ICSC04 – Emergency Procedures
Section 1
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Video Lesson: 1:00:03

This is module 1 of 3 on Emergency Procedures for the Sports Chiropractor. I have been practicing sports chiropractic for approximately 40 years and I have extensive background in dealing with on-site events. I am a two-time member of United States Olympic team medical staff and I have worked with FICS at the World Games in Cali, Colombia and the Pan Am Games in Guadalajara, Mexico. I have also taught this course for FICS internationally, both in Japan and in Mexico.

A sports chiropractic doctor/physician should be able to identify and perform the tasks that are required to act as a team physician on field and/or a sports physician in office. We should be able to identify triage and manage sports-related injuries on an emergent on-field basis as well as a non-emergent office setting. I have been in many situations doing things internationally, sometimes as a full contingent of medical staff. Other times at the venues, we have 6 doctors working to be a very sparse medical staff. There have been times where, on the field, I was present when an athlete fractured their cervical spine. I was also present in the Olympic Village when a coach for one of the teams had a heart attack. Understanding and knowing and being familiar with how to treat and handle emergency procedures on an emergent on-field basis is important for you to be a full member of an integrated medical staff.

The objectives of this course are: Knowing how to spot it, what it is and what to do for it. These are all action steps that we will cover in this presentation. In this first module, we will discuss personal protective equipment, uncertain situations, scene safety, the mechanism of injury, the golden hour. We will spend a large period of time on doing the initial assessment, getting a general impression, assessing mental status, airway, breathing, the use of oxygen, and circulation.

Minor symptoms may be the early warning signs of a more serious injury. That means, when in doubt, we always err on the side of caution. An ounce of prevention is better than a pound of cure. We should turn around and be prepared to handle any kind of situation that may develop. Protecting ourselves out there, is the first thing I want you to remember. Because if we are the care provider and something happens to us and we get injured, then the medical teams that are only two people, or two athletes get injured, there is nobody there to help with the injured athletes.

Be aware of your personal protective equipment. We must assume that all body fluids present a possible risk for infection. Therefore, we must protect ourselves against them. We should have gloves, usually, non-latex because there are several people unable to handle latex against the skin and they will get a reaction to it. We want to use Nitrile gloves, and in a lot of instances, especially nowadays with what is going on with the pandemic worldwide, we should have some form of eye protection. Either a face shield or goggles.

Just as there is a proper way of putting on the protective equipment, there is a proper way of removing the protective equipment. As we see in this slide, when the doctor is taking off the gloves, he is rolling down the gloves on one side, then using his gloved hand to roll down the glove on the other side, pulling the glove inside out, then using the inside of the glove to pull the other glove off. This way, at no time are your sterile hand touching the non-sterile glove or any other part of the body that is not sterile.

When we are out in the field, make sure of the safety for yourselves and other members of the medical staff. Have a proper mindset and make sure that we know what is going on around you. If you are at a rodeo and a cowboy gets thrown from the bull and gets stepped on, you see him lying there, not moving in the arena, are we going to jump right in and run over to the cowboy? Usually, medical staff, in a rodeo setting has red shirts. When you have a matador in a bullfight and he has a cape, what color is the cape? The cape is red. If I am going to have a red shirt and I am going to run into an arena where there is an

athlete down and there is a bull in the arena and I am wearing a red shirt, who do you think the bull is going to start to charge after? Me because I have the red on.

If you were looking after motocross, or some form of BMX bike racing, and an athlete goes down, are you going to run onto the course or are you going to make sure that 30 other motorcycles or bicycles are not coming around the bend and going to run you over while you are on the field assessing the injured athlete? It is important for us to make sure we are aware of the scene safety.

Let us discuss the mechanism of injury. We are not there to enjoy ourselves on the sidelines, we are there to work and to pay attention. Being alert to what is happening on the field is important. If I am at a soccer match and the athlete plants his foot and turns to run up field and goes down, that is a completely different mindset than if you have two athletes go up to head the ball and collide, and they go down. When they collide like that, my mindset changes and I have to right away think the possibility of there being some form of cervical spine injury. By paying attention on the sidelines, you can determine what the mechanism of injury is.

