropriate first responder units, and determine any potential hazards to responding units.**
- **EMTs and paramedics are responders trained to provide pre-hospital care to stabilize a patient on the scene and during transport to the hospital.**
- **EMTs and paramedics work under the direction of a physician who creates protocols, standing orders for them to follow in various types of medical and trauma situations.**
- **The hospital's emergency department is the default destination of any EMS call. A patient will only be left at the scene under certain strict conditions.**

Assignment

Have you ever been faced with an emergency medical situation? If you are comfortable discussing it, tell me what happened and how you reacted.

If you have never been faced with an emergency medical situation, I would like you to examine your daily life – think about your job, your hobbies, where you go, what you do on a normal day – and try to foresee what sorts of medical emergencies you would be most likely to encounter. Then try to give an honest appraisal of whether you would be prepared, mentally as well as physically, to assist in such a situation.

Lecture Three – Safety First

You can't help anyone if you turn yourself into the next victim. It's that simple.

I work with firefighters and other first responders who have a reputation as being hero types, willing to throw themselves in harm's way at the slightest provocation. The reality is, though, that while these men and women are indeed heroes, in every sense of the word, only the most foolish of them leap into a hazardous situation without taking at least minimal precautions to ensure their own safety.

Here's the story I always tell: If you've ever been on an airplane, you've heard the cabin crew give the lecture about what to do if the oxygen masks drop from the ceiling. More specifically, they always tell you that if you are traveling with a child, you have to put on your own mask first, then your child's. There is incredible resistance to this concept – many people seem to feel that it is their responsibility to ensure the safety of the child before their own. This is a well-meaning and incredibly heroic sentiment, and also the biggest mistake one could make in such a situation. Because here's the reality: if cabin pressure is dropping rapidly, you may only have moments to make the right action before oxygen deprivation makes you black out. You can put your own oxygen mask on first, ensuring you stay conscious long enough to help the child with hers, or you can try to put hers on first and fail to accomplish either.

A lay rescuer who won't pay attention to the basics of safety can turn a simple EMS call into a mass casualty incident.

Personal Safety

We'll get to the environment and the dangers of an emergency scene in a minute. First, though, when I talk about personal safety in this context, I'm talking about **body substance isolation** (BSI), the methods for keeping yourself safe from air-borne, blood-borne, and other pathogens. In EMS, we refer to these simplest safety measures by the euphemisms "standard precautions" or "universal precautions".

At a minimum, BSI includes exam gloves and eye protection. The gloves are crucial because you will be touching your patient at some point, even if it's only long enough to take a radial pulse and determine skin temperature. The eye protection is crucial because the membranes surrounding your eyes are an easy entry point for pathogens. In some circumstances, standard precautions might also include a face mask and disposable clothing covers.

Let's take a moment and talk about these critters. A **pathogen** is anything that can cause an illness or disease. We sometimes use the term infectious agent, but it means the same thing. Most of the time, when we talk about pathogens, we are referring to microorganisms, like viruses or bacteria, that make us sick.

Every pathogen has a route of transmission. Some, especially viruses, are airborne, meaning they can be spread through the air without any interpersonal contact. Flu viruses and the rhinovirus that causes the upper respiratory infection known as the common cold are the most prevalent of these.

Blood-borne pathogens, on the other hand, are only spread when contaminated blood from an infected host gets into the bloodstream of the uninfected person. Probably the most infamous blood-borne pathogen is the human immunodeficiency virus (HIV), the virus that causes AIDS. Yet, while HIV exposure is dangerous and (so far) irreversible, it's far from the most virulent pathogen a medical professional or lay rescuer is likely to face. Hepatitis C has overtaken HIV/AIDS as a cause of death in the United States, with an estimated 2% of the population infected – that number jumps to 60-70% among intravenous drug users.

The key to avoiding pathogenic contamination is to assume that every patient is infected and take appropriate precautions. That's why I have my gloves and eye protection on, before I step out of my ambulance, on every single call. A coughing patient is the cue for me to get out an N-95 face mask – for me if need be, but I have also put them on a coughing patient more than once. It sounds paranoid, but in the absence of confirmation – which is seldom available on an emergency call – that the patient has no communicable diseases about which I need to worry, I won't risk my health and safety, or that of my family.

Blood is a common hazard at my job. Gloves will protect me up to the wrist, but an uncontrolled bleed can put blood on all kinds of areas on my body. I am conscious when I go to work about whether I have any open wounds – puppies are great for leaving little scratches and bites on my arms – that I need to protect. If blood gets on any exposed skin, I clean it off with an alcohol wipe (and double-check that my puppy hasn't gotten hold of that part of my skin recently). If I get blood on my clothes, I always have a spare set or a jumpsuit that I can change into while I launder my uniform.

So you've got your universal precautions, and you're confident that none of your exposed skin has any punctures or cuts that could allow pathogens to enter your bloodstream. Are you safe? No, because you also have to be conscious of the ways in which you could <u>create</u> an entry for pathogens through carelessness on the scene. Motor vehicle accidents are the worst for this; typically there is a smorgasbord of broken glass, some of which might even have a patient's blood on it. Kneel in the wrong place, and you've just received an accidental exposure.

But the most common of these accidental exposures is the needle stick, where a provider jabs him- or herself with a used needle. Best case scenario, it's a poke from one of the lancets we use to draw blood to check glucose levels; worst case, it's a hypodermic needle or an IV stylus. Why are those worse? IV needles and hypodermic needles are hollow, unlike the lancet, so they can hold more of the patient's blood to carry it into your bloodstream.

Any accidental exposure should be reported to EMS personnel when they arrive. There are measures that can be taken to test and treat the exposure.

One more important point here: although we refer to them as blood-borne pathogens, many of these pathogens can also be transmitted through sputum, vomitus, or any other bodily fluid. Treat all bodily fluids the way you would treat blood, and treat all blood as if it's infected unless you are 140% certain it isn't.

We'll talk about putting together a first-aid kit in Lecture Eleven, but (spoiler alert) exam gloves, eye protection, and at least one N-95 mask are going to be on the list.

Scene Safety

This part is all about situational awareness. When you undertake to help someone in a medical emergency, you have to be certain the scene is safe and free of hazards that could cause injury to you or to your patient.

What kinds of hazards we're talking about is going to be situationally dependent. If you're the first lay rescuer on the scene of a motor vehicle accident, you clearly have to be aware of traffic, fire, broken glass, and leaking fluids (especially fuel), in addition to many more potential hazards. On the other hand, in a school environment, you may not encounter anything more dangerous than a blackboard eraser.

The best way to stay safe on an emergency is to remember and use this three-step response to any potentially dangerous situation, even when you don't see anything dangerous:

- **Plan –** this can actually begin well before the emergency situation. Take stock of the places you normally frequent, try to anticipate the hazards you could face if an emergency were to occur there, and come up with ways to stay safe.
- **Observe –** keep your eyes, ears, and other senses wide open. Watch for both anticipated and unanticipated dangers. Observation should begin as soon as you figure out there's an emergency, long before you ever approach the patient. In an emergency, it's easy to get so focused on the person needing help that you lose the wide angle view necessary to spot hazards.

  I learned a valuable lesson about tunnel vision on one of my first calls as a new EMT. We entered a mobile home on a fairly routine sick person call, and as soon as I saw the patient on the couch I got focused on observing the patient's condition and didn't see the large dog in the kitchen on my seven o'clock. Luckily, my partner – a thirty-year veteran of the fire service – was more observant than I was and immediately asked one of the other residents of the home to put the dog in another room.
- **React –** actually, this should be react, retreat if necessary, and reevaluate. Again, this is going to be situationally dependent, but once you determine there is some quanta of danger to you, you have to get out of the danger zone. You're not doing any good on an emergency scene if you end up being another patient. Your best option in many cases is going to be to put distance, cover, and/or concealment between yourself and the danger.

Emergencies are often active events, so it's also important that you remain flexible in the face of changing circumstances. Consider whether you might need more resources or assistance. Environmental dangers, including things like water or height, may require you to call in a rescue team. Human dangers might mean you need law enforcement.

Crime scenes deserve a little extra detail here. Obviously, you need to be aware of the continued presence of perpetrators and the possibility of violence. But don't neglect to take account of family members or other bystanders: law enforcement officers will tell you that domestic disturbances are the most dangerous and unpredictable type of calls they receive, because in many cases the person who was being victimized minutes earlier could turn on

police out of fear of how the abuser will react if the victim cooperates. Take note of any weapons, actual or potential, and watch for signs of alcohol or drug use that could make those involved or those watching unpredictable. Try not to disturb anything on a crime scene except to the extent necessary to deal with life threats, and make every effort to preserve evidence.

Patient Safety

A cardinal rule for lay rescuers is that if the patient shows any signs of head, neck, or spine injury, or if the mechanism of injury (see Lecture Six) indicates any possibility that the head, neck, or spine has been injured, you should not move the patient. The obvious danger to the patient is that you could unintentionally aggravate a spinal injury, causing permanent damage to the patient's spinal cord. However, there are exceptions to this rule:

- The scene is hazardous: You may have to move a patient quickly in order to protect the patient and yourself from vehicle traffic, fire, possibility of explosion, toxic gases or other hazardous materials, etc.
- Treatment for life threats requires moving the patient: You may need to move a patient onto a hard surface in order to perform CPR, or roll the patient to access a life-threatening bleed. This doesn't include moving the patient to treat anything less than a life threat or moving the patient to a more convenient location.
- Conditions at the scene are adverse to the patient: The clearest examples of this are a patient immersed in water, extreme cold or extreme heat in an environmental emergency.

When you absolutely have to move a patient with obvious or possible spinal trauma under one of these conditions, you should always try to move the patient along the long axis of the body, an imaginary line that runs from the top of the patient's head along the spine to the feet. The most common way to emergency move a patient in this manner is a drag, taking hold of the patient under the arms or by the clothing at the shoulders, and dragging straight backwards to the position to which you need to move. If you have no other choice, you can also take hold of the feet and drag along the long axis as well; be conscious, however, that you cannot protect the patient's head in this type of drag, and you should never drag a patient feet-first up or down any incline.

When you're lifting or moving a patient – or anything heavy, really – you should always be conscious of your body mechanics. Position your feet in a power stance, shoulder width apart. Use your legs, rather than your back, to do the lifting – bend at the knees, not the waist, and keep your back straight and chin up while you lift. Keep the weight as close to your body as possible while you lift; don't reach and lift if you can possibly avoid it. Don't turn or twist your body while you lift. Definitely don't twist your body while reaching.

Points to Remember

- **It's vital that you take appropriate steps to protect your own safety before attempting to assist anyone else; you can't help anyone if you wind up becoming another victim.**

- **Use personal protective equipment – gloves and eye protection at the very least – when examining or treating a sick or injured person to protect yourself from blood-borne pathogens.**
- **Plan, observe, and react to hazardous situations and other dangers on an emergency scene. In many cases your best option will be to retreat and put distance, cover, or concealment between yourself and the hazard.**
- **If there is any possibility that your patient has suffered head, neck, or spinal injury, you should avoid moving the patient unless the scene is hazardous, you have to move the patient to administer life-saving treatment, or conditions on scene would make the patient's condition worse.**
- **If you have to move a patient with possible spine trauma under emergency conditions, try to drag the patient in the direction of the long axis of the body.**

Assignment

As I said in the section on personal safety, we're going to be talking in detail later about what a fully-stocked first aid kit for a lay responder should contain. For right now, though, I would like you to assess what you have on hand right now to assure your personal safety if you should find yourself in a medical or trauma emergency. Check your bathroom cabinets, your EDC, the cheapo first-aid kit in your car. Do you have gloves? Do you have eye protection?

Don't neglect to assess the most important tool you have to assure your personal safety: your awareness.

If there are physical items that you need, like eyewear or gloves, come up with a plan to integrate them into your EDC (or at least your home). Do you know where to find them?

Lecture Four – Initial Patient Assessment

When a new EMT is taking their skills tests, in each scenario the first thing s/he needs to do is take appropriate BSI precautions and determine whether the scene is safe; failing to do or at least verbalize either of those, and s/he won't pass that scenario. Now that we have covered those two points, it's time to move on to assessing a patient.

We divide EMS calls into two broad categories: medical calls and trauma calls. Like the name implies, a trauma call is where someone has been injured through some sort of trauma: a motor vehicle accident, a fall, a gunshot, or any other mechanism of injury that can cause gross damage to the body. Medical calls are everything else: sickness, weakness, chest pain, breathing difficulty, environmental emergencies, etc.

No matter whether it's a medical or a trauma, though, the initial assessment is always the same. You run through the following steps, in the following order. Overall, you're looking for life threats as we discussed earlier. Remember what I described earlier as Rule Two: <u>you need to call for emergency medical services as soon as you detect a potential life threat</u>.

Responsiveness

How conscious is the patient? We score responsiveness on the AVPU scale:

- **Alert**: Patient is fully conscious, eyes open, takes spontaneous actions, probably even talking to you.
- **Verbal**: Patient doesn't speak or open her eyes spontaneously but will respond to words when you speak to her.
- **Painful**: Patient doesn't respond to words but will respond to painful stimulus, like a sternal rub.
- **Unresponsive**: Patient doesn't respond even to pain.

When I come upon a patient who is down (apparently unconscious), I will talk to them first: "Hey, how you doing? Can you hear me?" If I get a response, the patient is an A or V and we'll go on with the assessment. If I don't get a response, I will do a quick sternal rub – take the knuckles of one hand and rub them hard up and down the length of the patient's sternum. A patient who doesn't yowl or at least groan when you do that (try it on yourself) is unconscious, guaranteed. This entire process should take less than five seconds.

> **<u>Rule Two alert</u>: if the patient is unresponsive, or responds only to painful stimulus, make the call to dispatch immediately.**

When you call for assistance, make sure you start by telling the dispatcher the patient's level of responsiveness.

Airway

The first thing to remember is that an unconscious person cannot adequately protect her airway. By protecting the airway, I'm talking about taking action to make sure the airway remains open and able to take in air – swallowing, changing position, moving the tongue out of the way. Believe it or not, your body is always having to do these things to make

sure you keep breathing, but after a lifetime of doing it, most of the time you don't even notice. In some unconscious patients, the muscles controlling the lower jaw and tongue may lose their normal tone, causing the tongue to slide over or press the epiglottis into the airway

If your patient is alert, assessing airway and breathing is easy: ask her questions and get her talking. Talking means air is going in and out. Listen for vocal rasp or hoarseness, or a high-pitched wheezing sound in the upper airway called **stridor**: these can be signs of a partially obstructed airway, which means you should be dialing dispatch.

If your patient is not alert, you need to manually open the airway. There are two ways of doing this; which one you use depends on whether there is evidence of trauma.

The **head-tilt, chin-lift** maneuver aligns the structures of the airway to allow air to move in and out. To do the head-tilt, chin-lift:

- Place the patient on her back and kneel at one side of her head.
- Place one of your hands on the patient's forehead and apply gentle downward pressure until the head is at least in a neutral position (the angle it would be at if the patient were standing and looking straight ahead).
- Place the fingertips of the other hand just under the bony area at the front of the patient's jaw and apply upward pressure to lift the jaw forward. Be sure not to press into the soft tissues behind the tip of the jawbones; this itself can obstruct the airway.
- Don't allow the patient's mouth to close. If you have to, use the thumb of the hand that is lifting the chin to pull down the patient's lower lip. Do not put your thumb between the patient's top and bottom teeth.

If there is any possibility of head, neck, or spinal trauma, you cannot use not use the head-tilt, chin-lift. Instead you'll use the **modified jaw-thrust** technique:

- Kneel at the top of the patient's head. Do not tilt or rotate the patient's head.
- Reach forward and place your hands on each side of the patient's lower jaw, at the angles of the jawbones just below the ears.
- Stabilize the patient's head with your forearms as you press up on the angles of the jawbones to push the jaw forward.
- Don't allow the patient's mouth to close. If you have to, use one or both thumbs to retract the patient's lower lip. Do not put your thumbs between the patient's top and bottom teeth.

Once you have the airway open, you are going to "look, listen, and feel." Look inside the patient's mouth for obstructions, especially for blood or broken teeth in a trauma patient or vomitus or sputum in a medical patient. Listen for the sound of air moving. Feel for air movement at the mouth. We'll cover this again in the breathing section in a moment.

Rule Two alert: if there is any airway obstruction, or any sign of impending airway collapse like stridor or hoarseness, or if the patient is suffering from anaphylaxis, make the call to dispatch immediately.

Breathing

Breathing is all about answering two questions: Is the patient breathing, and is the patient breathing adequately?

In the airway section, we talked about "look, listen, and feel." In a patient with an open airway, this should flow right into the "look, listen, and feel" of breathing. Watch the patient's chest to see if it is rising and falling with each breath. Listen for air movement. Feel the chest for rise and fall if you have to.

> **Rule Two alert: if the patient is not breathing, make the call to dispatch immediately.**

If the patient is not breathing, you're going to go straight to rescue breathing. At the same time, you should also quickly check for a pulse in the carotid artery of the neck, and if you can't feel a pulse, it's time for CPR (see Lecture Seven).

If the patient is breathing, you next need to quickly assess whether the patient is breathing adequately. As a lay rescuer, you should be looking for two things: signs of respiratory distress and cyanosis.

Respiratory distress can come in many levels of severity. Listen to the patient's breathing: does it sound labored or wheezy? Watch the patient's posture: are they sitting leaning forward, resting their hands on their knees in the **tripod position**? If you have signs of respiratory distress, take a second to look at the hollow just above the patient's collarbones; if you can see this area visibly suck in when the patient draws a breath, the patient's compensatory mechanisms are worn out and the body is relying on accessory muscles to assist with the difficult breathing.

Cyanosis is a bluish tinge to the skin. Patients who aren't getting enough oxygen will often develop cyanosis around the mouth.

> **Rule Two alert: if you see cyanosis or any signs of respiratory distress, make the call to dispatch immediately.**

Circulation

Circulation refers to the movement of blood through the body. When you are doing the initial circulation assessment, you're looking at three things: pulse, skin color, and life-threatening bleeding.

If your patient is unconscious, as stated in the last section, you should check for a carotid pulse, and if there's no pulse, start CPR immediately. If the patient is conscious, you can check for a pulse in the radial artery in the wrist. You can count the beats for fifteen seconds and multiply that number by four to get the beats per minute. Any pulse rate below 60 BPM is called **bradycardia** and should be considered a life threat. (Okay, there are very rare individuals who are in such excellent physical condition that their resting heart rate may average below 60 – if that is your patient, you should be able to ask if they normally have a slow heart rate.) Any pulse rate above 100 BPM is called **tachycardia**. Unlike bradycardia, tachycardia may not be a life threat; your heart rate can go well above 100 during a hard workout, for example, or after a startling moment in a scary movie.

<u>Rule Two alert</u>: if the patient is pulseless or bradycardic, make the call to dispatch immediately.

If your patient is a child, don't be alarmed by a rapid pulse rate; kids usually run a resting pulse rate of between 100 and 140, depending on age.

Don't just count the pulse, feel its quality as well. Does the pulse under your fingers feel strong and steady? Is it weak and thready instead? Is the rhythm regular, or irregular? Does it occasionally skip a beat, even in an otherwise regular rhythm?

The patient's skin should be warm, pink, and dry. If the patient is pale and cyanotic, it could indicate a circulatory or respiratory problem. A patient who is diaphoretic – pale and sweaty – could be suffering from a number of illnesses, but s/he could also be undergoing a cardiac event. You can also check for capillary refill, the speed at which blood returns after being cut off: squeeze the patient's fingernail for a second or two until the area under the nail is white, then release and observe how quickly the color returns to pink. If it takes longer than two seconds, the patient is not getting sufficient circulation, at least in that extremity.

<u>Rule Two alert</u>: if the patient is cyanotic, or is diaphoretic without a known reason (like illness), make the call to dispatch immediately.

Finally, you want to quickly scan the patient for bleeding. I can't explain the difference between bleeding and life-threatening bleeding: I can only assure you it will be obvious. If your patient is unconscious and on the ground, it's also important to check the side of the patient that is not facing up: I will frequently run my gloved hands under a patient from shoulders to buttocks and then examine the gloves to make sure there isn't a serious bleed that I can't see.

There are arteries in the neck, torso, and inner thighs that, if lacerated or severed, can pump out enough blood to fatally exsanguinate a patient in minutes. If your patient is a losing a lot of blood or the blood is spurting, you have to get the bleeding stopped. Hold a towel or some gauze pads – or whatever you can find, providing it's clean; in a pinch you can use just your gloved hand – over the area that's bleeding and apply direct pressure until the bleeding is controlled. Do not remove the dressing, even after the bleeding is controlled.

If bleeding in an extremity is not controlled after a couple of minutes of direct pressure, you could consider using a tourniquet, but only as a last resort. A tourniquet is a belt or band of some kind wrapped tightly around the extremity between the wound and the body, about two inches above the wound. <u>Do not put a tourniquet around the patient's neck</u>. Don't place the tourniquet around a knee or elbow. Tighten the tourniquet just until the bleeding stops and hold it in place, either by securing it somehow or holding it until help arrives.

<u>Rule Two alert</u>: if there is uncontrolled bleeding or arterial (spurting) bleeding, make the call to dispatch immediately.

Any patient with a traumatic injury or severe blood loss is in danger of shock, a potentially life-threatening condition. We'll cover this more in Lecture Nine, but for now you need to know that any patient who has suffered a traumatic injury or severe blood loss should be kept warm and still until help arrives.

How many hands do you think I have?

It may be obvious that in a true medical emergency, you might have more to do than your one pair of hands can accomplish: you could be using two hands to hold the patient's airway open, two more hands to perform chest compressions, one or two more hands to control bleeding, all while you're giving rescue breaths, treating for shock, running to find an AED and a first-aid kit, and calling for EMS help. If there are bystanders present that you can draft into helping, you may have to direct them to do the things you can't at any given moment. It is important that you remember Rule One: stay calm. Give your helpers clear, easy-to-follow directions in a polite but firm tone.

If you are by yourself, you have to prioritize what assistance you can provide. Remember that lack of oxygen and blood flow will kill your patient faster than any other cause we have assessed in this lecture; when we discuss CPR in Lecture Seven, we'll talk about how to provide the most effective intervention when you are alone. Everything else is secondary to compressions and breathing. Also remember that the timing of when to make the call to dispatch as we have discussed is critical. Dial the emergency number, put your phone on speaker, put the phone on your patient's chest if you have to, and continue with your assessment and interventions while you are talking with dispatch.

Points to Remember

- **The initial patient assessment is the rapid process of determining whether the patient is conscious or unconscious and then assessing the ABCs (airway, breathing, circulation) for immediate life threats.**
- **At any time during the initial assessment, if you discover a life threat, you must call for medical help immediately.**
- **Responsiveness is scaled using the AVPU mnemonic: alert, verbal, painful, or unresponsive. Call for assistance immediately if the patient is not fully alert.**
- **In an alert patient, you can rapidly assess airway and breathing by getting the patient to talk. Call for assistance immediately if you hear stridor or hoarseness indicating an airway obstruction. In an unconscious patient, you need to open the airway manually and assess breathing.**
- **Assess circulation by checking pulse, skin color, and bleeding. If the patient has no pulse, start CPR and call for assistance immediately.**
- **Get bleeding under control by using direct pressure. If you can't control severe bleeding, or if it is spurting arterial blood, call for assistance immediately.**

Assignment

Please take some time and consider how the skills you have learned in your Jedi training to this point could assist you in the context of an initial life-threat assessment, whether you've picked up these skills in your coursework at the IJRS (or some other praxeum), your integrative practice, or your outside reading. Please post your thoughts in your coursework thread on the forum.

Lecture Five – Rapid Medical Assessment

Once you've completed the initial assessment and determined that there are no obvious life threats and that it is not a traumatic injury (which we'll get back to in the next lecture), you can move through the following steps to take a basic medical assessment on a conscious patient.

Here's my philosophy about lay rescuers doing medical assessments: no one expects you to be able to diagnose. That said, though, later in the course we'll be talking about some common medical conditions that you may be able to spot easily when you know what questions to ask and what signs to look for.

But the real reason that you should ask these questions is simple: you're there, and the medics aren't. If your patient crashes thirty seconds before the ambulance arrives, the medics aren't going to be able to ask these questions. In a situation like that, you're the only chance of getting useful information to the care providers.

Determining the Chief Complaint

The **chief complaint** is the patient's subjective statement describing the most significant or serious injury, symptoms, or signs of illness. It's the first answer to the question, "Hey, are you all right? What's wrong?"

Sometimes the chief complaint will be obvious and you won't have to ask that question. Sudden loss of consciousness is hard to miss. A person sitting forward, hands braced on their knees in what we call **tripod position**, and gasping for breath is a pretty easy call too.

Pain – OPQRST and the Pain Scale

Whenever the chief complaint is pain, or pain accompanies the chief complaint, you will want to get a description of the pain that you can pass on to medics when they arrive. You have probably heard the old saw that pain is the body's way of telling you something is wrong. The type and quality of pain is how we figure out what that something is.

Ask the patient questions to get a description of the pain using the OPQRST mnemonic:

- **Onset**: "Do you know what is causing this pain? Have you ever felt this pain before? What were you doing when the pain started?"
- **Provocation / Palliation**: "Is there anything that makes the pain worse: moving, bending, sitting up, lying down? Is there anything that makes the pain feel better?"
- **Quality**: "What does the pain feel like? Dull and achy? Sharp and stabby?"
- **Radiating**: "Is the pain staying in one place, or is it moving anywhere?" Particularly with chest pain, you want to know if the pain is radiating to the patient's shoulder, arm, or neck, especially if it's on one side more than the other.
- **Severity**: I ask the patient to rate their pain on a scale from 1 to 10, where 1 is minimal and 10 is the worst pain you've ever felt. If I feel like I can joke with the patient, I might say 10 is "stepping on a Lego." Generally, I am skeptical of a patient

who is able to tell me their pain is a 10 (or higher); it's been my experience that by the time the pain gets to 8 or 9, they really aren't talking much anymore.

- **Time**: "How long ago did the pain start? Has the pain been constant since it started, or does it come and go?"

The OPQRST mnemonic can also be adapted to get appropriate information from a patient in respiratory distress, even if the patient is not experiencing pain. "What were you doing when you started having trouble breathing? Is there anything that makes it harder to breathe? Is there anything that makes it easier? Can you describe how your breathing feels right now? Where are you at on a scale of 1 to 10 if 1 is very easy to breathe and 10 is can't breathe at all? How long ago did you start having trouble breathing? Did it come on all at once, or has it gradually been getting worse?"

Exploring the Chief Complaint

Getting a thorough description of the patient's pain is the key to any cardiac or respiratory events. Pain is also going to be the primary symptom of many trauma emergencies. In other cases, though, you may have a patient who isn't in pain, or at least pain isn't the chief complaint. For these cases, you will want to ask different questions to get relevant medical information from the patient. We'll cover some common medical conditions in Lecture Nine, which will give you some idea of typical symptoms to watch for and some questions you might ask.

In this lecture, we've been concentrating on the questions and answers between you and the person you are assisting. But remember that you have other senses that can be used to help you figure out what is going on and what you can do to help. Really observe your patient while you talk with her.

We rely heavily on our senses of sight and hearing to take in information. Watch her skin color and appearance; look for signs of cyanosis or diaphoresis. Observe her hands: are they trembling? Clutching? Listen to how she is breathing and speaking. For a patient in respiratory distress, for example, we use the rule of thumb that the more serious the breathing difficulty is, the fewer words a patient will be able to get out between breaths – once we get down to about four words or less, we know this is major.

But don't neglect your sense of smell. A person in a diabetic emergency, for example, may have an overpowering fruity odor on their breath. Also note whether you smell alcohol on the person's breath, as alcohol consumption can sometimes exacerbate certain conditions, mask others, or cause the patient's responses to be unreliable.

As long as you are adequately protected from blood-borne pathogens, take a pulse. Easy places to find a pulse are the radial pulse (on the inside of the wrist just on the thumb side of the tendons that curl your hand up toward your biceps) and the carotid pulse (in the hollow area of the neck on either side of the trachea). Locate the pulse, count how many beats you feel in fifteen seconds, and multiply that number by four. Also take note of the quality of the heartbeat you feel: is it strong, weak, arrhythmic (skipping a beat or not beating regularly)? Practice on friends, family members, or on yourself if you have no experience taking a pulse.

Having said all that, though, it's a common mistake to focus in on the patient to the extent that we develop "tunnel vision" and don't notice our surroundings. Of course, as Jedi we strive to develop not only situational awareness but our powers of observation in the face of distraction. Make note of what's around you, not just hazards but also environmental clues that can help you understand what's going on with your patient. Drug paraphernalia is a common example I give: an unconscious patient may be suffering any of a number of medical conditions or traumatic injuries, but if I find paraphernalia at the scene, I can make an educated inference about the cause of the problem.

Taking a SAMPLE History

There is a certain amount of information you should try to get in any medical emergency – remember, as the first on the scene you may be the only person in a position to get this information if your patient crashes before medics arrive. To remember what is important for care providers to know, we use the mnemonic SAMPLE:

- **Signs and symptoms**: these are all the questions and observations about the chief complaint and any associated symptoms that we covered in the last three sections.
- **Allergies**: "Are you allergic to any medications? How about any foods? Any bugs, stings, environmental stuff?"
- **Medications**: "What medications are you taking? What do you take ___ for? Did you already take your meds today?" Dosages are helpful. Also, don't neglect over the counter supplements, which can sometimes have unexpected adverse interactions with prescription meds.
- **Past medical history**: You want to know what chronic conditions the patient has, so you can ask something like, "Are you seeing a doctor for anything?" or "Do you have any medical conditions that you're seeing a doctor for?" Another important question is, "Have you ever experienced something like this before?" When a patient has experienced a seizure, for example, I want to know if they have ever had a seizure before. For many conditions, I might also ask, "Has anyone in your family experienced something like this before?"
- **Last oral intake**: "When was the last time you ate or drank anything?" Especially important in diabetic patients and environmental emergencies, but you should always ask this. If a patient winds up needing emergency surgery, the anesthesiologist will want to know.
- **Events leading to illness/injury**: "What were you doing when this started?"

Can you get a lot of this information even if the patient is unconscious? Sometimes, if there is a family member or a close friend present, they might be able to tell you a lot. If you can't ask the patient, ask any bystanders if they know him/her.

Check to see if the patient is wearing or carrying anything that would give you a clue to their medical history. Many people with chronic conditions that affect their responsiveness wear a medic-alert bracelet or even dog tags with similar information. If you have someone in respiratory distress due to what looks and sounds like a throat obstruction, and they are

conscious but unable to speak, ask whether they are allergic to something – and if so, are they carrying an Epi-Pen – or asthmatic, in which case they might have an inhaler.

Points to Remember

- **In a medical emergency, one of the most useful things a lay rescuer can do is collect relevant information about the patient. Because a medical patient can change status rapidly in some cases, the patient may no longer be conscious when medics arrive, so you are the best chance for getting that information.**
- **Figuring out the chief complaint may be obvious at a glance or may require some questioning to determine what is wrong with the patient.**
- **Getting a thorough description of any pain the patient is experiencing, using the OPQRST mnemonic, is key to identifying many cardiac and respiratory emergencies.**
- **Assessing a patient involves not just asking questions, but really observing the patient and her surroundings for clues that will help you figure out what's wrong.**
- **Taking a SAMPLE history can help get information that is relevant in nearly every medical emergency.**
- **Even when a patient is unconscious, you can often get the needed information from family members, bystanders, or what the patient is wearing or carrying.**

Assignment

Please take some time and consider how the skills you have learned in your Jedi training to this point could assist you in the context of a medical assessment, whether you've picked up these skills in your coursework at the IJRS (or some other praxeum), your integrative practice, or your outside reading. Please post your thoughts in your coursework thread on the forum.

Lecture Six – Rapid Trauma Assessment

When you have a patient who is injured instead of sick, once you have completed the initial assessment and address any potential life threats, your approach to the patient should be somewhat different. But some of what we covered in the medical assessment will still be applicable. Assuming the patient is conscious, you may still have a chief complaint, and you will likely be assessing pain with the OPQRST scale. And one of your key roles as a lay rescuer is still going to be getting crucial information, from the patient or bystanders, that may not be available any longer by the time EMS arrives on scene.

Determining the Mechanism of Injury

We touched on this topic briefly in Lecture Three, where we discussed whether a patient can be safely moved. Every trauma is the result of one or more physical forces acting on the human body in such a way as to cause injury. The **mechanism of injury** is the force or set of forces that may cause injury in any particular case. Sometimes the mechanism of injury will be obvious: a T-bone motor vehicle collision is unmistakable. In other cases, the mechanism of injury may not be readily apparent, especially if your patient is unable to tell you what happened and no one saw the injury. Understanding the mechanism of injury is critical to assessing the nature and severity of a patient's injuries.

With a little study of the effects of force on the body, knowing the mechanism of injury can also help you predict injuries common to that particular mechanism. A gunshot wound, for example, is associated with penetrating injury. Fire or explosion causes burns. Falls are associated with injury to bones and contusion or abrasion of soft tissues. Conversely, the type and quality of the injury can help you determine a mechanism of injury where it is otherwise not readily apparent.

Generally, there are four major types of force that cause injury:

- Direct: the force causes injury by striking into the body, at or near an angle perpendicular to some surface of the body. A punch to the stomach, an impact with the ground after a fall, and a bullet hit are all examples of direct force.
- Indirect: the force travels along a line of motion causing injury somewhere other than the point of impact. Spine compression injuries from a feet-first impact are a common example of indirect force; the direct force is the feet striking the ground, but the real injury comes when bones of the spine bash together downward against each other with the sudden loss of velocity.
- Rotational: the force rotates or twists the body or part of the body, causing injury. Bones and joints are especially prone to this sort of force, as anyone who's ever twisted an ankle can attest.
- Hyperflexion / hyperextension: the force causes a joint to move on its normal movement path, but to a greater extent than the connective tissue of the joint will tolerate. Necks, knees, fingers, wrists, and elbows are especially prone to these sorts of injuries. Nearly all the time, the force that causes the hyperflexion or hyperextension will be one of the preceding three types as well.