Then we are going to talk about the golden hour. That is the time from when an athlete gets injured, if it is life-threatening, for them to be in the hospital on the operating table that gives them the best chance to survive. If you notice, the first 20 minutes of this golden hour is activating the Emergency Medical Services and having them get to the scene, and then starts the golden 10 minutes. That is the most important time. This is when we are going to do our initial assessment and our initial interventions. By being on-site, being able to handle emergency procedures, we are starting this golden 10 minutes right away, giving the athlete a better chance for survival, if there is some form of a life-threatening injury.

If we get on the scene and we see no signs of life with the athlete, lying there motionless, what are the signs of life? Is he moving? Are we seeing his chest or stomach rise or fall as he breathes? If we are finding no pulse, those are all indications of no signs of life. Then right away, we are going to start CPR. Most of you, if not all of you, should already have your CPR certification. That is one of the requirements for getting your certification and for being on-site and doing any sporting events with FICS.

We have done our protective equipment (PPE), our scene safety and mechanism of the injury. Now, our next step is being on the field and what do we do? The first thing you want to do is you want to develop a general impression. Scene safety, mechanism injury and looking to see what is going on, so now the next step is to assess mental status, airway, breathing, circulation, and then we are going to identify the priority of injury to the patient.

You are on the field of play. When assessing mental status, use the AVPU scale. A stand for alert and V stands for verbal stimulus, meaning the athlete is lying supine or prone, and you are talking to them and they are giving you a response. If they are lying down and you talk to them but get no response, you either give them a sternal rub or you tug on their hair, or you pinch them. You get a response and that is a painful response. Is the patient or the athlete unresponsive? The **AVPU** scale is.

- A is for alert.
- V is responsive to verbal stimulus.
- P is response to pain.
- U is unresponsive. It is not as important in these situations about the Glasgow Coma Scale because we just want to do action steps on the field.

If possible, and if there is time, we always want to take a **SAMPLE history**.

- Signs & symptoms
- Allergies
- Medications
- Past Medical History

- Last oral intake
- Events leading up to the present injury

If it is not written down, it was not done, therefore if there is time, we want to be able to find out what the signs and symptoms are. Does the athlete have any allergies? Is the athlete on any medication? Is there any pertinent past medical history? When was the last time they had something to eat? What were the events that were leading up to the actual event, the actual injury? If there is time, these are some of the questions we want answered so we can provide this information to the next level higher of medical care that is going to take the athlete and you are going to turn the athlete over to.

Here is the Glasgow Coma Scale, but again, we do not want to sit there and must add up all the numbers. I got 3 for voice, and I got a 4 if he is confused when he gives a verbal response. They get a 2 if there are other kinds of things from a motor response. We do not have the time. It is not the need to do that. We are more interested in being able to use the AVPU scale in these kinds of situations.

Let us look at airway which is always assessed first. Advanced techniques are going to be used after basic airway management, but the first step is going to be opening the airway, and once the airway is open, we can make a decision if we need to use any adjuncts to keep the airway open. How do we assess the airway? What are some of the things we are looking for? It is the athlete speaking in two or three-word sentences. Are they using the accessory muscles to breathe? Is there nasal flaring or rib retraction in young children? Remember, we are going to work with a vastly different age population in dealing with sporting events. Certain things have to be done for different age population, which is why in children, we are looking for nasal flaring and rib retraction. We are also making sure in assessing whether there is any labored breathing.

The airway may be obstructed by the tongue and in this case, we will use the head tilt-chin lift technique to open the airway, or if we suspect there being some cervical spine injury, we are going to use the jaw-lift maneuver. As we can see from the picture, here is an instance of the athlete lying supine and the relaxation of the tongue is occluding the airway. Take the proper steps to open the airway and opening the airway using the head-tilt chin-lift maneuver. Put one hand on the head, the other fingers underneath the chin, and tilt the head and lift the chin. Notice in this picture that the doctor has gloves on. There is his PPE. Otherwise, we want to use the jaw thrust maneuver when we suspect a cervical spine injury. In this picture, we see that we are maintaining in-line alignment of the cervical spine and we are using our index finger and long fingers to jut the jaw forward to open the airway. This is used anytime we are suspecting there to be a cervical spine injury.