Remember we said that a mechanism of injury can be a force or a set of forces. Many impacts actually come in pairs, one external and one internal, and impact force always causes a secondary force somewhere (momentum and inertia, products of those pesky laws of motion). The best example of this is a hard punch to the head. The direct force is the impact of a fist upon the skull. But that causes another indirect force inside the skull as the brain is mashed against the skull by the sudden acceleration and deceleration.

> **In EMS we have a saying that in a motor vehicle accident, forces always come in threes. The first is the impact of the vehicle against another vehicle or object. The second is the impact of a body inside the vehicle against the inside of the vehicle, even if just a seat belt. The third is the impact of the brain and internal organs against something unyielding – bones, usually – inside of the body.**

Assessing the Injuries

When you have a conscious patient who can tell you what happened and where it hurts, you can focus your assessment on the affected area. Be conscious, however, of the mechanism of injury, and look for predictable additional injuries about which the patient may not yet be aware. When the pain or severity of a particular injury diverts the patient's attention from anything else that may be wrong with her, we call that a **distracting injury**. (A distracting injury can also be something that diverts the rescuer's attention from serious problems with the patient, usually something gnarly or gory that distracts us from the basics like ABCs or spinal stabilization.)

As a lay rescuer, your assessment of any area of the body should consist of inspection, actually looking at the area, and palpitation, feeling and even pressing on those areas. (A third one, auscultation, most often requires a stethoscope, which you likely won't have on you during a medical emergency.) When you visually examine the body, you should be looking for symmetrical abnormalities (like one knee much larger than the other), color (bruising, or paleness that might indicate loss of circulation), shape, and movement (usually whether the injured area can be moved through a normal range of motion without pain).

When you palpate the body, feel for abnormalities in shape, temperature, texture, and sensation. One other major thing you want to feel and listen for while you're palpating the body is **crepitus**, the sound and feel of fractured bone ends grinding against each other, which (it should go without saying) signifies a fracture.

We have all kinds of mnemonics for reminding you what to note during an assessment. Some old-school EMS folks use DOTS, for deformity, open wounds, tenderness, and swelling. Myself, I learned the **DCAP-BTLS** method:

- **Deformity**: a part of the body that no longer has its normal shape, whether by dislocation or by broken bones pushing out against the skin.
- **Contusion**: a bruise, caused by impact rupturing small blood vessels under the skin and causing blood to pool and cause discoloration.
- **Abrasion**: a scrape, caused by something rubbing against the skin with enough force to remove or abrade it.

- **Puncture or penetration**: a hole in the body, caused by an object impacting with enough force to break the skin.
- **Burn**: these can be reddened, blackened, or blistered. Usually you'll know these areas because they're warmer than the surrounding skin.
- **Tenderness**: the patient tells you the area hurts when pressure is applied to it.
- **Laceration**: a cut or open wound. Along with penetrating wounds, this is where serious bleeding comes from.
- **Swelling**: the injured area grows in size by blood or other fluids collecting in the area.

Remember what you have learned about mechanism of injury, and keep a high index of suspicion for injuries you can't see under other injuries that may not seem all that bad (the distracting injury in reverse, in a way). A scrape may not sound serious, but where you have a mechanism of injury sufficient to cause some road rash, you should at least suspect there could be additional injury in that area under the skin, and investigate that suspicion appropriately.

Head-to-Toe Assessment

When the patient is not conscious, or otherwise unable to tell you a chief complaint, or when you are determining the complete extent of the patient's injuries, your assessment has to be more global than the focused assessment of just the affected area. The head-to-toe assessment is a systematic approach to complete assessment to make sure nothing is missed.

Just like in the focused assessment, you want to inspect and palpate each area of the body, looking for all the same things including crepitus and DCAP-BTLS. But with each area you will also be looking for specific things as set forth below:

- Head: Inspect and palpate the scalp. Inspect the ears, looking for blood or clear fluid leaking that could signify a skull fracture. Examine the eyes, checking to make sure that the pupils are round and equal in size. Inspect the nose and mouth, looking for blood or broken teeth that could obstruct the airway and any sign of burns. Palpate the facial bones.

  Rule Two alert: if the pupils are unequal size or not round, if there is any sign of skull fracture, if there are burns in the area of the nose and mouth, or if there is any trauma that could obstruct the airway, make the call to dispatch immediately.

- Neck: In the neck, the big things you are looking for are **jugular vein distention** (JVD) and **tracheal deviation**. If you can see the patient's neck veins bulging when s/he is sitting up, it means the heart is not pumping effectively and blood is backing up in the veins. But bulging in the neck veins is somewhat common if the patient is lying down – if the patient's neck veins are flat while lying down, it could be a sign of major blood loss. Tracheal deviation means the windpipe is shifted to one side of the neck. If the trachea is not along the patient's midline, an imaginary line running

from head to toe down the center of the patient's body, it is usually a sign of **pneumothorax** (a collapsed lung) and signifies a life threat.

Rule Two alert: if the trachea is not along the patient's midline, or if the patient's neck veins bulge in a sitting position, make the call to dispatch immediately.

- Chest: When you move down from the neck, palpate the collarbones. Palpate the sternum. Put your hands on both sides of the chest and feel for equal chest expansion on respiration. Gently palpate and press in on both sides of the ribcage. Watch for **paradoxical movement** in the ribcage, when part of the chest moves in the opposite direction from the rest of the chest: *i.e.*, it moves outward when the patient exhales and sucks inward when the patient inhales. This happens when one or more of the ribs break at two ends, leaving a segment of rib or ribcage floating free and connected only by the intercostal muscles. This should be considered a life threat.

Rule Two alert: if the two sides of the chest are not expanding equally on respiration, or if you detect paradoxical movement during respiration, make the call to dispatch immediately.

- Abdomen: Imagine the abdomen is divided into four quadrants: upper left, upper right, lower right, lower left. Palpate each quadrant in turn, pressing in at least one inch (2.5cm). The abdomen should be soft and pliable; it it's rigid, it could be a sign of internal bleeding. If the patient expresses pain on rebound – that is, it may or may not hurt when you press the area, but it hurts more when you release the pressure – this usually signifies injury to the internal organs or appendicitis. If you palpate a mass that pulsates under your touch, stop pressing the abdomen immediately – this is the classic sign of an abdominal aortic aneurysm, a weakened major blood vessel, and continuing to press on it could rupture the abdominal aorta and cause life-threatening internal bleeding.

Rule Two alert: if you feel abdominal rigidity or a pulsating mass in the abdomen, make the call to dispatch immediately.

- Pelvis: Press in on the sides of the pelvis. If you feel crepitus or the bones moving beneath your hands, do not move the patient and call for EMS assistance.
- Extremities: Squeeze circumferentially down the length of each leg and then each arm. If you feel deformity or crepitus in the thigh, do not put any kind of pulling pressure on the leg and call for EMS assistance; a femur fracture handled incorrectly could cause life-threatening laceration of the femoral artery. Test each foot and each hand for circulation, motor response, and sensation: check for a radial pulse in each wrist and a pedal pulse on the top of each foot. If you cannot feel a pulse in any wrist or foot, it usually means the patient's blood pressure has fallen too low to pump adequately to the limb, and this should be considered a life threat. If the patient is conscious, ask him or her to squeeze your hands, press up and down against your hands with her feet, and whether s/he can feel which finger or toe you are touching (without looking). If the patient is not conscious, test sensation by

pinching hard on the back of each hand and the top of each foot and look for a response from the patient.

Rule Two alert: if you suspect a femur fracture or cannot detect a distal pulse in any wrist or foot, make the call to dispatch immediately.

- Back: If it's safe to do so, roll the patient onto her side and inspect the back. Don't do this is the mechanism of injury would indicate a possibility of head, neck, or spine trauma.

Remember while you do the trauma assessment to keep an eye on the patient's ABCs and level of responsiveness. The patient who was conscious and breathing when you first started examining her can decompensate rapidly after significant trauma. If there is any change to level of responsiveness or ABCs, stop the assessment and go back to addressing life threats as you did in the initial assessment.

Points to Remember

- **Understanding the mechanism of injury is critical to fully assessing the nature and severity of a patient's injuries.**
- **Assessing a patient's injuries involves inspection and palpation of the affected areas, as well as any other areas where you suspect there may be injuries.**
- **When your patient is unconscious and unable to tell you the chief complaint, it's important to do a head-to-toe assessment to assess the patient's condition.**

Assignment

Please take some time and consider how the skills you have learned in your Jedi training to this point could assist you in the context of a trauma assessment, whether you've picked up these skills in your coursework at the IJRS (or some other praxeum), your integrative practice, or your outside reading. Please post your thoughts in your coursework thread on the forum.

Lecture Seven – Cardio-Pulmonary Resuscitation

Recall from Lecture Four that when you begin the initial assessment of a patient, you first want to check the patient's level of responsiveness and the ABCs of airway, breathing, and circulation. If the patient is unresponsive, not breathing, and has no pulse – and you can determine all of this within ten seconds or less – you must begin CPR and contact EMS for assistance as quickly as possible.

Time is so critical here because when breathing and circulation stop, the heart and brain (as well as the rest of the body) are no longer getting a supply of oxygen, and permanent damage from which the patient may never recover can occur within a couple of minutes. This is one of the most important ways that a lay rescuer can contribute to favorable patient outcome.

> **The discussion that follows is based upon the most recent AHA guidelines and research supporting them. However, even the best course manual can never be an adequate substitute for offline training with a qualified CPR instructor.**

Adult CPR

Here are the steps, in order, for performing CPR on an adult patient. We'll cover this process in some depth, and then contrast the changes in the child and infant protocols in the following sections.

Assess the Patient

This is just as we discussed in Lecture Four: check for responsiveness and assess the airway, breathing, and circulation. Remember that this can be done in ten seconds or less. As you approach the patient, look for signs of life: chest rise, limb movement, etc. Tap or gently shake the patient and ask, "Hey, can you hear me?" If you get no response, try a quick, hard sternal rub. Look, listen, and feel for airway and breathing. Check a carotid pulse. If the patient is pulseless and **apneic** (not breathing), continue with the CPR protocol: call for assistance and begin CPR.

If the patient is not breathing but has a pulse, provide two rescue breaths but do not start compressions. Continue to reassess and be ready to start full CPR if the pulse stops.

Call for Assistance

Again, as we discussed in Lecture Four, one of the most important things a lay rescuer can do is get emergency medical treatment on the way to the patient as quickly as possible. In a cardiac event, this is especially important. While the research shows that good quality CPR is the number one factor associated with favorable patient outcomes in these cases, it's also important to get defibrillation and cardiac medications in play as early in the event as possible.

Remember, you can dial the emergency number and begin compressions while your phone is on speaker. If you don't have a cell phone, you'll need to find someone who does or send someone to find a landline.

Be sure to tell the dispatcher (or have your assistant tell him/her) that CPR is in progress. Emergency vehicle operation policies allow us to exceed the speed limit, run red lights, use emergency lights to force other cars to get out of our way, etc., when responding to an emergency call in the ambulance. Generally, though, we only drive like this when it's a true emergency, meaning a life threat. If you let dispatch know that CPR is in progress, s/he will pass that information on to responding units, and we will take steps to get to the scene as quickly as possible.

Position the Patient

You need to get the patient in a **supine** position – lying on his/her back, face upward – on a hard surface. Most of the time, this is going to mean the floor. Unless the patient is lying on a stretcher or a hospital bed, a mattress under the patient is going to be too soft to allow for effective chest compressions.

Obviously, there is a conflict here between the need to position the patient for effective CPR and the general rule that you don't move a patient if there is any sign of head, neck, or spine trauma. The simple answer is, I would rather have a live patient with spinal injury than a dead one, injured or not; failing to give CPR will kill a patient faster than moving him or her. That said, however, you should try to follow the moving techniques given in Lecture Four, if at all possible: have one person hold the head in manual stabilization if possible, move the head and body as a unit without flexing or rotating the neck, and move the body along the long axis.

Open the Airway

This was discussed in Lecture Four. Use the head-tilt, chin-lift technique unless there are signs of head, neck, or spinal trauma, in which case you should use the modified jaw-thrust instead.

In a few unconscious patients, simply opening the airway may possibly cause the patient to begin spontaneously breathing, so as you open the airway you should be using "look, listen, and feel" again to check for breathing.

Start Chest Compressions

If you remember nothing else about giving compressions, remember the mantra, "Push hard, push fast." However, there is a lot more to effective compressions that you need to learn and practice. That's why there is just no substitute for proper training with a qualified instructor. You can practice on a CPR mannequin – this should go without saying, but <u>never, ever practice CPR on a live person</u> – which may even give you visual cues to know that you're performing the technique properly, and you will get feedback from your instructor.

Here's the proper technique for delivering chest compressions:

- Kneel at the side of the patient's chest. I routinely sock my knees right into the patient's side, which helps to keep the patient from moving out of position.
- Place the heel of one hand on the patient's sternum, right between the nipples. Put your other hand on top of the first with your fingers interlaced.

- Lean over the patient so that your shoulders are directly over your hands. Straighten your arms and lock your elbows; you must not flex or bend your elbows while delivering compressions. The movement here is not coming from your arms and shoulders, it's coming from the hips. You're going to hinge your body at the waist to develop the force necessary for effective compressions.
- Deliver compressions straight down with enough force to press the sternum in at least two inches. This takes more force than you might realize. Your first one or few compressions might be accompanied by the sound and feel of ribs breaking under your hands, which is a very disconcerting experience. You have to ignore it. Again, it's better to have a live patient with broken bones than a dead one with ribs intact.
- Fully release the pressure on the sternum, allowing it to rise all the way up to the starting position. Do not unlock your elbows. Do not lift your hands from the sternum, or you may lose the proper position. This part is important: you have to fully release the compression in order for the heart to refill with blood that can be pumped out on your next compression. If the heart is not refilling, you're traumatizing the chest for no reason, and the patient's brain and body are still not getting oxygenated blood.

One press and release is one compression. You want to deliver compressions at the rate of 100 per minute. In recent years, use of the disco song "Staying Alive" by the Bee Gees has been popularized as a way to keep the right tempo: hear the song in your head and give compressions along with the beat, which is right about 100 BPM. There are other songs with the right tempo that you can use as well. Personally, I hear U2's "Sunday Bloody Sunday" when I deliver compressions; it's got a driving beat that reminds me to push hard as well as fast. (I have a partner with a particularly twisted sense of humor who says he hears Queen's "Another One Bites the Dust.")

Don't go too much faster than 100 BPM, though. If you're rocking along at 120 or 140, you're not allowing enough time for the heart to refill with blood between pushes.

Start Rescue Breathing

In adults, you start compressions before ventilations because as a rule, when an adult patient is not breathing, it's because the heart has stopped. In rare circumstances, you may have an apneic patient with a pulse; as stated above, you don't begin compressions in these cases, but give two rescue breaths and continue to reassess. As long as the apneic patient still has a pulse, give rescue breaths at the rate of ten to twelve per minute.

Give rescue breaths by placing a CPR face mask over the patient's nose and mouth, holding it firmly in position, and blowing into the one-way valve.

> **Remember we talked in Lecture Three about minimum PPE being a pocket CPR mask. If you don't have the appropriate protective equipment to give rescue breaths, stick with hands-only CPR.**

The best technique to hold the mask in place is the E-C clamp. If you are at the top of the patient's head (we'll get back to this in a second), place the thumb and index finger of each hand at the top and bottom of the domed part of the mask that goes over the patient's nose

and mouth. The thumb and index finger makes kind of a C shape in this position, so these four fingers together should make kind of an oval or diamond shape, with the mask protruding through the center of the oval. Then curl the remaining three fingers of each hand under the patient's jaw (the E shape) and anchor them at each side of the jawbone. You can exert upward pressure with these fingers to hold the mask tightly in place so it seals properly over the patient's nose and mouth and to help pull the head back and the jaw forward so that the airway is open (see Lecture Four).

If you are performing one-person CPR, however, you aren't going to be in position at the top of the patient's head, and you don't have more than a second to get the mask in place if you're going to give two breaths and still get back to compressions before ten seconds have passed. In this case, you just have to do the best you can to get a tight seal and get the patient's head into a head-tilt position so the airway is open. Leave the mask on the patient's face when you let go to resume compressions.

Blow just until you see the chest begin to rise. The ventilation should take about one second, then allow two or three seconds for the air to be released before giving the next rescue breath.

If you are giving rescue breaths along with compressions, perform thirty compressions and then give two rescue breaths. This is one "cycle" of CPR. <u>You should not allow the chest compressions to stop for more than ten seconds at any time during CPR</u>.

If the patient's stomach begins to distend after a few rescue breaths, it usually means that something is obstructing the airway, or the ventilations you're giving are too forceful, making the air you're pushing go into the stomach instead of the lungs. A slight bulge is not a major problem, but if the distension continues to grow, you need to fix your technique before it becomes serious. Get the patient's head into a better head-tilt to ensure the airway is forced open, and give ventilations only until you see the patient's chest begin to rise.