There are different sizes of airways for different age of the population of the athletes we are dealing with. Younger people have a larger tongue relative to the mouth. They have less well-developed rings of cartilage in the trachea and the head-tilt chin-lift maneuver may occlude the airway. That is why we open the airway in children with not as much head tilt and chin-lift because we do not want to occlude the airway.

Once the airway is open, make the determination if we would need any airway adjuncts. There are two different kinds. There is an oropharyngeal airway. This keeps the tongue from blocking the upper airway. This allows for easier suctioning of the airway if it is needed and this is used in conjunction with a BVM device, a bag valve mask of which we will discuss later. This is used on an unconscious athlete without a gag reflex. As you notice from the picture, these airways come in different sizes.

How do we insert the oral airway? The first thing we need to do is we need to select the proper size. We want to measure from the corner of the mouth to the ear lobe. That determines what size airway we are going to use. Then we are going to open the mouth, either with the head tilt chin lift or the jaw thrust maneuver. We want to hold the airway upside down, so it looks like a U. We want to insert it into the mouth. Once it gets to the end of the hard palate, we want to rotate it 180 degrees until the flange rests against the athlete's lips.

The other airway is a nasopharyngeal airway. This is used on a conscious patient who cannot maintain an airway. This can also be used on a patient who has a gag reflex. This airway should not be used on a patient with a possible skull fracture. Insert this into the nose and if there is some form of skull fracture, we do not want to be pushing the bones further back into the brain, adding possible injury to that.

Measure for a nasal airway from the side of the nose to the earlobe. Select the proper size and lubricate the airway with a non-petroleum-based lubricant. We do not want them to inhale any of the petroleum bases into the lungs. Believe it or not, most people's right nostril is larger than their left nostril, so you want to gently push open the nostril with the bevel turned towards the septum we want to insert the airway. It goes very easily. The first time I did this, I was surprised how easy it was, so being familiar with how to use the device is half the battle.

What happens if there is some form of mechanical obstruction of the airway? Be prepared to act quickly. These obstructions may be from the positioning of the head, the tongue, some form of aspiration of vomitus into the throat or some foreign body. We are talking about a foreign body. Most of the time, these athletes have a mouth guard in. They may have taken a hit, and bite hard on the mouth guard, a piece of the mouth guard comes off, and gets lodged in the throat. If they get hit and they lose a tooth, and the tooth becomes lodged in the throat, opening up the airway with the head-tilt chin-lift maneuver may resolve this problem of mechanical airway obstruction.

What about there being a partial airway obstruction? The patient is going to be breathing noisily. They are going to be able to cough and speak. Encourage them to cough and speak. That is the body's way of trying to force out the obstructed airway. That novel concept, the body knows how to take care of itself, just give them the chance. The one thing we do not want to do is back blows to a conscious child or adult who is choking. If they are taking a breath in and we are giving that back blow, we could force the object further on down the airway, causing more of an obstruction. We want to give the athlete 100% oxygen using a non-rebreather mask of which we will discuss that later when we are also discussing about the BVMs we spoke about in the prior slides. As in all instances, when there is an airway obstruction, we want to provide prompt transport to the patient to a hospital facility.

What are some signs then? We talked about a partial airway obstruction, and we talked about an obstruction in the conscious patient. What happens if we have an obstruction in an unconscious athlete? It could be due to obvious trauma or blood or other obstructions in the area. There will be some noisy breathing sounds such as bubbling, gurgling, crowing or any other kind of abnormal sound. We will see that the patient has extremely shallow or absent breathing, the rise and fall of the chest. We will not feel any of the breath coming out of their mouth and nose.

What are some of the causes of these foreign body obstructions? We discussed relaxation of the tongue, vomit, blood clots, bone fragments, tissue damage, any kind of thing that will happen to the esophagus, the trachea, and anything in the neck region. Swelling due to an anaphylactic reaction, allergic reaction to something, will cause some form of obstruction of the airway along with the possibility of foreign objects, teeth, biting off a piece of the mouth guard that they are wearing.

How do we recognize an obstruction? Is it partial or is it complete? Is the patient able to speak and breathe or cough? If the patient is unconscious, then we are going to attempt to deliver artificial ventilation of which we will discuss later. How do we remove the obstruction? We are going to perform an abdominal thrust maneuver. If the attempts to clear the airway and the obstruction are unsuccessful, then we might have to begin CPR. In these instances where there is either a mechanical, a partial or a complete obstruction, we must transport the athlete to the appropriate facility.

To do the abdominal thrust maneuver, we must recognize and assess choking. The international sign for choking is crossing your hands across your neck and your chest. Position our self behind the athlete, spread their legs and put our leg between their legs. This way, our head will be to the side in case the athlete falls

backwards, ensuring the athlete does not hit his head. Additionally, while having the legs spread, you could rest the athlete on your knee, in case they are going to fall either forwards or backwards, you can position yourself to keep them supported.

Wrap our arms around the athlete, making a fist right above the belly button. When we make the fist, we want to keep the thumb outside. A lot of times, if you tuck the thumb inside, when you give the thrust, you will break your thumb. Keep the thumb outside and give a posterior superior thrust. The sign of a J. Remember, when we started out in chiropractic school, our big problem was we were thrusting. We were pushing when we tried to move the segments. It is the same thing with doing this maneuver. It is not a push; it is a thrust that needs to be performed. If the patient becomes weak or unconscious due to air not getting into the body and the patient passes out, we want to gently assist them to the floor and attempt to ventilate them. That is artificial ventilation. If this fails, we want to try to reposition the head with the head-tilt chin-lift maneuver and try again. If this is unsuccessful and the airway is still obstructed, begin CPR.

When we are dealing with the younger population, we want to kneel on one knee behind the child. We want to give them abdominal thrusts and keep on doing it until the object comes out. If the child becomes unconscious, bring them gently to the ground, open up the airway, and look to see if we can see any foreign object. We only try to remove an object if we see it. The blind sweep is no longer performed. We only want to remove the object if we can see it. Then, attempt the rescue breath if the airway remains obstructed, begin CPR.

We discussed all those things about airway, assessing the airway, head-tilt chin-lift maneuver, jaw thrust maneuver, oral airway, nasal airway, mechanical obstructions, being a partial obstruction or a complete obstruction, the unconscious athlete's airway, and we talked about removing the obstruction using the abdominal thrust maneuver.

Now, we are going to move on into breathing. How do we assess breathing? Is the athlete’s respiration shallow or is it deep? Does a patient appear to be choking? Is the patient cyanotic or blue around the lips indicating that oxygenated blood is not getting throughout the body? Is the patient moving air in and out of their lungs as their chest rises and falls? These are all different ways we use to assess breathing.

The active part of breathing is inhaling. This is when the diaphragm and the intercostal muscles contract allowing your lungs to expand. This decreased pressure allows the lungs to be filled with air and the air travels and are exchanged through the lower parts of the lung. Exhaling does not usually require any kind of muscular effort. The diaphragm and intercostal muscles are going to relax. The thorax decreases in size, and the ribs of the muscles assume their normal position. This increase in pressure forces out the air from the lungs.

We are talking about respirations. The rate is the number of breaths in 30 seconds times 2 or the number of breaths in 15 seconds times 4. What is the quality? Are they hyperventilating, breathing heavy and fast? Is their breathing rhythm regular or is it irregular? Is there a normal effort or a labored effort in breathing, is the breathing noisy, wheezing, snoring, gurgling, all different kinds of sounds coming out that indicate to us the possibility of some form of airway obstruction affecting breathing? Is the athlete's breath shallow or is it deep? All things that we are going to use to determine if there is any difficulty in breathing.

The normal breathing rates. Numbers are important as they are the way we are going to determine in an emergency on-field situation if there were any problems developing in the athlete. In an adult, it is normally 12 to 20 breaths per minute when breathing. In children, it is 15 to 30 breaths per minute and in an infant, it is 25 to 50 breaths per minute. As you notice, the younger the patient, the more breaths per minute is in the normal range.