Two-Person CPR: Switch Rescuers after Five Cycles

In two-person CPR, you want one person at the patient's side performing compressions and the other at the top of the patient's head giving rescue breaths. After five cycles of thirty compressions and two breaths, or roughly two minutes, you need to switch places so that neither one of you becomes overly fatigued. Remember, giving effective compressions requires more force than you might think. As you get tired, you will naturally slow down below 100 BPM and push with less force, and your compressions will be less effective.

The proper way to switch is to have the person at the head take the other side of the person's chest from the person doing compressions; the less each of you has to move, the better, and if at all possible you want to avoid crossing over each other. If I am giving compressions from the patient's right side, when it's time to switch my partner will move from the head to the patient's left side, and I'll move to the head. Then after five more cycles, I'll move back to the patient's right side, and my partner will move back to the head.

Obviously, if you are the only person performing CPR and you can't draft a bystander to assist under your direction, you're just going to have to keep it up until help arrives. That's yet another reason why making the call for EMS assistance early is so important.

Reassess Every Two Minutes

That signal to switch is also a good time to reassess the patient's breathing and circulation. Quickly check for breath with "look, listen, and feel" and take a carotid pulse. The person just coming off compressions should do this reassessment while the other rescuer is getting into position to start her own compressions on the other side of the patient. Don't try to take a pulse after your partner has begun compressions; if she's doing it right, you'll feel a pulse with each compression, so you're getting a false positive. But remember, never stop compressions for more than ten seconds, so you have to reassess quickly.

If pulse and breathing return spontaneously, you should immediately put the patient in **recovery position**: on her side. It doesn't matter which side you roll the patient onto unless she is pregnant, in which case you should always roll the patient onto her left side. I generally prefer to roll the patient so she faces toward me, so it's easier for me to reassess her. The main reason for recovery position is so that if there is any water in the lungs, sputum, or vomitus – and if you've been pumping her stomach full of air unintentionally while giving rescue breaths, she's very likely to vomit – the patient can expel it without obstructing the airway.

Child CPR

The biggest differences between adult and child CPR are when to initiate compressions and the ratio of compressions to ventilations when you have one or two rescuers. For CPR purposes, a child is any patient over a year old that has not yet gone through puberty. A patient under a year old is an infant (see next section). If the patient is an adolescent, use the adult protocols instead.

In an adult, you don't begin chest compressions if the patient has a pulse, any pulse. However, if a child or infant has a pulse less than 60 (bradycardia), begin compressions anyway. Remember that children's hearts usually beat faster than adults, 100 to 140 beats per minute.

In an adult, you should call dispatch and then begin compressions. In children and infants, however, you should do five cycles (two minutes) of CPR before calling for assistance. This is because while as we discussed earlier, an adult not breathing with no pulse is probably cardiac in origin, children generally have healthier hearts. When a child becomes pulseless and apneic, it's usually a respiratory rather than a cardiac event, so manually keeping the blood moving and circulating oxygen through the patient's body takes precedence over getting defibrillation and cardiac drugs to the patient.

If you are performing CPR alone, continue the ratio of 30 compressions and two breaths as you would with an adult. However, if you have someone with you that can do either compressions or ventilations, you should give two breaths after 15 compressions. Just as with an adult, positive ventilations (blowing into the patient) should take one second and continue just until the chest begins to rise.

Mechanically, you may not be able to perform compressions to a depth of two inches on a child's shallower chest. Instead, gauge the depth of your compressions relative to the depth of the child's chest. You should press down to a depth of 1/3 to 1/2 the depth of the chest.

Everything else remains the same as the adult protocol: give compressions at a rate of 100 per minute, release completely so the heart can refill, and switch places and reassess every two minutes (at a 15:2 ratio of compressions to breaths, this would be ten cycles rather than five).

Infant CPR

If the patient is twelve months old or less, there are special considerations.

First, the best place to get a pulse on an infant is not the wrist or the neck, but the brachial pulse in the inside of the upper arm, halfway between armpit and elbow. Keep in mind that an infant's heart and respiration rates should be considerably faster than an adult's or even an older child's.

When opening the airway with a head-tilt, be aware that because infants' airway structures are much more flexible, it is possible to tilt the head so far back that the airway structures are forced closed again. You should tilt the head back only slightly from a neutral position. Also, infants' heads are larger relative to their bodies, so if the child is on a surface, you'll probably need to put some kind of padding under the infant's shoulders to get the head into the correct position.

For chest compressions, the heel of your hand is too large to press the appropriate area of the sternum. If you are at the infant's side, use two fingers on the sternum instead; some resources say to use the index and middle fingers, others say use the middle and ring fingers, but I don't think it makes that much difference. Place these fingers one finger's width below an imaginary line connecting the nipples. If the infant is small enough, you can also encircle the child's chest with both hands and press down on the sternum with your thumbs. The end of your thumbs should be just touching that imaginary line between the infant's nipples. This is the preferred technique for two-person infant CPR, but on a larger infant or if you have smaller hands, it could be more difficult.

As with child CPR, give 30 compressions and two breaths unless you have a partner to assist you, in which case you should use the 15:2 ratio instead. If you are just giving rescue breaths, you should give the breaths at 12-20 per minute (one second in, two seconds out) instead of 10-12 per minute.

Newborns are slightly different. A newborn will frequently have a respiration rate of 40 breaths per minute or more. Give CPR at a ratio of 3:1 compressions to breaths.

Automated External Defibrillator (AED)

Many public buildings now have an AED available, and you should get to know where the AEDs are located in the places you frequent. Used properly within minutes of the onset of a cardiac event, an AED can greatly improve the chances of favorable patient outcome. But AEDs are only intended for use in a cardiac event; there's no other medical emergency for which an AED will ever be helpful.

The paramedics I work with carry a manual defibrillator, which requires them to connect the patient to a monitor, read and interpret the rhythm, decide whether it's a "shockable" rhythm (more on that in a sec), decide what voltage to deliver, charge the electrodes, and

deliver the jolt of electricity. An AED, on the other hand, requires the user to do only the first step, and usually the last; a computer in the AED does all the rest.

AEDs come in two varieties, semiautomatic and fully automatic. The difference is whether the user has to push a button to deliver the shock when prompted or whether the machine does it itself. You won't see many full auto AEDs, for safety reasons. A full auto AED has no way of knowing if everyone has taken their hands away from the patient before it delivers the shock, so there is a risk that a lay rescuer can be accidentally electrocuted if s/he is touching the patient when the shock is delivered. On a semi-auto AED, before I push the shock button, I am going to visually examine the length of the patient to make sure no one is touching her, and I am going to yell the warning, "Clear!"

Every AED can be different, so it's always a good idea to read the written instructions on the machine, which are usually very simple and clearly illustrated, and follow the audible or on-screen prompts the machine will probably give you. But the general instructions are pretty consistent with all models:

- Turn the machine on, either by pressing the power button or by lifting the lid if the machine has one.
- Place the two pads on the patient's bare torso as indicated in the pictures. Typically, one pad goes on the patient's right upper pectoral area, and the other goes on the patient's left side below the nipple line. Make sure you know from the illustrations which pad goes where, or if it matters either way (sometimes it doesn't matter).
- Don't touch the patient while the machine says it's analyzing or when the machine says a shock is advised.
- Resume CPR without hesitation when the machine prompts you to do so – remember the goal is never to let compressions lapse for more than ten seconds.

The "automated" part of an automated external defibrillator is the computer on board that analyzes the patient's cardiac rhythm and determines whether it's "shockable"; that is, whether it can be remedied by electrical shock or not. No AED will allow you to shock a patient unless it detects a shockable rhythm, so there's no risk of zapping a victim that doesn't need it. To explain this, I'll need to talk briefly about cardiac rhythms.

Picture an EKG screen you may have seen in movies or on television. The beeping green waveform displays the electrical activity in the heart, which is measured by conductive pads placed on the patient's skin. The stereotypical waveform you probably think of is what we call normal sinus rhythm; in other words, the electrical activity is normal and is stimulating the appropriate electrical nodes in the heart to contract in an organized fashion. The wave on the screen isn't actually showing the contraction of the various chambers of the heart, but the electrical jolts that cause those contractions.

While there are a dozen or more variant rhythms from normal sinus that a paramedic needs to learn, for our purposes we're only going to talk about four of the most common:

- **Ventricular tachycardia** (V-tach) is where the electrical activity in the heart is in the proper organization but is too fast to allow the heart to empty and refill properly.

- **Ventricular fibrillation** (V-fib) is where the electrical activity is not organized and so the chambers of the heart are not coordinated to produce a normal heart beat. If you could see a heart in V-fib, you'd see it quivering "like a bag of worms."
- **Pulseless electrical activity** (PEA) is where the electrical activity is properly organized but the heart muscle itself fails to respond, either because the heart muscle is damaged or sick or the patient has lost too much blood to continue pumping.
- **Asystole** is where the heart has ceased generating electrical signals altogether. On an EKG, this waveform looks like a flat line, so the vernacular for someone in this rhythm is "flatlined."

You may have the impression from popular culture that the shock administered by a defibrillator "jump starts" the heart, but actually it's just the opposite. The shock actually stops the heart momentarily, allowing the electrical nodes in the heart to reboot in a sense and hopefully come back in a normal rhythm. V-fib is the classic "shockable" rhythm – we see it in about half of cardiac events when we get there in the first few minutes after onset. In fact, defibrillating ventricular fibrillation is where the device gets its name. In the best case, the heart stops momentarily and then comes back on in a normal sinus rhythm. The theory on how defibrillation works in ventricular tachycardia is more complex, but V-tach is also a shockable rhythm, although much more rare than V-fib.

But as you can probably see, defibrillation won't work on the other two rhythms. In PEA, the problem is not the electrical activity but how the heart muscle is reacting to it – namely, not at all. A shock won't change that. Similarly, a shock won't do any good if the heart is in asystole, because the heart is already stopped, so sending a jolt to stop the patient's heart will not change anything.

One other thing you should be aware of when using an AED is the consideration of how long the patient has been down without circulation. The electrical stimulus an AED provides, the hard reboot we discussed a moment ago, requires the blood to be circulating (or at least recently circulated) to get the right chemicals in place in the heart to keep the muscles going. Research shows that shocking someone who has been down for several minutes without CPR is virtually guaranteed to be ineffective. So while someone is running to fetch the AED, and while they are getting it hooked up, you should be doing chest compressions to get the circulation going manually. If you arrive with the AED instead and you don't know how long the patient has been down, do two minutes of CPR before hooking up the AED and have someone continue compressions while you connect it.

Choking

Choking is invariably an airway obstruction, so you should be recognizing and addressing the issue within the first few seconds of your initial assessment. A conscious patient with an airway obstruction will usually indicate this by pointing to her throat or putting both hands to her throat in a strangling gesture.

The difference between a "mild" airway obstruction and a severe one is whether the patient is able to talk to you. Ask the patient if s/he is choking and, if so, whether s/he can talk or cough. Treat a mild airway obstruction by having the patient cough forcefully to dislodge

the obstruction. If the patient cannot cough, or cough hard enough, or if the obstruction causes the patient to turn blue or grey, treat the obstruction as severe.

A conscious patient with a severe airway obstruction should be treated by giving her abdominal thrusts (commonly called the Heimlich maneuver). To give abdominal thrusts:

- Position yourself behind the patient, whether s/he is standing or sitting, and encircle his or her body with your arms under the armpits.
- Make a fist with one hand and position the fist with the thumb against the midline of the patient's belly, about halfway between the waist and the bottom of the sternum.
- Grasp the fist with your other hand and apply pressure inward and upward (toward the patient's head) in a smooth, quick movement.
- Deliver rapid thrusts in this manner until the obstruction is expelled or until the patient loses consciousness.

A conscious patient who is pregnant, or who is obese and too large to deliver abdominal thrusts effectively, can be treated with chest thrusts instead. The difference is that you place the thumb side of your fist against the midline of the sternum, about two finger widths above the lower tip of the sternum – be careful not to press against the diaphragm just under the sternum – and thrust straight back toward the spine.

If the patient loses consciousness, lower her into a supine position and begin CPR. Each time you open the airway to give rescue breaths, visualize the airway and if you can see the obstruction, remove it with a finger sweep. Do not use a blind finger sweep in the back of the patient's throat if you cannot see the obstruction – you could push it further into place and cut off all air to the lungs.

A choking infant requires special handling. Look for signs of choking: small objects, wheezing, agitation, blue coloration, lack of a strong cry. If the infant is conscious, hold the infant in your lap and give five sharp blows to the back between the shoulder blades with the heel of your hand, then turn the infant over and give five chest thrusts as you would if you were giving infant CPR compressions using the two-finger method (two fingers against the midline of the sternum, just under an imaginary line between the infant's nipples). Repeat the sequence of five back blows and five chest thrusts until the obstruction is dislodged or until the patient loses consciousness; if the latter occurs, begin CPR immediately while you send someone to contact EMS. If you are alone, perform two minutes of CPR before stopping to call.

Points to Remember

- **Push hard (at least two inches or 1/3 to 1/2 the depth of the chest), push fast (100 BPM).**
- **Give thirty chest compressions and then two rescue breaths, unless you are performing two-person CPR on an infant or child (15:2) or a newborn (3:1).**
- **An AED, properly used in the earliest stages of a cardiac event, can greatly improve the chance of a favorable patient outcome.**

- **Relieve choking airway obstructions by having the patient cough if the obstruction is mild, or by administering abdominal thrusts if the obstruction is severe or cannot be dislodged by coughing. Use chest thrusts instead of abdominal thrusts if the patient is pregnant or obese.**
- **Use an alternating sequence of five back blows and five chest compressions for a choking infant.**

Assignment

CPR certification is a basic minimum requirement for IJRS students.

If you are CPR-certified, and your certification is current, provide a copy of your most recent certification card. You can do this by direct email to the instructor if you are not comfortable sharing such information on a semi-public forum, but make a post in your homework thread indicating the card has been sent.

If you have been CPR-certified but your certification is expired, or if you have never been certified, schedule a CPR training at your earliest opportunity. (If CPR training is not available, or if you need help locating or scheduling a training, contact the instructor for assistance.) Make a post in your homework thread indicating when your training is to take place, and follow up by sending a copy of your certification card to the instructor once you complete the training.

If for any reason you view this assignment as something you are not able or not willing to do, please make a post in your homework thread explaining the reasons you hold this view. There may be legitimate reasons why CPR certification is not available to or not right for you, especially for some of our international students, but I can't know until we discuss it.

Lecture Eight – First Aid for Common Injuries

Now that we've spent some time learning how to assess a medical or trauma patient, the next three lectures will cover how to treat him or her once you've figured out what's wrong. I'm not going to cover most of these conditions in depth, except where necessary, because I'm more interested in giving you the bullet on how to assess and treat it rapidly.

Bleeding

As we said in Lecture Four, severe uncontrolled bleeding should be considered a life threat.

Direct pressure on the site of the bleeding should always be your first line of defense in controlling bleeding. Use gauze pads, or a bulky dressing if there is a lot of blood. (In a pinch, you can use just your gloved hand, but that's one less hand you have to assess or treat anything else.) You can use an elastic bandage or a roll of Coban self-adhesive tape to hold the pressure on and free up your hand, but wrapping the pressure dressing makes it harder to reassess whether you have the bleeding stopped.

You can also elevate the wound above the head, if possible, or at least above the heart. This will tend to slow the supply of blood to the injured area and make it easier to control the bleeding.

If you can't get an arterial bleed stopped through direct pressure, you can use a pressure point proximal (meaning closer to the torso and the heart) to the wound. This requires some knowledge of where the major arteries are located, though, and it often isn't effective, especially on larger patients with more subcutaneous fat that makes it harder to find a good pressure point. We don't really use pressure points in EMS anymore.

As a last resort, you could consider a tourniquet for truly life-threatening bleeding in an extremity. A tourniquet is a belt or band of some kind wrapped tightly around the extremity between the wound and the body, about two inches above the wound. Do not put a tourniquet around the patient's neck. Don't place the tourniquet around a knee or elbow. Tighten the tourniquet just until the bleeding stops and hold it in place, either by securing it somehow or holding it until help arrives. There are commercially available tourniquets that fasten around the extremity with Velcro and have a tension lever to wind the tourniquet to the desired tightness and then snap it into place to hold the tension. For about twenty bucks, it's not a bad idea to throw one into your kit.

> **Rule Two alert: if you can't get a severe bleed stopped with direct pressure and elevation, or if the patient loses so much blood that s/he loses consciousness or you can no longer detect a radial pulse, make the call to dispatch immediately.**

Dislocation

Dislocation is where a bone comes out of its joint, generally because the traumatic force of the mechanism of injury has caused a tearing or rupture of the soft tissue or connective tissue that holds it in place. The most common areas of dislocation are the shoulder, hip, and knee.

You should never try to reduce (meaning put back into place) a dislocated joint. There are many different mechanisms of dislocation, and each requires a distinct technique to reduce properly; additionally, the attempt at reduction can cause trauma inside and around the joint and even lacerate a major artery in the area (the brachial in the shoulder and armpit, the femoral in the hip area).