Normal breathing characteristics. Is there a normal rate and depth, regular rhythm, good breath sounds in both lungs? We should, on the sidelines, have the appropriate equipment we need to determine the extent

of the injury to the athlete. We will discuss that in another module when we talk about what our sideline kit bag should contain. We are also looking for the regular rise and fall movements of the chest. Is their breathing easy or is it labored? Is there adequate depth to the chest when the athlete is taking the breath in?

Abnormal characteristics. Slower than 8 breaths a minute or faster than 24 breaths a minute are indications of abnormal breathing. Remember, we said in the adult, it is 12 to 20 breaths per minute. We are going 4 less breaths at 8 or 4 more breaths at 24. Those are the indications of there being abnormal breathing. Is their rhythm irregular? Is it labored? Is there muscle retraction? Remember, we spoke about that before, especially young children. Is there pursing of the lips? The skin is an organ. You will get a lot of information from an organ in terms of blood flow. That is why checking the skin to see if it is pale or blue, cool or clammy are going to give us indications if there is some problem with insufficiency in breathing, insufficiency of oxygenated blood getting throughout the system. We can pick up a lot of that from the skin. Let us look at nasal flaring in young athletes. Are the respirations shallow or are they irregular? All indications there is some form of abnormal breathing developing.

What about hyperventilation? It is over breathing resulting in a decrease in the levels of carbon dioxide. Remember, when we breathe in, the air contains 21% oxygen. We are breathing in 21% oxygen. When we exhale, we are exhaling 15% oxygen. We are only using about 5% of the oxygen that we inhale when we take a breath. When an individual is breathing too quickly, hyperventilating, we are going to find them to be a lot of anxiety. Numbness will be in the extremities. There will be a sense of difficulty breathing despite rapid breathing. There might be some dizziness, and one of the classic signs is tingling in the hands and in the feet, which usually indicate hyperventilation.

How do we treat when there is respiratory insufficiency? Secure and support the airway. Remember Airway is always assessed first. After the airway is cleared of any obstructions, we might have to help ventilate the athlete, thinking about the BVM device and the amount of breaths used for ventilation. We will cover this later on when we look at providing oxygen and when there is a problem with an obstructed airway and difficulty breathing, the athlete must be transported to the appropriate facility.

What we are trying to do is prevent dyspnoea. Dyspnoea is defined as a shortness of breath or difficulty breathing. The athlete might not be alert enough to complain about shortness of breath. That is why we must be familiar what the signs and the symptoms are that indicate difficulty breathing. Difficulty breathing, a lot of anxiety, a lot of restlessness. We are looking for decreased respiration. Remember, less than 8 breaths per minute, greater than 24 breaths per minute. Is there cyanosis, blue around the lips, indicating that oxygenated blood is not getting throughout the body? Do they have abnormal breath sounds when you are listening with the stethoscope? That is why we should be using this in our clinics all the time. When we are giving initial exams or we are giving comparative exam to our patients in an office setting, listen to the breath sounds. You might not be able to know exactly what the abnormality is but by listening on a regular basis, you are going to be able to pick up if something is abnormal. That is what we want to do as we pick up any type of abnormal breathing on the field. Does the athlete have difficulty speaking? Are they using their accessory muscles of breathing to help them breathe? These are all the different signs and symptoms that there is dyspnoea or difficulty breathing.

How about the altered mental status? That is where that AVPU scale comes in. In the beginning, the patient was alert and orientated. Now, their eyes are closed, and they are only responding when we talk to them. We are seeing their mental status is altering. Is the athlete coughing, trying to expel something that might be obstructing the airway? Is there an irregular breathing rhythm? The athlete might breathe better sitting in a tripod position. Are we finding increased pulse or increased respiration? Again, signs that there is some form of difficulty breathing, maybe some form of obstruction of the airway. Usually, we are going to see people with a barrel chest. We see those who have COPD or emphysema breathing that way. You are saying, "I am not going to see that. I am an athlete," but you might see it on somebody in the stands because

if something happens to a spectator and you are part of the medical staff at the event, they may turn to you to look to help evaluate the individual who is in the stands. You just need to be aware of some of the things to look at.

What is the treatment for dyspnoea? We are going to perform that initial assessment and check the airway, check the breathing and give the patient oxygen. When we cover oxygen later in the module, we will talk about using the non-rebreather mask, the bag valve mask (BVM), and how we will give ventilations because if the patient is in respiratory distress, we need to ventilate them or help them breathe. Of course, we want to check the pulse. Remember, airway breathing circulation. If the airway is not open, they are not breathing, they do not have a pulse, we want to start CPR.

Artificial ventilations. This is only used when a patient cannot breathe adequately on their own. We are going to use a barrier device, like we see in the picture here. First, what you want to do is you want to open the airway. Place the barrier device over the patient's mouth and nose with the pointy part of the mask over the nose. Take a regular normal breath and give a slow rescue breath at the rate of 10 to 12 breaths per minute for an adult. Remember, as we said, numbers are important. In an adult, we want to give 1 breath every 5 seconds. In a child, we want to give 1 breath every 4 seconds. In an infant, give 1 breath every 3 seconds.

Use the mouth to mask technique and kneel at the patient's head or on the side, as we see in this picture here. Place the mask on the patient's face, take a regular normal breath and breathe into the patient for one and a half to two seconds. Remove our mouth from the device and watch the patient's chest rise and fall. Here is an example of the caregiver standing at the head. We notice they have their gloves on, the proper PPE. We are showing that they are having a C-shape with their hands around the breathing device, or the mask, to help get a secure fit. If the fit of the mask is not secure, when you give the breath, the breath is going to go out the side of the mask instead of inside the injured athlete.

How do we assess if we are doing the right thing? Is it adequate ventilation? Is there equal rise and fall of the chest? Are we ventilating at the appropriate rate? In the adult, 1 breath per 5 seconds. Is the athlete's heart rate returning to normal? These are all indications we are doing the appropriate thing. What happens if there is minimal, or no chest rise and fall? What happens if we are ventilating too fast or too slow? What happens if the heart rate does not return to normal? Those are all indications of inadequate ventilation. We are doing something wrong when we are trying to ventilate the injured athlete.

We do not want to end up in gastric distension. This is when artificial ventilations fill the stomach with air. This usually occurs if you are going to blow too hard, if you are going to give too many breaths, or if the patient's airway is obstructed and the air bypasses the trachea and the esophagus right to the stomach. This may cause the stomach to become distended and eventually, the patient is going to vomit. We do not want that to happen. That is why we must know that we are doing things adequately and we must take our time to make sure things are being performed, these tasks are being done, the correct way.

Now, reassess athlete and make sure that the airway is supported. Be aware of any onset of shortness of breath and whether the condition worsened? When we are dealing with an unstable athlete, reassess every 5 minutes, obtain their vital signs and perform our reassessments. We want to transport the patient, as we discussed, any time there is any airway obstruction or difficulty breathing.

When we are dealing with breathing, it is important to be able to provide oxygen to the athlete. If oxygenated blood does not circulate through the body for zero to 1 minute, we are going to find some sort of cardiac irritability. Between zero and 4 minutes of un-oxygenated blood getting to the brain, you are not going to have too much of a problem, but between 4 and 6 minutes, there is the possibility of brain damage if the brain is not getting a sufficient amount of oxygenated blood. From 6 to 10 minutes, brain damage is very likely, and more than 10 minutes of there being non-oxygenated blood circulating throughout the brain, there is going to be irreversible brain damage. That is why having oxygen on the sideline is important.

How do we know it is oxygen? All oxygen containers are green and white, and all containers are marked oxygen. Even more so, to prevent you from giving the athlete something other than oxygen refer to the pin index safety system. This is the regulator, the device that delivers the oxygen, has pins in it that will only fit in the holes in an oxygen tank. This way, the oxygen delivered device cannot be put on some sort of tank that does not have oxygen in it.