There are only two things you need to do for a dislocation: immobilize the area to prevent further injury, and assess the patient's circulation and sensation in the extremity distal (meaning further from the body) to the dislocation. Immobilize a shoulder dislocation by using a triangular bandage (or whatever you have on hand) to make a sling for the elbow on the injured side, tightening the sling behind the patient's neck to a position of comfort, and then wrapping around the torso and the sling above the elbow with a roll of gauze to help hold the sling in place. Immobilize a knee dislocation by splinting the knee in place.

You really can't immobilize a hip dislocation without the tools we carry on an ambulance, so it's a good idea to call dispatch for this kind of injury even if it doesn't appear to be a life threat yet.

Check the pulse, motor response, and sensation in the extremity before and after you immobilize the joint. If you had CMS before you immobilized but not after, you've probably tightened something too much and need to release the tightness until CMS returns. If there is a decrease in circulation, motor response, or sensation in the extremity before you immobilize, it means blood flow to the extremity is being cut off and the patient needs medical attention – again, even if this doesn't appear to be a life threat, you should consider calling EMS assistance.

Fracture

A fracture, as most of you probably already know, is a broken bone. There are a number of different ways to classify fractures, but for our purposes we're only going to be concerned with two: closed-extremity and open-extremity. A closed-extremity fracture is one in which the skin at the fracture site is intact. An open-extremity fracture is a fracture with an associated open wound, either from a penetrating force from outside that then caused the bone injury or from the injured bone end tearing through the skin from the inside.

A closed-extremity fracture can be handled easily by splinting the injured extremity. A splint is just something rigid or semi-rigid that the limb can be tied to in order to hold the fractured bone in place: you can use a commercial splint, or you can improvise with whatever you have on hand (a book, a board, even tightly-rolled towels). Never put the tie of a splint directly over the site of the fracture. Whenever you splint a bone or joint, include the joint or bone both distal and proximal to the fracture: for example, a fracture of the forearm bones should be splinted so that the elbow and wrist are immobilized to the splint as well. If the fracture is angulated, meaning the break has caused a normally-straight limb to be bent into an abnormal angle, splint the area in place as is; don't try to bend the bone straight again. You should consider calling for EMS to help with an angulated fracture, even if it doesn't appear to be a life threat.

An open-extremity fracture is complicated by the possibility of infection in the wound site and will virtually always require surgical correction. Cover the open wound with sterile

gauze pads if possible before you think about splinting. If you can't cover the wound with something sterile, consider calling for EMS assistance even if the injury doesn't appear to be life-threatening. Never try to push or retract a protruding bone end back into place; you could actually cause more damage and even a serious bleed if you don't take appropriate precautions and use the correct technique.

Be certain to check circulation, motor response, and sensation distal to the fracture both before and after you splint. As with dislocation, if you had CMS before you splinted but lost it after, you've probably tightened something too tight and need to loosen it to restore circulation to the injured limb. If there is a deficit in CMS before you splinted, your patient needs medical attention to correct the loss of blood flow; consider calling EMS even if it isn't otherwise a life threat.

All fractures require medical attention, but suspected fractures of the femur or the cervical vertebrae of the neck should be considered a life threat. You should not move a patient with a suspected neck or back fracture unless it is absolutely necessary to save the patient's life from a hazardous condition (see Lecture Three).

> **Rule Two alert: if you suspect a neck, back, or femur fracture, make the call to dispatch immediately.**

Head Injuries

In this broad category, I want to address scalp injuries, skull injuries, and brain injuries together, because you really should know how they can overlap.

Most people know that scalp lacerations bleed profusely, owing to the numerous blood vessels under the skin there, so there's a perception that a scalp injury is gory but not serious. But by now I hope I have harped on the concept of mechanism of injury enough that you already realize you should keep a high index of suspicion that an apparent scalp injury could well be a skull and/or brain injury as well. Proper treatment for a scalp injury therefore includes precautions for skull and brain injuries as well:

- Inspect the site of the injury, looking for any unusual depression in the skull or visible bone or bone fragments in the wound. If you see either of these, cover the laceration with sterile gauze – do not apply direct pressure – and call for immediate assistance.
- If you do not see depression or bone at the site of the injury, gently palpate the scalp around the wound. If you feel crepitus or movement of the skull, again, cover the laceration with sterile gauze – do not apply direct pressure – and call for immediate assistance.
- Examine the ears and nose for blood or clear fluid leaking. The clear fluid, if you see it, could be cerebrospinal fluid, which is often a sign of skull fracture inside the cranium rather than on the surface where you can palpate it.
- Only when you are certain that the skull is intact, you can apply direct pressure to stop the bleeding.
- Continue to assess the patient for brain injury, as we'll discuss in a moment.

Any injury significant enough to disrupt the normal functioning of the brain, even temporarily, is a **traumatic brain injury**, and any traumatic brain injury should be considered a life threat. The most common types of traumatic brain injury are:

- **Concussion**: the force impacting the skull is sufficient to knock the brain against the inside of the skull. A concussion can cause loss of consciousness or memory, and is usually accompanied by a groggy or nauseous feeling, but is generally only temporary.
- **Contusion**: bruising of the brain, caused by an impact sufficient to rupture blood vessels on the outside or the inside of the brain.
- **Laceration**: a cut or wound to the brain, either by an object penetrating the skull or by the brain impacting against a bony ridge inside the cranium.

The real danger of brain injuries, and the reason you should always treat any sign of brain injury as a life threat, is intracranial pressure. A traumatic brain injury can cause swelling of the injured area of the brain, whether by fluid accumulation, **hematoma** (blood pooling in the area of the injury), or both. In an intact cranium, though, there isn't room to accommodate much swelling of the brain, so the brain begins to push down into the only opening available to it, the foramen magnum at the base of the skull. The trouble is that the foramen is where the brain stem that controls your autonomic functions like heart rate and respiration lives. The swelling brain puts pressure into the foramen, which depresses the brain stem, which disrupts the pulse, blood pressure, and breathing.

Assess for traumatic brain injury by looking for any of the following signs, when coupled with a mechanism of injury consistent with head trauma:

- Loss of consciousness
- Altered mental status, such as confusion
- Personality change, irrationality, or unexplained irritability
- Seizure
- Paralysis or weakness on one side of the body
- Irregular breathing
- Increased blood pressure (over 200 systolic) and decreased pulse rate
- Raccoon eyes, black eyes (not caused by a blow to the eye or nose), or discoloration under the eyes
- Pupils of unequal size, that are not round, or that do not react to light by contracting
- Blurry vision or double vision in one or both eyes
- Patient complains of pain or any sensation that cannot be otherwise explained

It's important to realize that because the brain has so many different functional areas, injuries to different parts of the brain can manifest in many different ways and at many different levels of severity.

In later stages, the pressure can get so high that the patient will lose control of his or her voluntary muscles. These patients will usually exhibit **decorticate posturing** – the arms and wrists flex, the legs extend rigidly, the toes generally point inward – or **decerebrate posturing** – the arms and legs extend rigidly, the wrists flex at the sides, and the shoulders rotate inward – either spontaneously or in response to a painful stimulus. These posturings are often among the last symptoms of TBI to appear, before coma and death.

Keep reassessing periodically if you do not seek medical attention immediately. Remember that the biggest danger is caused by the intracranial pressure, which depending on the nature and extent of the injury can take several minutes to over an hour to build to the point that it disrupts brain function. So you may have a patient who is asymptomatic at first and only shows signs of brain injury quite some time after the trauma occurred.

> **Rule Two alert: if you suspect a skull fracture or traumatic brain injury, make the call to dispatch immediately.**

Finally, remember too that when you suspect any head injury with a significant mechanism, you should suspect neck injury and take appropriate precautions as well.

Shock

Shock is the common name for a condition called **hypoperfusion**, where the circulatory system is unable to adequately supply the cells of the body with nutrients and oxygen or remove waste products from the cells. To understand shock, I need to talk briefly about how the circulatory system functions.

You may be aware that the circulatory system is composed of the heart, blood vessels, and blood. The body has an extraordinarily sophisticated mechanism for regulating the movement of blood throughout the body to make sure that the blood is getting where it needs to be, largely by controlling the rate or force of the heart pumping or the size of the blood vessels. During a workout, for example, the body will dilate the blood vessels going to the working muscles and pump a little faster to make sure the muscles are getting enough blood to continue working. It's important to realize, however, that because the volume of blood in the body is usually constant, sending more blood to one part of the body means diverting it away from somewhere else. The body will typically furnish plenty of blood to your legs while you run, but it will compensate by sending less to the digestive tract.

A failure of one of these components of the circulatory system will cause the others to do something to compensate, and sometimes these compensatory mechanisms make things worse. If your patient is losing a lot of blood, for example, the body will try to compensate by causing the heart to pump faster. This, however, causes even faster blood loss, sending the body into a vicious cycle that can be fatal.

Shock may develop if the heart fails, if blood volume falls below a viable level, or if the blood vessels dilate uncontrollably, any of which can cause the compensatory mechanisms to kick in. Most of the symptoms of shock are caused either by these compensatory mechanisms or by the normal reactions that occur once the mechanisms fail. Regardless of the cause, once the body can no longer perfuse properly, the patient is in shock.

We use these three causes to classify the type of shock:

- **Hypovolemic shock** is the most common type we see, where the hypoperfusion is caused by a loss in blood volume.
- **Cardiogenic shock** is often seen during a cardiac event where the heart is damaged or not pumping normally, causing hypoperfusion.
- **Neurogenic shock** is relatively rare, caused when brain or spinal cord trauma disrupts the nerves that control blood vessel constriction, causing the blood vessels to dilate and stay that way, so that normal blood volume is insufficient to adequately fill the circulatory system anymore.

(Anaphylaxis, which we'll cover in the next lecture, is also a type of shock, but because the presentation and treatment are so different, it makes more sense to me to treat it as a separate topic.)

Whatever the cause, though, for our purposes you will generally see these symptoms:

- Altered mental status is usually up front, because the brain is so sensitive to changes in oxygen supply; you may observe grogginess, anxiety, or even uncharacteristic aggression.
- The patient's skin will become pale, cool, and clammy as the body diverts blood from the skin to the vital organs. (Note: in neurogenic shock, the patient will be warm and flushed instead, because the body no longer has that ability to constrict the blood vessels to the skin.)
- The patient's pulse and respiration rates will increase as the body tries to take in and pump more oxygen to make up for the inadequate perfusion. As shock continues and the compensatory mechanisms become exhausted, the pulse may become weak and thready and respirations may become shallow and labored.
- Nausea and vomiting are likely as the body diverts blood away from the digestive system.
- In late stages, you will often see abnormally dilated pupils and cyanosis (bluish tinge to the skin) around the lips and nail beds.

Rule Two alert: if your patient is displaying signs of shock, make the call to dispatch immediately.

Uncontrolled, shock is a potentially fatal condition within as little as a few minutes, so it's critical to get EMS on the way early because we have the oxygen and (often) IV fluids to help arrest the condition before the patient decompensates. In the meantime, your treatment will be to keep the patient calm and keep the patient warm. Fear and panic lead to faster heartbeat, which will exacerbate the hypoperfusion and exhaust the compensatory mechanisms more rapidly. Cover or wrap the patient in a blanket, and keep the patient still.

Until recently, part of the shock protocol was to elevate the patient's feet as well. While research shows that it really doesn't help physiologically as much as we thought, if there is

no evidence of spinal injury, elevating the feet can have a calming effect on the patient as well as conveying confidence to the patient that you know what you're doing.

> **Head injuries and shock can share some common presenting problems. In general, a severe head injury will cause high blood pressure and low pulse rate; shock will cause low blood pressure and rapid pulse rate.**

Strains and Sprains

I suspect that few people have gotten through life without experiencing one of these most common types of injury. A **sprain** is an injury, usually a stretching or tearing, of ligaments in a joint, usually caused by the joint being moved beyond or outside its normal range of motion. A **strain** is an injury to a muscle tissue by overstretching or overexertion.

Sprains and strains will usually present as pain, tenderness, swelling, and/or bruising of the affected area. Medical attention is advisable if the patient exhibits any of the following additional signs and symptoms:

- Deformity of the affected area
- Crepitus in the affected area
- A joint that is locked into position
- Any loss in circulation, motor response, or sensation in or distal to the affected area
- **Paresthesia**, or "pins and needles" feeling, in or distal to the affected area

If you're going to transport the patient, whether for medical attention or just to get the patient home, immobilize the injured area with an elastic bandage or a splint to prevent further injury, especially in a lower extremity.

Treat sprains and strains that don't require medical attention using the RICE mnemonic:

- Rest: keep pressure off the injured area for at least the first one to three days after injury. If the injury is in a lower extremity, walking should be kept to a minimum.
- Ice: put ice or cold packs on the site of the injury as soon as possible to ease pain and minimize swelling. Reapply for ten to fifteen minutes at a time, three to four times per day.
- Compression: wrap the injured area using an elastic bandage to provide support and prevent re-injury and to minimize swelling. The elastic should never be applied so tightly that it compromises circulation to the injured extremity, and should be looser proximally to the injury.
- Elevation: keep the injured area elevated above the level of the heart whenever possible to minimize swelling.

If the patient will tolerate it, you should also give NSAID pain reliever like ibuprofen or naproxen according to dosage instructions. Managing swelling is vital to avoid lasting injury like compartment syndrome, so if the swelling doesn't go down within about 48 hours after the injury or nerve or circulatory compromise develops, seek medical attention.

Points to Remember

- **Control bleeding using direct pressure and elevation of the wounded area. As a last resort, you could consider a tourniquet, but only for a life-threatening bleed on an extremity.**
- **Never try to reduce a dislocation yourself; immobilize the area as well as you can, assess for circulation and sensation, and get the patient medical assistance.**
- **Treat a fracture by immobilizing the area and assessing for circulation and sensation. All fractures require medical assistance.**
- **The danger of head injuries is an increase in intracranial pressure caused by swelling or bleeding, which can take several minutes to over an hour after the injury to display symptoms, but which can result in fatal disruption of the autonomic systems of breathing and circulation.**
- **Shock, a common byproduct of a traumatic injury or cardiac event, is caused by a failure of the circulatory system to keep tissues perfused with blood. Treat shock by keeping the patient calm and keeping the patient warm and calling for immediate EMS assistance.**
- **Strains and sprains should be treated by using the RICE mnemonic: rest, ice, compression, and elevation. Sprains and strains accompanied by any sign of dislocation, fracture, or nerve or circulatory compromise should receive medical attention.**

Assignment

Offline first aid training is a basic minimum requirement for IJRS students. As with the last lecture, provide your most recent first aid certification, schedule a training or a refresher, or defend your decision not to seek offline first aid training. If you need help locating offline training, please contact your instructor.

I want to add something additional for this lecture, however. While offline first aid training is crucial for providing you with the hands-on skills that I can't give you online, I am generally pretty dissatisfied with the depth and quality of the offline lay rescuer training I have been part of over the years. So attend your training, review the materials you were given at your last training, or go online to examine the materials provided by the Red Cross or other first aid training providers, and compare that material with what has been provided in this course. Are there areas where you feel our course has given you superior knowledge? On the other hand, are there particular topics or techniques that I have not covered here that you feel should be covered in the next update?

Lecture Nine – Common Medical Conditions

In this section, we'll briefly cover a few of the most common emergency medical conditions, the questions to ask to gather appropriate information, and the best way to treat the patient until help arrives.

Allergic Reactions

In simplest terms, an allergy is just an abnormal or exaggerated response by the immune system to some foreign substance. Many people are familiar with pollen allergies, which cause sneezing and congestion, and some plant allergies like poison ivy that cause swelling and irritation of the skin.

The biggest danger of a severe allergic reaction is **anaphylaxis**, a specific type of shock that causes a sudden drop in blood pressure as blood vessels dilate wide throughout the body, coupled with a swelling of many body tissues including those that line the airway. It's rare for a plant or environmental allergy to cause anaphylaxis (although it can happen). Where anaphylaxis usually occurs is with specific insect (bees and wasps), food (especially nuts and shellfish), and medication allergies. Anaphylaxis is a life threat, period.

Distinguishing between a mild allergic reaction and anaphylaxis should occur during the initial assessment, because the differences between the two are signs of either respiratory impairment:

- Inability to speak
- Labored, noisy breathing
- Tightness in the chest or throat
- Hoarseness, wheezing, or stridor

and/or shock (see Lecture Eight):

- Altered mental status
- Skin that is either pale, cool, and clammy or warm, dry, and flushed
- Rapid pulse and respiration rates
- Nausea and/or vomiting

> **Rule Two alert: if your patient is displaying signs of respiratory impairment and/or shock, make the call to dispatch immediately.**

Patients in anaphylaxis frequently also experience panic as their airway is increasingly obstructed. It is crucial – and usually difficult – to keep the patient calm. You will probably also see swelling of the face, lips, and tongue, and you may see hives forming all over the patient's body. The patient will probably also report warmth or tingling in the lips, face, and throat, or possibly in the hands or chest.

Assessing anaphylaxis is going to be similar to assessing a choking victim (see Lecture Seven), because the presentation of both is an airway obstruction. Choking victims will

frequently put their hands to their throats in the universal signal for choking, while patients going through anaphylaxis generally won't. But your first three rapid-fire questions in a presentation like this are likely to be, "Are you choking?" (If no,) "Are you allergic to anything?" (If yes,) "Do you have an Epi-Pen?"

Treatment for anaphylaxis is a medication called epinephrine, a stimulant that jacks up the blood pressure and partially relieves the airway swelling. These days, at least in the U.S., many if not most people who have an allergy that causes anaphylaxis will carry an Epi-Pen or similar device that allows the patient to inject him- or herself with an accurate dose of epinephrine. Help the patient administer it if necessary.

Even if the patient administers epinephrine, s/he still requires immediate medical attention. The effects of a dose of epi only last ten or fifteen minutes at most before the drug is burned out of the patient's system, and then the anaphylactic symptoms will almost invariably return.

Some patients won't have an epinephrine administration device. Others may never have experienced an anaphylactic reaction before, so they won't have epi because they don't know they need it. (It's very rare that someone has an adverse reaction the first time they are exposed to the allergen, because the body has not yet built the antibodies that cause the allergic reaction; it's the second or third exposure that causes the severe reaction.) While you wait for EMS that you called (because Rule Two), treat these patients just like you would treat for shock: keep the patient calm, and keep the patient warm.

Asthma

Asthma is a chronic respiratory condition that may "flare up", whether predictably or unpredictably, because of exercise, allergens, pollutants, stress, or some other exacerbating factor. During an asthma flare, the muscles that control the small bronchioles in the lungs contract spasmodically, narrowing the air passages and making breathing difficult. The characteristic wheeze of an asthma flare will usually be heard, or be more pronounced, only on the exhalation; when you inhale, the vacuum effect in the chest cavity that inflates your lungs seems to actually pull the bronchioles open slightly.

Most asthmatic patients will carry a rescue inhaler or "puffer," a device which sprays out a mist of a medication called albuterol that causes the bronchioles to relax and dilate. So much like in a severe allergic reaction, when you hear the characteristic wheezing on exhalation, your first two questions should be, "Do you have asthma?" and if so, "Do you have an inhaler?" Assist the patient with using the inhaler only if necessary; getting the shot of the medication coordinated with the inhalation is a skill that takes some practice, but albuterol is not effective if it's just sprayed into the mouth rather than completely inhaled.

If the patient doesn't have an inhaler, or if proper use of the inhaler as directed does not relieve the respiratory distress, you need EMS assistance – consider this a life threat. We can administer albuterol in a small volume nebulizer that makes it easier to get the medication into the patient's lungs where it will be effective, and we can monitor the patient's oxygen concentrations and give supplemental oxygen if necessary. It's also possible that if the inhaler did not work, asthma is not the cause of the breathing problem.

Another treatment that may provide some relief, either before you call or while you wait for medical assistance, is getting the patient to exhale against resistance. Have the patient purse her lips closed – not as tightly as possible, but moderately tight – while she exhales, blowing out hard to get the air through her lips. Sometimes that back pressure will force the bronchioles open and help relieve the muscular spasm that contacts the bronchioles.

Diabetes and Hypoglycemic Emergencies

Diabetes mellitus is a condition in which the body is unable to properly regulate the amount of sugar in the blood, either by decreased production of a hormone called insulin (type 1 diabetes) or the inability of the cells of the body to respond to insulin properly (type 2 diabetes). Without getting too much into the physiology, sugar (usually glucose) is a primary source of energy for cells, but without insulin, glucose cannot enter the cell membrane to fuel the cell.

Type 1 diabetics usually take insulin: orally, by injection, or through an insulin pump connected by slender tubes into the abdomen. Type 2 diabetics generally don't, but they have to follow fairly strict diets and may take other medications (like metformin, Glucotrol, or Glucophage) to manage their diabetes. Either way, though, most diabetics monitor their condition by using a blood glucose meter at least once per day.

The most common diabetic emergency is **hypoglycemia**, or low blood sugar. A diabetic patient will usually develop this condition when s/he takes too much insulin (causing the cells to suck up more sugar and thereby reduce the amount available in the blood), neglects to eat (reducing the supply of sugar available), or overexerts him- or herself (causing the body to burn sugar faster than expected). The brain and body are extremely sensitive to low blood sugar levels, so the onset of hypoglycemic symptoms will usually be very swift. You should expect to see:

- Altered mental status, which may appear to be intoxication, uncharacteristic behavior, anxiety, or even unconsciousness when blood glucose levels fall low enough
- Cold, clammy skin
- Slurred speech and loss of coordination
- Rapid pulse rate
- Seizure, on occasion

Assessment can be difficult, in part because the condition so resembles intoxication. If the patient is conscious (or you have family members or bystanders who know the patient), it should be obvious that the SAMPLE history (see Lecture Five) will give you the information you need: medications, past medical conditions, last time the patient ate or drank, and events leading up to the illness.

If you can't get the information you need from the patient or bystanders, check the patient and the environment for clues: a medic-alert bracelet or wallet card, a blood glucose meter, diabetic medications. Insulin will usually be kept in the patient's refrigerator.

If the patient is conscious, you may get the patient to test her blood glucose if a meter is available. As a rule, blood glucose should be between roughly 80 and 140 mg/dL. Between 60 and 80 mg/dL, the patient should be diaphoretic and experiencing mild alteration in mental status. Below 50 mg/dL, the patient will probably be unresponsive (and you should therefore be calling for EMS assistance in keeping with Rule Two). If you do witness testing of the patient's blood glucose and the result is inconsistent with the symptoms you observe, suspect failure of the device or improper testing procedures; in such cases, you may want to err on the side of caution and call for EMS.

If the hypoglycemic patient is conscious and the blood glucose level is low but not dangerously low, the best treatment is giving him or her something to eat. Carbohydrate is best, the simpler the better: milk, fruit or fruit juice, and saltines or toast are some good choices. (I don't suggest giving table sugar, although some sources do.) This will take longer to get the sugar into the blood than the oral glucose we carry on the ambulance, but it's something immediate you can be doing that may obviate the need for medical attention altogether. Try to follow the immediate sugar with substantial food, preferably with both protein and carbohydrate.

Hyperglycemia, as the name implies, is a blood sugar level that is dangerously high. Usually this happens either because the patient did not take her insulin as directed or increased her dietary intake. A hyperglycemic patient will usually become clearly symptomatic at a blood glucose level between 200 and 300 mg/dL; the problem is that organ damage from diabetic ketoacidosis can begin to occur even before the blood glucose level gets to 200. And unlike hypoglycemia, high blood sugar can creep up over days or even weeks before symptoms appear, if the patient is not monitoring her condition properly. When symptoms do begin to appear, they are frequently:

- Increased thirst and frequent urination, as the body demands more water in an attempt to flush the excess sugar out of the blood
- Nausea
- Rapid breathing
- A fruity, acetone odor on the patient's breath

By the time symptoms appear, the patient is often so dehydrated that severe changes in mental status are common. In later stages, hyperglycemia can manifest symptoms like shock.

Unlike hypoglycemia, there isn't a good field treatment for hyperglycemia that a lay rescuer (or an EMT, for that matter) can administer. The patient requires medical attention.

Poisoning, Interaction, and Overdose

Frankly, there are so many dozens of medications and hundreds of toxic chemicals, all of which have different mechanisms and symptomatic patterns, that I could never draft a comprehensive list of what to look for, much less how to treat it. The key to assessing and treating this kind of patient is going to be your powers of observation and communication.

Poisoning is the introduction into the body of a toxic substance that should not be there. Overdose, by contrast, is when a substance is intended to be introduced into the body, but too much of it creates adverse effects. Interaction occurs when substances intended to be introduced into the body are introduced in the right amounts, but the combination of two or more substances produces an adverse effect. Deciding what you're dealing with requires you to take a good SAMPLE history, especially the allergy, medication, and last oral intake questions.

In the best case scenarios, you have an adult patient who is conscious and alert and can tell you what they took. In the worst cases – an unconscious patient with no witnesses, or a young child who can't communicate – you may have to do some detective work. Look for the environmental clues: open containers, medication containers, drug paraphernalia, etc. Read labels, especially on over the counter supplements; many people don't realize that OTCs can have dangerous adverse reactions with prescribed medications.

At least in most Western nations, there is a poison control hotline that you can call for advice. You should find the number for your local or regional poison control center and program it into your phone or post it somewhere you can find it when you need it. (If you need help finding your poison control number, ask the instructor for assistance.) Honestly, I have never responded to a poisoning call on my ambulance, but if I ever do, I'm going to be on the phone with poison control as soon as I know what I'm dealing with. That's what our protocols say.

One final word about overdose: If the substance on which the patient has overdosed is an illegal drug, you should not let that stop you from calling for EMS assistance, even if the patient is a friend or loved one. I would always rather have a live friend with a criminal record than a dead one, period.

Stroke

Stroke refers to some damage to the brain not caused by trauma. The two main types of stroke are **ischemic stroke**, where a blood vessel to the brain is blocked and so a portion of the blood is damaged by oxygen deprivation, and **hemorrhagic stroke**, where a blood vessel in the brain ruptures and blood in the brain causes the damage. Different patients may exhibit different signs and symptoms, depending on the location in the brain of the damage, but there are some fairly common symptoms:

- Hemiparesis, or paralysis or weakness on one side of the body
- Drooping of the facial muscles, especially on one side of the face
- Headache
- Confusion
- Dizziness
- Partial or complete aphasia, or inability to use words – this may be the inability to use the right words for what the patient wants to say, the inability to understand someone else's words, or the complete inability to communicate at all

- Seizure
- Nausea or vomiting
- Loss of vision in one eye

If you suspect a stroke, the easiest and fastest tool to confirm your suspicion is the Cincinnati Stroke Scale, in which you test the patient for:

- Facial droop: ask the patient to smile wide. Both sides of the face should move roughly equally. If one side moves much less than the other, or not at all, that's a positive finding.
- Arm drift: ask the patient to close her eyes and hold her arms straight out in front of her for ten seconds. Both arms should move together and remain extended. If one arm drifts downward, never extends completely, or doesn't move at all, that's a positive finding.
- Speech impairment: ask the patient to say something like, "The sky is blue in Cincinnati," or my favorite, "Firefighters are our friends." The patient should be able to repeat the words you gave her with no slurring. If she slurs the words, uses different or inappropriate words, or says nothing, that's a positive finding.

A positive finding in any of these three areas should be considered presumptive evidence of a stroke, and you should call for EMS assistance or get medical assistance immediately. An exception to this rule would be if the patient's baseline were already impaired in that area. It's not uncommon for people to have a stroke and partially recover but still have some hemiparesis or aphasia that would make them test positively on a Cincinnati scale even if they were not having another stroke. In the SAMPLE history, therefore, getting the patient's past medical history is important. You can also ask the patient or a bystander if the condition you are observing during the Cincinnati is normal for the patient.

The other crucial piece of information you should try to get is the time the symptoms started, as accurately as you can. The current treatment for ischemic stroke is the administration of powerful thrombolytic ("clot buster") drugs. The problem is that these drugs have to be given within three to three and a half hours after the stroke, or what we call the "thrombolytic window." Testing in the hospital eats up some of that time too, so we in EMS generally have to get the patient to the ED no more than 150 minutes from onset. If we don't know when symptoms began, the patient may not be able to get the medications that can keep her from permanently losing function.

Points to Remember

- **Anaphylaxis is a life-threatening allergic reaction that causes respiratory distress and shock. The go-to treatment for anaphylaxis is epinephrine, which the patient may have available; if the patient doesn't have epinephrine, treat the shock by keeping the patient calm and warm while awaiting EMS assistance.**
- **During an asthma flare, the muscles inside the air passages in the lungs spasm and constrict, making exhalation difficult. Treatment is typically albuterol, which the patient may have available in a rescue inhaler.**

- **The best field treatment for hypoglycemia is getting the patient to eat something. There is no good field treatment for hyperglycemia.**
- **A lay rescuer's job on the scene of a poisoning, overdose, or drug interaction is collecting as much information as possible about what the patient has taken. Poison control is the best resource for medical assistance, because there are so many toxic substances and medications that can manifest in so many different ways.**
- **Assess a suspected stroke using the Cincinnati stroke scale to test for hemiparesis and aphasia, two key indicators of stroke. It is also vital to find out when the symptoms began to determine whether the patient is within the thrombolytic window.**

Assignment

In this lecture, I've presented a few common medical conditions that you could be faced with as a lay rescuer, but I would like to expand this list with your help. So for this assignment, I'd like you to come up with at least one other relatively common medical condition you are likely to encounter in another person during your normal life that we did not cover in this lecture. When deciding what to research, think about the people you know, the things you normally do, the places you frequent. Then research that condition and briefly present its pathophysiology, typical symptoms, and emergency treatment that could be provided by a lay rescuer with no specialized equipment besides a first aid kit. Be sure to focus on any potential for life threat, if applicable.

Lecture Ten – Environmental Emergencies

Extreme heat, extreme cold, high altitude, and immersion in water are some of the most life-threatening conditions many of us will ever face. It is vital that you understand how to recognize and treat the symptoms of these environmental emergencies.

> **This lecture will teach you only how to assess and treat environmental emergencies. If you're interested in learning how to avoid them in the first place, I highly recommend you consider taking the IJRS course in *Situational Awareness*.**

Drowning

Drowning is any respiratory impairment resulting from immersion in liquid. We used to reserve the word for fatal respiratory impairments, calling everything else "near-drowning" instead, but now it's any impairment of breathing whether the patient is revived or not.

The typical mechanism of drowning is not the way it's generally pictured in the movies. When a person is submerged too long, the body will eventually try to get a breath. This results in the person both swallowing and inhaling a small amount of water. That water going into the airway, in turn, triggers an epiglottal reflex that closes off the airway completely to keep more water from getting into the lungs. When the patient loses consciousness from hypoxia (not enough air), the throat may or may not open again; if it does, water will flow freely into the lungs, but if it doesn't, the lungs can remain relatively clear, at least for a while. How quickly and how well the patient responds to resuscitation often depends on where in the drowning process the patient was at when rescued.

The most important thing to remember about drowning is that you really can't help the patient effectively until the patient is out of the water. Getting the patient to dry land (boat, dock, whatever) should be considered an emergency move, so try to move the patient along the long axis of the body if there is any suspicion of a mechanism of injury (such as from diving or fall from a height into the water). If you suspect a neck injury, you can raise the patient's arms straight above his or her head and hold the arms together on either side of the patient's head to help stabilize the cervical spine until the patient is out of the water.

Start with an initial assessment – responsiveness and ABCs (see Lecture Four). Open the airway properly, check for breathing, and check a carotid pulse. If there is no pulse, begin CPR (see Lecture Seven). If you have a pulse but no breathing, administer rescue breaths at the rate of 10 to 12 per minute and continue to reassess.

> **<u>Rule Two alert</u>: if the patient is apneic and/or pulseless, make the call to dispatch immediately.**

Remember, just push air until you see the chest rise; the water the patient swallowed while submerged will often cause gastric distension and make it harder to breathe into the patient's lungs, but the last thing you want to do is force even more air into an already distended abdomen by breathing too much or too forcefully. Keeping the patient's airway open while breathing is crucial to this as well.

We have a saying in EMS: "The patient isn't dead until he's warm and dead." It's important to continue resuscitation efforts after drowning when the patient is pulled from water less than about 70 degrees Fahrenheit (21.1 degrees Celsius), because the cold can artificially depress circulation and breathing. Patients pulled from cold water can sometimes be revived after as long as thirty minutes in cardio-respiratory arrest.

If the patient begins to spontaneously breathe during resuscitation, immediately roll the patient into recovery position on her side. The water that went into her stomach and lungs is likely to come back out, and the last place you want it going is back into the patient's airway or lungs, especially if it's accompanied by vomiting. Vomitus in the lungs is mucho bad news.

Any drowning victim, resuscitated or not, requires medical attention. Even if the patient begins spontaneously breathing and regains consciousness during resuscitation, the water remaining in the lungs can still cause life-threatening complications if not treated.

Exposure to Cold

The human body loses heat in a number of different ways: through conduction into an object of colder temperature; by convection into the air (or water, which we'll get back to shortly); during evaporation by moisture carried away from the skin. Even respiration carries away some heat with each exhalation. If that's not enough, the body will simply radiate heat, mostly through the head and neck. Most of the time, the heat lost can be easily rebuilt by the body's natural temperature regulation systems. It's when the body is exposed to an ambient temperature too low for the heat lost to be rebuilt that we wind up in trouble; more specifically, when the body can't keep its core temperature above a certain point, we begin to lose function in a number of different systems.

Hypothermia is the medical name for when core temperature drops too low for proper functioning. It progresses through several stages, based upon how low the core temperature falls:

- When the core temperature is between about 99˚ and 96˚F (37.2˚ to 35.5˚C), the body begins to shiver in an attempt to build up internal heat. Pulse and respirations are more rapid than normal to circulate the heat.
- Between about 95˚ and 91˚F (35˚ to 32.8˚C), the shivering becomes more intense and less controllable, and the patient begins to have difficulty speaking. The patient will begin to experience tingling or numbness in the extremities as the body compensates by drawing the blood away from circulating to the extremities, keeping it in the torso in an attempt to maintain core temperature. The skin may begin to appear pale or cyanotic.
- Between about 90˚ and 86˚F (32.2˚ to 30˚C), the shivering generally stops and the muscles become rigid instead. The patient's balance and coordination are affected, and her movements can be erratic or jerky. The patient's thinking dulls, making her feel and appear drowsy, and she may have a "glassy stare," but she will generally still be rational at this stage.