What we are trying to do here is preventing hypoxia, which is the body's cells and tissue not having enough oxygen. How do we know that? What are we going to look for? There will be nervousness, irritability, and fear in the athlete. There will be tachycardia that is speeding up in the heart. There may be a change in their mental status. There is where that AVPU scale comes into play again. They might be using the accessory muscles of breathing. There will be difficulty in breathing and the patient might complain of the possibility of chest pain.

We want to use supplemental oxygen and we know the oxygen container is white and green. It says oxygen on it. We are inspecting the cylinder for the appropriate markings. Then we are going to crack the cylinder and if the delivery device is not attached, this way, we are going to blow out any kind of dust that is in the top of the tank. This way, if we are putting it on the athlete, his or her first breath is not going to be all the dust that was accumulated in the holes in the oxygen container.

After we crack the cylinder, we will attach the flow meter and regulator. The regulator is what delivers the oxygen from the container to the injured athlete. Open the cylinder and attach the proper delivery device to the flow meter. As you can see in the picture on the bottom right, that little piece jutting out is referred to as the Christmas tree and attach that to the device we are using to put on the athlete to administer the oxygen. Adjust the flow meter to desired flow rate and apply the oxygen device to the patient. When done, discard the delivery device, which are disposable, and a one person use device. After we discarded the delivery device, turn off the flow meter and shut down the oxygen container.

What is the oxygen delivery equipment? This is what is called a non-rebreather mask. The picture of it is to the right. We want to provide up to 90% oxygen, and we use this at between 10 to 15 liters per minute. That is what you are going to set the oxygen delivery device to after it is attached to the oxygen cylinder. Another optional delivery device, which you will very rarely use, is called the nasal cannula. That provides between 24 and 44% oxygen to the athlete. If we are going to use that, the setting is between 1 and 6 liters per minute, but most often, we are going to be using the non-rebreather mask. It is important to know the numbers. We want to use this at 10 to 15 liters per minute and will use the bag valve mask (BVM).

This can be used with the help of one to two doctors administering it to the patient. This is a mouth-to-mask ventilation, and this device can also be hooked up to the oxygen container. It is an oxygen-powered ventilation device. A BVM can deliver more than 90% oxygen to the athlete. It delivers less tidal volume than mouth to mask. When we are giving mouth to mask, remember, we talked about taking a breath in and slowly giving the breath to the injured athlete. Everybody's lung capacities are a little different. You might be blowing too hard, but by using the BVM, as you can see in the picture on the bottom, when we squeeze the bag, we are getting a lesser amount of oxygen into the lungs. Less chance we are going to get that gastric distention we spoke about before. This BVM device, like we discussed earlier, is used when we are using an oral or a nasal pharyngeal airway that helps keep the obstructed airway open.

Two people can use this device. Inserting the oral airway, one caregiver is going to maintain a good seal while the other caregiver is going to squeeze the bag. We want to place the mask on the patient's face and squeeze the bag to deliver the ventilations. We could see here on the left; it is two people. One person is holding the mask on the patient's face to get a good seal. The other caregiver is squeezing the bag to make sure we are delivering the appropriate amount of oxygen in a sufficient amount. The picture on the right shows one person using the device. This is a device that is needed to have practice with. The more you practice, the better you are going to be able to and have more comfort in using the device.

Remember, oxygen supports combustion. That means you want to keep all open flames away from the oxygen container. You also must remember that the oxygen container is under high pressure. If the container falls over and the top of the container breaks off, your oxygen container is going to work like a torpedo. It is going to go through the wall and the next wall after that and keep on going until it runs out of high pressure. Because remember, the tanks are under high pressure.

We just talked about breathing, excessive breathing, normal and abnormal characteristics, are we adequately or inadequately providing breathing, dyspnea, ventilating the athlete and gastric distension. We talked about the using of oxygen, and at critical times, it is needed to use the oxygen, how we are operating the oxygen delivery device, and how to use the different types of delivery systems when providing oxygen. Now, we are going to move on to circulation.