- Between 85˚ and 81˚F (29.4˚ to 27.2˚C), the patient's heart rate and respirations begin to slow dramatically. The patient usually either becomes irrational or drifts into a stupor (or both). Cardiac dysrhythmia can develop.
- When the core temperature falls to between 80˚ and 78˚F (26.7˚ to 25.6˚C), the patient will likely lose consciousness. Most reflexes will no longer function at this temperature. The heart rate slows even more before cardiac arrest finally occurs.

Rule Two alert: if the patient is exhibiting any of the signs of hypothermia that has progressed past the shivering stages, make the call to dispatch immediately.

Hypothermia can be aggravated or hastened by a number of factors. In water, for example, body heat is conducted away much faster than in air – this works even when the patient is not immersed, by the way, so wet clothing in cold weather is a doubly bad thing. Patients suffering from shock, burns, or diabetes are additionally susceptible to cold because their bodies' compensatory mechanisms are already strained or non-existent.

The treatment for hypothermia is warming the patient, but other steps have to be taken as well. Remove any wet clothing and dry the patient first, to slow the convection and evaporation of heat away from the patient's body. Get the patient into a warmer environment and into dry clothes, and wrap her in blankets. You can use hot packs, heating pads, hot water bottles, or shared body heat to slowly warm the patient, emphasizing the torso and not the limbs. (If you use hot packs, the best place to put them is in each armpit and the groin.) If the patient is alert, you can give him or her warm beverages, but only very slowly. Keep the patient still; don't allow her to exert herself. Do not massage the extremities to encourage circulation. Do not handle the patient roughly; this can cause cardiac dysrhythmia that can be fatal in a severely hypothermic patient.

Why is slow rewarming important? In long-term exposure – any of the stages above after the initial shivering stage – the body attempts to conserve core temperature by constricting the blood vessels that go to the extremities, so by the time you are rewarming the patient the blood in the limbs is likely cold and stagnant. You want to rewarm the core first so that the body can gradually restore circulation to the extremities and bring that cold blood slowly back into the main circulatory system. If you start warming with the limbs, allow the patient to exert herself, or give hot liquids too quickly, the body will open the blood vessels to the limbs completely, making that frigid blood rush back into the core. That in turn can cause bradycardia, shock, or even cardiac arrest.

Heat Emergencies

As you can probably guess, **hyperthermia** is a dangerously high body temperature. Basically, almost all of the things we said about the mechanisms of exposure to cold apply in reverse when the patient is in an environment that is too hot: heat is not carried away from the body in a hot environment, and the skin and lungs may actually absorb more heat than they lose. Age, disease, and existing medical conditions and injuries can all further compromise the body's heat regulation mechanisms. Children can be especially susceptible because their surface area to conduct heat away is small compared to their mass.

We categorize heat emergencies into two broad classes, depending on the presentation of the patient.

Heat exhaustion is the earlier stage, in which the patient's skin will be moist, pale, and normal to cool temperature. In this stage, prolonged exposure to excessive heat causes:

- Weakness
- Dizziness
- Rapid, shallow breathing
- Weak pulse
- Muscle cramps, usually in the legs and abdomen, caused by salt loss through excessive perspiration
- Unconsciousness is possible, although this is usually transient

All of these signs and symptoms are actually encouraging, because they show that the body's heat regulation mechanisms are still working properly. At this stage, you need to treat the patient by getting them out of the hot environment, into the shade or someplace air conditioned. Loosen or remove clothing. Have the patient lie down in a supine (face up) position, elevating the legs if possible. Put cool, damp towels over any areas that are cramping. If the patient is conscious and not nauseated, you can give him or her small sips of water – stop immediately and roll the patient into recovery position on her left side if vomiting results. Watch for shivering; be ready to stop cooling and cover the patient with a blanket if s/he starts to shiver.

When the body's compensatory mechanisms fail, the patient moves to the second stage called **heat stroke**. Unable to continue to cool itself, the patient's skin will be warm or hot. Sweating stops, because the body has lost too much salt to allow perspiration to continue. Either loss of consciousness or altered mental status will usually occur. The muscle cramps, if any, will stop, but seizures are possible. The pupils will often be dilated.

> **<u>Rule Two alert</u>: if the patient is exhibiting any of the signs of heat stroke, make the call to dispatch immediately.**

Treatment (while you wait for EMS) starts with removal from the hot environment into shade or some place that is air conditioned. Remove the patient's clothing. Apply cold packs to the patient's posterior neck, groin, and armpits. Keep the skin wet with sponges or wet towels, and you can fan the patient to speed up heat loss through evaporation.

Heat stroke can cause damage to the body's temperature regulation system that can make a subsequent heat stroke more likely, so getting a SAMPLE history, including whether the patient has suffered a heat emergency in the past, is vital.

Altitude Sickness

Altitude sickness is not commonly treated as an environmental emergency, although it clearly meets the definition. In fact, the first draft of this course did not include information on altitude sickness at all. Then I attended a Gathering in Colorado, traveling by plane

from my home at an altitude of about 450 feet to an altitude of over 5000 feet, and experienced it for myself first-hand the morning after I arrived.

High altitudes are generally defined as beginning at 2500 meters (8200 feet), but some people will begin to experience symptoms of altitude sickness at 1500 meters (less than 5000 feet). The primary cause of altitude sickness is decreased air pressure as you ascend: the oxygen concentration stays pretty stable at 21% until you reach stratospheric altitudes, but the lower pressure still means you're getting less oxygen than you're used to. But there is no way to predict who will fall victim to AMS; even physically fit people can react to the decreased air pressure whereas a person of lower fitness level may make the same ascent without experiencing symptoms at all. Ascending slowly is thought to make a difference, so staying overnight at an intermediate altitude before ascending to the higher destination altitude may help prevent altitude sickness. Consuming alcohol within the first 24 hours after ascent can also cause altitude sickness.

Altitude sickness comes in three varieties. The first and least serious is called acute mountain sickness (AMS); left untreated, however, AMS can develop into one of the other more serious types. Symptoms of AMS usually begin within a day or so after ascent and may include:

- Headache, usually throbbing and worse on awakening
- Insomnia
- Fatigue, lethargy, and/or weakness
- Nausea and vomiting
- Dizziness
- Increased pulse rate, especially if it doesn't resolve after a rest period
- Shortness of breath during even mild exertion

These symptoms will usually be worsened after even minimal exertion. Some people may also experience peripheral edema, or swelling of the hands, feet, or face.

Treatment for AMS while still remaining at high altitude includes hydration, rest, and acclimation to the new altitude. A doctor may prescribe acetazolamide as a preventative or prophylactic measure. But the only sure-fire treatment for altitude sickness is descent to a normal altitude – like any other environmental emergency, there may not be much you can do until the patient is removed from the hostile environment.

The two more serious types of altitude sickness occur when untreated AMS progresses to the point that it begins to cause fluid to build up in the lungs (high altitude pulmonary edema, or HAPE) or in the brain (high altitude cerebral edema, or HACE). The exact mechanism by which the edema occurs hasn't been conclusively established. Either condition can be fatal in a very short period if untreated.

The theory is that HACE occurs when the blood vessels in the cranium dilate in an attempt to increase oxygen to the brain. HACE is characterized by:

- Worsening headache

- Confusion
- Loss of coordination
- Retinal hemorrhage, and/or
- Loss of consciousness that can progress to coma.

HAPE, on the other hand, is thought to happen because the body constricts blood vessels in the lungs while increasing cardiac pressure. The buildup of fluid in the lungs causes progressive respiratory compromise and can cause death in a matter of hours. Most professionals think AMD can more quickly progress to HAPE if the patient has a cold or other respiratory infection on ascent. Symptoms you need to watch for include:

- Shortness of breath even at rest as opposed to after exertion
- A gurgling or crackling sound during respirations
- Wet cough that produces a frothy sputum

Rule Two alert: if the patient is exhibiting any of the signs of cerebral or pulmonary edema, make the call to dispatch immediately.

Points to Remember

- **You really can't help a drowning victim until s/he is out of the water.**
- **Assess a drowning victim with the initial assessment, providing CPR if pulseless or rescue breathing if apneic with a pulse. Every drowning victim requires medical assistance.**
- **Exposure to cold is dangerous when the body is no longer able to maintain its core temperature enough to regulate normal body functions.**
- **Treat exposure victims by removing wet clothing, wrapping in dry clothes and/or blankets, and gradually re-warming. Do not handle the patient roughly or allow the patient to exert herself, and do not warm the patient too rapidly.**
- **Treat heat emergencies by first removing the patient from the heat. If the patient stops sweating, it is a sign that the body's compensatory mechanisms have failed and should be considered a life threat.**
- **Altitude sickness is best treated by descent to a more normal altitude. Altitude sickness is a life threat if it progresses to pulmonary or cerebral edema.**

Assignment

Of the four types of environmental emergencies we've covered in this lecture – water, altitude, heat, and cold – which are you likely to encounter where you live? Do you have any experience with any of these types of emergencies? Do you feel like you are better able to handle these types of emergencies after this lecture?

Secondly, though stocking a first aid kit is the topic of the next lecture, of the types of environmental emergencies you are most likely to encounter, do you have the supplies you need to provide emergency treatment for those emergencies as a lay rescuer?

Lecture Eleven – Preparing a First Aid Kit

Now that you know what to do in some of the most common emergency situations, it's time to get your supplies together so you're ready when the situation actually comes.

Most readily available medical kits are not worth messing with. Those nine-dollar "first aid kits" in the automotive aisle at the grocery store that come in a 6" square white plastic box with a red cross on the lid? Don't waste your time with those; basically they're a box of band-aids with an "instruction book" that gives your only possible response to any emergency as "Call 911".

The Essential Kit

This is my list of what a good first aid kit should have, at a bare minimum. In part, this was adapted from the old Red Cross disaster kit standards, which sadly don't seem to be available in this form anymore (h/t to Kol Drake for copy-pasting them to the forum before they were sucked into the black hole of the intarwebs).

- Nitrile or latex exam gloves – at least two pair, but you can generally find a small box of 50 that won't take up much space in your kit.
- Eye protection, if you don't wear glasses – the clear plastic ones are easy to find at a hardware store and work just fine as PPE – and at least one N-95 mask.
- Penlight or small flashlight – for testing pupils, visualizing throat or ear obstructions, or playing hangman in the dark.
- Thermometer (oral, tympanic, or temporal) – not the old-school glass and mercury kind. They break.
- Trauma shears or scissors – trauma shears are just angled heavy-duty scissors with the bottom tine blunted to cut through clothing without slicing into your patient. The ones I carry on duty are on Amazon for about fifteen bucks; they cut through jeans and leather belts like paper and are still just as sturdy as they were the day I got them.
- Tweezers
- CPR pocket mask – these are like the face masks on the bag-valve masks we carry on the ambulance, but they usually collapse into a slim carrying case and have a one-way valve that you breathe into. Consider this essential PPE if you have to give rescue breaths.
- Blanket – you can get the high-tech kind that hold in heat like crazy and still fold up small enough to fit in your kit.
- Hot packs, at least three – for treatment of hypothermia.
- Cold packs, more is better – for heat emergencies, you'll need three or four at a minimum, but cold packs are also great for icing sprains, or more severe musculoskeletal injuries in some cases, to relieve pain and prevent swelling.

- 2 ABD-type bulky absorbent dressings, at least 4″x 8″ – for really heavy bleeding, but I hope you never need one for a flailed chest.
- Sterile gauze pads, 4″x4″ and 2″x2″, at least 10 of each size – for less heavy bleeding, deep abrasions, etc.
- A roll of Coban or similar self-adherent wrap – the sticky gauze-like wrap they put around your arm after you give blood, but get a wider size, like 2″. Better than tape when you need a pressure bandage on an extremity.
- Adhesive cloth tape, 1″ or 2″ wide – for when you have to stick something down and can't use a Coban wrap.
- Compression bandage, like an Ace bandage, 3″ or 4″ wide
- Triangular bandage and a roll of 2″ gauze – for shoulder injuries requiring a sling-and-swath, but the triangle bandage has dozens of improvised uses.
- Plain old adhesive bandages, in assorted sizes for everyday booboos
- 5 antibiotic ointment packets or a tube of antiseptic ointment, like Neosporin
- 5 hydrocortisone ointment packets or a tube of it – for treating the itch and skin irritation from insect bites, poison ivy, etc.
- At least 10 alcohol wipes – for disinfecting
- Aspirin, four 81 mg tablets – for suspected cardiac events, if the patient is conscious, you want to get these on board as soon as you hear the words "chest pain". The chewable kind work better when the patient is in too much pain to gag down a solid pill.
- OTC pain reliever of your choice, but I suggest carrying both acetaminophen and ibuprofen for fever management (because you can stagger the doses).

Can you find decent first aid kits already made? Yes. Back when I was going through EMT training, I found a jump-bag style kit on Amazon that had most of what I listed above for about fifty USD. Throw in the rest of the missing items, and you're in business. The thing I liked best about the pre-made kit, however, was the jump bag itself; it had organizer loops and pockets inside and out to keep all these supplies in place so you know exactly where everything is and where everything goes.

Here is the reality of any first aid kit you make or buy: all the gear and supplies in the world won't do you a bit of good if you can't find what you're looking for under stress.

So in my opinion, the container you choose to keep your kit in is as important as the kit itself. If you take all the items I listed above and throw them into a gym bag, you'll wind up with a mess at exactly the wrong time. Consider something pre-made with clever storage solutions built in, or troll the internet for DIY ideas from the crafty types who lifehack things like this. They're out there, I guarantee it.

(Aside: Is it too much of me to want the monkeys at ThinkGeek to make a complete first aid kit that comes in a sweet organizer case shaped like the medical droid Too-Onebee?)

Customizing Your Kit

I said my list above was the bare minimum that should be in your kit. You should also consider the unique needs of your family and friends. Does anyone in your house use an albuterol inhaler, regularly or as needed? Put an extra one in your kit. Does anyone in your house have a known insect or environmental or severe food allergy? You're going to want an Epi-Pen.

Don't stop with known medical conditions. Think about the places you go to, and the activities you spend time doing, and what medical, trauma, or environmental emergencies you are most likely to face there. Do you need a rattlesnake kit? Do you need a rope throw bag for water emergencies?

Give some thought to your pets, if your pets regularly come with you on outdoor excursions. Google "first aid for pets" if you need some idea about what kind of supplies and techniques might be implicated for your particular or anticipated situation.

Maintaining Your Kit

Check your first aid kit regularly, every three to six months at least. Make sure all the batteries are in good shape, and throw in an extra set if they're questionable. Check the expiration dates on anything with an expiration date, and replace any expired medications or supplies.

Beyond that, though, spend some time maintaining your connection with your kit on a regular basis. As I said earlier, you have to be able to find what you need in there when you really need it, which is almost certainly going to be a time when you are under stress and in a hurry. Your best advance preparation is being familiar with what's in your kit and where you can find it. You should be able to find any particular item in your kit immediately, so test yourself by visualizing what you would need for any particular emergency, and then grabbing the supplies you need as quickly as possible.

I go through the supplies on my ambulance at the start of each shift – with so many people sharing the same supplies, it's not uncommon for someone to use something on a call and not replace it after the call, or use something and put it away in a different place in the kit. When I am helping to train new EMTs on our station policies and procedures, I emphasize knowing where everything is (and how important it is to replace and restock in the same place every time). These are good habits for you to develop with your personal kit as well.

Personal Kit and Anywhere Kits

So in this lecture we have been talking about a fairly comprehensive first aid kit. You'd probably keep one in your house, perhaps keep one in your car or toss your home kit in the hatchback. But would you carry it everywhere? Probably not.

There are two strategies to consider using when you're not walking around with your full first aid kit in your hand, which I think of as the personal kit and the anywhere kit. The personal kit is pretty self-explanatory: what would I carry at all times? A pocket CPR mask

comes in a slim plastic case that has enough room left over to stash a pair of nitrile gloves. That's the minimum PPE gear I carry, but I can fit one in the outside jacket pocket of a business suit without drawing too much attention. Really that is about all I need to carry when I'm not on duty as an EMT.

The anywhere kit is a little different, and it's based on the Jedi skills of situational awareness and adaptation to one's environment. The anywhere kit is composed of three broad parts:

- what I have with me, my personal kit or even a full kit in the back of my car if it's readily available;
- what someone else has made available where I am; and
- what I can improvise from available materials.

Many if not most public buildings, in the States anyway, have a first aid kit – somewhere – and an AED. In many cases, there is a marker somewhere pointing out the locations of these items.

> **Example: The county courthouse where I spend much of my time has a first aid kit on the second floor, in the hallway between courtrooms, and an AED on each floor.**

Think about the places you go most frequently: work, school, grocery store, coffee shop, etc. How many of these places have an available first aid kit, even a rudimentary one? Do you know where it is? Have you examined it to see what it contains and how to use it? How about an AED?

Improvising available materials is the subject of another whole course; in the States, some folks certify in wilderness medicine, which is largely concerned with improvising medical supplies in the wild. But take some time to think about what you might need for any individual situation and what you might use instead if that particular item was not available. Do you need a bulky dressing, for heavy bleeding or even a flail segment? Could you use a clean folded cloth hand towel in its place? What else could you use in a pinch? Where would you find it?

Points to Remember

- **You should consider making or buying a complete first aid kit with all the essential supplies you will need for a variety of medical emergencies.**
- **Whatever kind of kit you adopt, spend some time getting to know it so that you can find what you need immediately, even when under stress.**
- **Customize the essential kit with supplies specific to your individual circumstances, such as supplies to treat a family member's known medical conditions, supplies you anticipate may become necessary for where you are going or what you are doing, or supplies to care for your pets.**
- **Give some thought to how you would supplement the supplies you have with you with what is available or what you could improvise at any particular time.**

Assignment

If you have a first aid kit already, evaluate it using the criteria we discussed in this lecture. Are there items or supplies you need to replace? Are there items or supplies you need to include that aren't already there? Take some time to consider the medical emergencies you have learned to recognize and treat; is your kit up to the task?

If you don't have a first aid kit already, consider purchasing or creating one. If this is something you are unable or unwilling to do, tell me why, or what stands in the way of doing this.

Either way, take some time to evaluate the concept of the "anywhere kit" described in this lecture. What items, supplies, or other resources are available in the places you go to most frequently? Choose two or three such places – your workplace, school, gym, wherever – and evaluate what is available in each location. Pay particular attention to how well the kit is stocked, using the guidelines set forth in this lecture. What would you like to see added to the kit? Is there anything in the kit that doesn't appear to be useful? How about location of AEDs? If one of your chosen locations has an AED available, is it maintained properly, and are the instructions for its use clear?

Lecture Twelve – Legal Considerations

I want to touch briefly upon a few basic legal considerations that could potentially apply to a lay rescuer. My experience and training is in United States law and emergency medicine, and more specifically those of the State of Washington, so if you are not from the U.S., these legal concepts may work differently in your jurisdiction (or may not apply at all).

Consent

Over the course of the past few lectures, we've talked about the various things a lay rescuer should do to assess and treat someone in a medical or trauma emergency, and most of these things require you to put your hands on the patient. The thing is that putting your hands on someone against their will, in most jurisdictions, is a crime: battery, possibly, or assault. If you hold down a patient who is having a seizure, is that unlawful imprisonment? If you put a bleeding person into your car to rush her to the hospital, have you just kidnapped her?

The difference between emergency treatment and a crime is the consent of the patient. While it's not as critical for a lay rescuer as it is for an EMS provider, you should get the patient's consent before providing any assessment or treatment. In most cases, if the patient is conscious, this should be easy: "I'm gonna help you out, is that okay?" Tailor what you say to what's going on with the patient: "I'm gonna get this bleeding stopped, is that okay?" You should only have to ask for consent to treat once; if you plan to transport the patient – which should be a rare occurrence at worst, if you have called for EMS assistance – you should get consent to transport before you stuff the patient into your car.

A conscious adult patient can give express consent in this way, meaning s/he understands and authorizes what you're about to do.

If the patient is unconscious, or physically or mentally incapacitated but in need of emergency care, you can proceed with assessment and treatment under the doctrine of implied consent. The law assumes that a rational, conscious patient would consent to life-saving treatment if s/he were able.

Children are a special case. In most jurisdictions, children are presumed incapable of giving express consent because of their immaturity. A parent must consent for them. If there is no parent present, a school official can give this consent under the doctrine of *in loco parentis* – the school stands in the shoes of the parent and has the same responsibility as the parent while the child is at school. If there is no parent or school official available, the best thing to do is call for EMS assistance, try to determine how to contact the child's parents, and treat any imminent life threats under the doctrine of implied consent until help arrives. By calling dispatch, you're also opening a channel for law enforcement assistance, if necessary; police also have some form of *in loco parentis* power in most jurisdictions and could even take a child into protective custody if necessary.

Refusal of Treatment

The flip side of consent, of course, is the patient who refuses to be treated. If the patient is conscious and competent and tells you not to touch him or her, you have to respect her

wishes, even as a lay rescuer. Otherwise, you're opening yourself up to all sorts of civil or criminal liability. The best thing to do in this case is call for EMS assistance (again, with the potential for law enforcement assistance as well, if that becomes advisable).

If the case is a true medical emergency, your legal situation could change rapidly. The clearest example is the patient who loses consciousness because of her illness or injury – once she's down, implied consent takes over, and her refusal is no longer effective. Remember, the law presumes that a rational person would give consent to life-saving treatment if s/he were conscious, and unconsciousness should always be considered a life threat.

> **Example: I have used this on overdose cases to get consent: "If you say no to treatment, I have to abide by that. That's cool. I'll just wait until your body starts shutting down and you lose consciousness, and then we'll go to the hospital. Or you could save us those few minutes and let me help you now before you get sicker. What do you say?"**

Abandonment

Way back in Lecture Two, we discussed how as a general rule, once you start treating someone, you have to keep at it until you turn the patient over to someone who can provide a higher level of care – law enforcement or EMS for you as a lay rescuer, a paramedic or the hospital for me as an EMT – or until a competent patient refuses further treatment. How this works for you as a lay rescuer is going to be different in most jurisdictions than how it works for an EMS provider. Most of the time, if the patient says they don't want further treatment and they don't want to go to the hospital, you can walk away with no legal duty to act (whether you may have a moral or ethical duty to act is another question altogether).

But the important thing you need to know as a lay rescuer is that once you begin providing care to someone, you must not remove them from the possibility of further help. In my Torts class as a 1L, we read a case where two guys were out drinking heavily, and one of them fell and hit his head. Instead of calling EMS or going to the hospital, the friend packed the injured man into his car and drove to his own house, then staggered inside and passed out, leaving the injured man in the back seat. When he came to, his buddy was dead, and the friend was held liable not because he didn't provide emergency treatment – he had no duty to do so, not to mention he probably wouldn't have known what to do anyway – but because by packing the injured man up and driving away, he removed the patient from the chance of receiving help from anyone else.

"Good Samaritan" Law

Depending upon local statutes, a lay rescuer may be protected by some type of **"Good Samaritan" law**. These laws protect those who volunteer to serve and tend to others who are injured or ill. They are intended to reduce bystanders' hesitation to assist in an emergency for fear of being sued or prosecuted for unintentional injury or wrongful death. Good Samaritan laws vary from jurisdiction to jurisdiction, as do their interactions with other legal principles, such as consent, parental rights, and the right to refuse treatment. Not all jurisdictions provide protection to laypersons; in such cases, only trained personnel – doctors, nurses, and emergency responders – are protected.

Good Samaritan laws are not universal in application. The legal principle of imminent peril may also apply. In the absence of imminent peril, the actions of a rescuer may be perceived by the courts to be reckless and not worthy of protection. To illustrate, a motor vehicle collision occurs, but there is no fire, no immediate life threat from injuries, and no danger of a second collision. If a "good Samaritan" elects to "rescue" the victim from the wreckage, causing paralysis or some other injury, a court may rule that the Good Samaritan law does not apply, because the victim was not in imminent peril, and hold the rescuer liable for damages because his/her actions were reckless and unnecessary.

It is therefore the responsibility of each individual student to research Good Samaritan law in their own jurisdictions, on a local and state level (in the United States), to ensure that you are protected by such laws if you find yourself in the situation of having to be a lay rescuer. (Spoiler alert: that's going to be the assignment at the end of this lesson.)

Points to Remember

- **In the absence of consent to lay hands on the patient, most assessment and treatment actions could constitute a criminal offense.**
- **A conscious and competent adult must give express consent.**
- **A unconscious or incompetent patient may be treated under the doctrine of implied consent – the law assumes a conscious and competent patient would consent to life-saving treatment.**
- **If a patient refuses treatment, and there is the possibility of a life threat, you should respect the patient's wishes but call for EMS assistance.**
- **If you undertake to provide care for a patient, you should continue care until you turn the patient over to EMS, law enforcement, or the hospital.**
- **Good Samaritan laws in many jurisdictions prevent rescuers from civil or criminal liability for undertaking to help someone in an emergency, but their protection is not absolute; it is the responsibility of every lay rescuer to research and understand the Good Samaritan law applicable in his/her jurisdiction.**

Assignment

Does the jurisdiction in which you live – city, county, state, or nation as applicable -- have a "Good Samaritan" law? Research the law applicable to the area you live in and post an essay outlining that law in the appropriate area of the forum. Where do you find the law in your jurisdiction? How is the law interpreted? Is it clear, or are there ambiguities or "gray areas" within the law? Do you understand your rights and responsibilities under the law?

You may use any resource available to you, but if you have to interview any sources to find or understand the law, you may consider talking with a lawyer instead of a law enforcement officer; as Setanaoko says, "[L]awyers are the ones that will prosecute or defend you – law enforcement just collects the information and reports on it, we are not experts with the legal red tape."

If you have already taken Setanaoko's course on *Aiding Emergency Services*, you may reuse your "Good Samaritan" law essay from that course. However, please be certain that your essay is up-to-date and comprehensive. I am a tough grader.

If your jurisdiction does not have a "Good Samaritan" law, tell us so and then you may choose any of the other legal considerations discussed in this lecture for your research topic, or develop your own topic on a relevant legal consideration not presented here.

The End

Glossary

Terms in this glossary are identified in the main document by **bold-face type**. Not all bold-faced terms are included.

Abrasion: a scrape.

Advanced life support (ALS): the highest level of pre-hospital care to stabilize patients before and during transport to the hospital, including skills like manual defibrillation, external heart pacing, EKG interpretation, surgical airways, needle decompressions, and administration of a wide variety of medications for cardiac care and pain management.

Anaphylaxis: a specific type of shock from an allergic reaction that causes a sudden drop in blood pressure as blood vessels, coupled with a swelling of many body tissues including those that line the airway.

Apneic: not breathing.

Asystole: a cardiac rhythm in which the heart has ceased generating electrical signals altogether.

Automated external defibrillator (AED): a device that, when used properly, analyzes a patient's cardiac rhythm, determines whether the rhythm can be remedied by electrical shock, and delivers the shock if so.

Basic life support (BLS): the lowest level of pre-hospital care to stabilize patients before and during transport to the hospital, including basic airway management, artificial ventilation, oxygen therapy, bleeding control, cardio-pulmonary resuscitation (CPR), automated defibrillation, spinal immobilization, and treatment for shock.

Body substance isolation (BSI): standard precautions to reduce the risk of exposure to air-borne, blood-borne, or other pathogens, including exam gloves, eye protection, face masks in some cases, and thorough precautions to avoid blood or other bodily fluids coming into contact with areas on the body where they can cause infection.

Bradycardia: abnormally slow heart rate, below 60 BPM.

Chief complaint: the patient's subjective statement describing the most significant or serious injury, symptoms, or signs of illness.

Computer-aided dispatch (CAD): systems in place in many areas that provide a dispatcher with vital information, such as the origin location of a call, questions to ask to classify the nature and seriousness of the emergency, and any potential hazards to first responders.

Contusion: a bruise.

Crepitus: the sound and feel of fractured bone ends grinding against each other.

Cyanosis: a bluish tinge to the skin caused by inadequate oxygen getting to the skin; seen around the mouth, it is a sign of hypoxia.

DCAP-BTLS: a mnemonic for remembering the types of traumatic injury; stands for deformity, contusion, abrasion, puncture or penetration, burn, tenderness, laceration, and swelling.

Decerebrate posturing: the arms and legs extend rigidly, the wrists flex, and the shoulders rotate inward, either spontaneously or in response to painful stimulus; a sign of late-stage brain injury.

Decorticate posturing: the arms and wrists flex, the legs extend rigidly, and the toes generally point inward, either spontaneously or in response to painful stimulus; a sign of late-stage brain injury.

Deformity: a part of the body that no longer has its normal shape, whether by dislocation or by broken bones pushing out through the skin.

Diabetes mellitus: a condition in which the body is unable to properly regulate the amount of sugar in the blood, either by decreased production of a hormone called insulin or the inability of the cells of the body to respond to insulin properly.

Drowning: any respiratory impairment resulting from immersion in liquid.

Emergency department (ED): a specialized unit of a hospital designed to provide immediate emergency care of acute medical and trauma patients.

Emergency medical services (EMS): the broad term for the organized system of providing pre-hospital care, which includes emergency dispatch, first responders such as police and fire-rescue units, EMT / paramedics and other pre-hospital care providers, and the hospital emergency department.

Emergency medical technician (EMT): a provider who has been trained to provide pre-hospital care on scene or in the ambulance en route to the hospital (or both).

"Good Samaritan" law: a broad category of laws that vary from jurisdiction to jurisdiction, designed to reduce bystanders' hesitance to assist someone in a medical emergency for fear of being sued for malpractice or wrongful death. In most cases, these laws limit the civil liability of one who undertakes to assist another in need of medical help.

Hematoma: swelling caused by blood collecting in an injured area under the skin, in damaged tissues, or in the brain.

Hyperglycemia: dangerously high blood sugar.

Hypoglycemia: low blood sugar.

Hypoperfusion: also called shock, a condition in which the circulatory system is unable to adequately supply the cells of the body with nutrients and oxygen or remove waste products from the cells.

Intermediate life support (ILS): typically includes all the BLS skills plus intravenous fluid therapy and endotracheal intubation.

Jugular vein distension (JVD): the patient's neck veins bulge while in a sitting or standing position, signifying that the heart is not pumping effectively and blood is back up in the veins.

Laceration: a cut or open wound.

Lay rescuer: a "civilian" who does not practice emergency medicine or provide rescue services by occupation or profession, including people who are trained in CPR and First-Aid. Lay rescuers are a crucial part of the EMS system because they are the people who will activate the emergency response by a call to dispatch to report the emergency, and then (hopefully) provide immediate care to keep the patient stable until first responders arrive.

Life threat: the most serious classification of medical emergency where the patient could die without rapid and appropriate medical intervention. Anything to do with heartbeat or breathing, any loss of consciousness, any uncontrolled bleeding, any environmental emergency, or any sign of shock should be considered a life threat until proven otherwise.

Mechanism of injury: the force or set of forces that may cause injury in any particular set of circumstances.

Medical control: because even the most thorough protocols cannot anticipate every situation an EMT may face, the EMT can call an ED physician to make a decision on treatment or termination of treatment that would be outside the EMT's scope of authority to make under available protocols.

Medical program director (MPD): a physician who oversees a particular agency's or county's EMS system. The medical director is responsible for developing the agency's protocols and conducting periodic reviews of EMS reports with providers to identify care issues and compliance with protocols and applicable regulations.

Paradoxical movement: when part of the chest moves in the opposite direction from the rest of the chest: *i.e.*, it moves outward when the patient exhales and sucks inward when the patient inhales. This signifies a flailed chest and should be considered a life threat.

Pathogen: anything that can cause an illness or disease; sometimes called an infectious agent. Most of the time, pathogens are microorganisms, such as viruses or bacteria.

Pneumothorax: a collapsed lung, caused either by air escaping the lung through a hole into the chest cavity or by blood collecting in the chest cavity and keeping the lung from inflating.

Protocols: the written standing orders for pre-hospital care providers to follow when providing care in a wide variety of situations.

Pulseless electrical activity (PEA): a cardiac rhythm is which the electrical activity in the heart is properly organized but the heart muscle itself fails to respond, either because the heart muscle is damaged or sick or the patient has lost too much blood to continue pumping.

Recovery position: also called the lateral recumbent position, placing the patient on her side so that the airway is not obstructed if the patient should throw up or expel water from her lungs.

Scope of practice: a term used by a jurisdiction's licensing board to describe the procedures, actions, and therapies that a given level of provider is authorized to do or provide. In EMS, these are broadly laid out by reference to BLS, ILS, and ALS practices.

Shock: see **hypoperfusion**.

Sprain: an injury, usually a stretching or tearing, of ligaments in a joint, usually caused by the joint being moved beyond or outside it normal range of motion.

Strain: an injury to a muscle tissue caused by overstretching or overexertion.

Stridor: a high-pitched wheezing sound on inhalation or exhalation caused by air moving through a partially obstructed upper airway.

Supine: lying on one's back, face up.

Tachycardia: rapid heart rate, above 100 BPM.

Tracheal deviation: the windpipe is shifted to one side off the patient's midline, usually signifying a collapsed lung.

Traumatic brain injury: any injury significant enough to disrupt the normal functioning of the brain, even temporarily.

Tripod position: where a patient sits or stands leaning forward with their hands braced on their knees or another surface; usually considered a clear sign of respiratory distress.

Ventricular fibrillation (V-fib): a cardiac rhythm in which the electrical activity in the heart is not organized and so the chambers of the heart are not coordinated to produce a normal heart beat.

Ventricular tachycardia (V-tach): a cardiac rhythm in which the electrical activity in the heart is in the proper organization but is too fast to allow the heart to empty and refill properly.