Circulations assess after the airway is open and we give 2 rescue breaths. Remember, airway breathing circulation. After we assess for the airway and gave rescue breaths, we know the airway is open, and the athlete is breathing, so now check the pulse and circulation and evaluate for all signs of circulation. We are professionals; therefore, you should be able to pick up a pulse. If it is taking you more than 10 seconds to find the pulse, there is a strong chance the patient has no pulse.

Numbers are important. The normal pulse range for an adult at rest is between 60 to 100 beats per minute. In a child, it is between 80 and 100 beats per minute. In a toddler, it is between 100 and 120 beats per minute. In the newborn, it is between 120 and 140 beats per minute. You will notice the pulse rate and normal ranges is quicker for the younger, smaller patient. We must be careful of what is going on. If an athlete intercepts a pass playing American football and runs the full length of the field and is lying down in the end zone on their back and you get there, and they are breathing more than 24 breaths per minute, you have to realize the athlete might just have ran 100 yards. You must assess the situation. Within a minute or so, if the breaths are backed or the pulse rate is back down to its normal beats, then we know that the athlete is recovering, and things are doing fine. If it stays for a longer period of higher than 100 beats per minute, then we have to start looking for some other form of condition that is developing, and we might have to do some other types of interventions for the injured athlete.

How do we deal with circulation? Check the pulse for 30-seconds x 2, or 15-seconds x 4. We either want to track at the carotid in the neck or the radio in by the wrist, or if we are dealing with a child, we could check the brachial in the arm. Is the pulse strong and bounding, weak or thready, regular or irregular? These different things will determine if there is any problem with the athlete's circulation.

How do we assess circulation? You need the pulse, the rate, the rhythm, the strength. Assess and control any kind of external bleeding, which we will cover a little later. We spoke about how the skin is the largest organ in the body. The skin is going to give us a lot of indication of whether or not we are getting oxygenated blood or circulation of blood throughout the system by seeing, is it blue around the lips, is the skin pale or flushed? All indications of the possibility of problems with the circulation of blood throughout the system.

Evaluate the skin temperature. Is the skin moist, dry, hot or cold? In children, we want to check the capillary refill. Capillary refill evaluates the ability of the circulatory system to restore blood flow to the capillary system, commonly referred to as perfusion, and is done by depressing the patient's fingertip, and looking for the return of blood. When you look at a patient's fingertip, it is nice and pink. When we depress the fingertip, it will turn white. Once we let go, within two seconds, it should be nice and pink again. That indicates that we are getting blood supply throughout the system to the smallest part of the circulatory system, which is the capillary. This is very good when dealing with children, less effective when dealing with adults. One of the things you have to look out for is if the athlete has on now polish, using the capillary refill is not going to be able to see the change in color of the fingernails.

What are the circulatory differences? The heart rate is going to increase for any kind of injury. There is going to be vasoconstriction of the blood vessels to keep the vital organs nourished with blood. Constriction of blood vessels can affect the blood flow to the extremities. That is why things like capillary refill in children are very good to pick up if there are any circulatory deficiencies.

When we are dealing with perfusion, it is circulation within the tissues in adequate amounts to meet the cells' need for oxygen, nutrients, and waste removal. Some tissues and organs need a constant supply of blood while others can survive with very little when at rest. The heart demands a constant supply of blood, otherwise, if it is not oxygenated blood getting through the heart, that is when there will be a problem of a heart attack. The brain and spinal cord can survive for only 4 to 6 minutes without there being a good supply of oxygenated blood to the brain. The kidneys can survive for up to 45 minutes without oxygen supply. Skeletal muscle can last up to 2 hours. That is why if there is ever an instance that a part of a finger or a hand or something is amputated, you can turn around, find the piece that has been amputated, wrap that in a dry cloth, put it in some water, and put it in a cool place. That can be taken to the hospital because if it has been less than 2 hours, there is a good chance that limb can be reattached.

We want to restore circulation, control bleeding, and improve oxygen delivery as soon as possible. If the athlete is unresponsive and has no pulse, begin CPR. When you took your CPR class, you learned about why you use an AED, an automated external defibrillator, because the quicker this is used on somebody, we are performing CPR on, the better chance it is going to be for the athlete to survive, however do not use an AED on a patient who has a catastrophic traumatic injury.

[END]