Unit 4
FIRST AID
Lecture notes

I. Emergency Procedures
a. Most sports injuries do not result in life or death emergency situations, but when such situations do arise, prompt care is essential.
b. Emergency care is defined as an unforeseen combination of circumstances and the resulting state that call for immediate action.
c. Time becomes a critical factor and assistance to the athlete must be based on knowledge of what to do and how to do it.
d. The prime concern of emergency aid is to maintain cardiovascular function, and indirectly, central nervous system function, since failure of any of these symptoms may lead to death.
e. All sports programs must have an EMERGENCY PLAN that can be quickly and easily set in motion. The following issues should be addressed when developing an emergency plan:
   i. Know the location of the phones and emergency telephone numbers.
   ii. Know who is designated to make emergency telephone calls. Who has the key to gates or padlocks and who will open them?
   iii. Know the information to be given over the telephone.
      1. Type of emergency situation.
      2. Type of suspected emergency.
      3. Present condition of the athlete.
      4. Current assistance being given (for example, CPR or rescue breathing).
      5. Location of telephone being used.
      6. Exact location of emergency and how to enter facility.
   iv. A separate emergency plan is necessary for each sports field, court, or gymnasium.
   v. Make sure that each responsible person involved in the activity has been apprised of the emergency plan and that each person knows their responsibilities in the plan.

II. Primary Survey
a. A primary survey is that portion of the assessment concerned with evaluation of the basic life support mechanisms: AIRWAY, BREATHING, and CIRCULATION. These are referred to as the ABC’s of life support.
b. With most athletic injuries, a primary survey is completed easily and quickly. Critical life-support mechanisms can be evaluated almost immediately. For example, if an injured athlete is conscious and talking, one can assume that they are breathing and have a pulse.
c. Time is of the most importance, so the primary evaluation must be done rapidly and accurately.
d. During the primary survey, the examiner needs only to talk, feel, and observe. No diagnostic equipment is needed. Inquiries should be brief and pertinent, with no detailed questioning at this time.

e. Four diagnostic signs should be observed.
   i. State of consciousness.
   ii. Respiration.
   iii. Skin color.
   iv. Pulse.

f. The examiner must remain calm no matter what the situation may be. A calm attitude instills confidence in the athlete.

g. A record of initial observations should be started.

h. A thorough understanding of basic life-support procedures is necessary to the performance of a primary survey.

i. Airway
   i. Anything that blocks the passage of air through the windpipe (trachea) into the lungs causes an airway obstruction.
   ii. The most common cause of airway obstruction is blockage of the opening by the tongue. This may occur when an athlete is unconscious. In this case, the tongue may fall toward the back of the throat and block the airway opening.
   iii. An obstructed airway is life-threatening and requires immediate attention.
   iv. Because the tongue is attached to the lower jaw, moving the lower jaw forward will usually lift the tongue away from the back of the throat and open the airway. This may be all that is required for breathing to resume spontaneously.
   v. The current recommended technique to open the airway is the head-tilt-chin-lift method. This maneuver is accomplished by tilting the head back with one hand and lifting the chin up gently with the other. With the athlete on their back, place the hand closest to the athlete’s head on the forehead and apply firm backward pressure. At the same time, place the tips of your fingers under the lower jaw on the bony rim and lift the chin forward. Be careful when compressing the soft tissues under the chin because this could obstruct the airway. The chin should be lifted so that the teeth are almost brought together, however, avoid completely closing the mouth.
   vi. When a neck injury is suspected, movement of the cervical spine must be avoided. The jaw-thrust method can be used.
   vii. To relieve an airway obstruction caused by a foreign body, the examiner can use the Heimlich maneuver on a conscious athlete.
      1. For the conscious victim, the Heimlich maneuver is applied until he or she is relieved or becomes unconscious.
      2. Stand behind the athlete. Place both arms around the waist just above the hips and permit the athlete’s head, arms, and upper trunk to hang forward.
3. Grasp one fist with the other, placing the thumb side of the grasped fist in the center of the abdomen, clear of the rib cage.
4. Sharply and forcefully thrust the fists into the abdomen, inward and upward. Repeat the thrusts until the object is expelled, swallowed, or the athlete becomes unconscious.

j. Breathing
   i. The term apnea refers to any temporary cessation of breathing. An athlete may stop breathing or be in respiratory arrest for a variety of reasons. The most common is airway obstruction. The airway may be obstructed by the tongue or a foreign object as explained above. Swelling in the throat caused by an allergic reaction, or tissue damage caused by a severe blow to the neck can also obstruct the airway.
   ii. Respiratory arrest may also result from cardiac arrest, poisons, drugs, or drowning.
   iii. Regardless of the cause, it is extremely important that the rescuer recognize the condition immediately.
   iv. The first priority is assessment and care of injuries involving an athlete’s breathing is to establish an open airway. When the airway is opened, an athlete may begin to breathe spontaneously.
   v. If it does not appear that breathing has begun after opening the airway, put your ear close to the athlete’s mouth and nose. Look at the chest for any breathing movements. Listen for any exchange of air. Feel for breathing against your cheek or ear.
   vi. If the athlete is not breathing, appropriate techniques of artificial breathing must be initiated immediately.

k. Circulation
   i. There are several reasons why an athlete’s heart may stop beating, but should it occur, the exact cause is immaterial to the sports medicine professional. Of utmost importance is the recognition of cardiac arrest and the immediate initiation of emergency measures.
   ii. Circulation is assessed by palpating for a pulse. The carotid artery in the neck is the most commonly used artery to check for a pulse during an emergency situation. This is the main artery in the neck. The carotid artery is normally not obstructed by clothing or equipment and is easily accessible. Position yourself on one side of the athlete and place your index and middle fingers on the windpipe. Slide your fingers gently toward you. Press gently into the soft part of the neck next to the windpipe. The carotid pulse can be felt in the groove. Always feel for the carotid pulse on the side of the neck closest to you.
   iii. If the athlete does not have a pulse, appropriate emergency techniques of artificial circulation must be initiated immediately. Every sports medicine professional must be certified in Cardiopulmonary Resuscitation (CPR).
III. CPR Certification
   a. CPR certification must be done by a certified CPR instructor. Contact the Red Cross, American Heart Association or a local emergency response council or fire department for possible instructors.

IV. Secondary Survey
   a. Upon completing the primary survey and controlling any immediate life-threatening problems, the secondary survey, which involves a more thorough examination of the athlete is conducted. This examination is a head-to-toe assessment to detect conditions that may not in themselves pose an immediate threat to life, but if left unrecognized and untreated, could become life threatening.
   
   b. This secondary survey should be completed before beginning stabilization and transport, if necessary, of the athlete.
   
   c. Injuries such as bleeding, spinal injury, and shock are examples of conditions that must be ruled out.
      
   i. Bleeding – in order to detect bleeding, the examiner should do a quick scan from head to toe, lightly touching every part of the body, periodically checking their hands for blood. This should be done first and take only about 15 seconds.
   
   ii. Spinal injuries – in order to detect spinal injuries, the examiner should gain a thorough history from the patient, including questions of what happened and how? Do they have neck or back pain? Do they have tingling and numbness in any extremity? Can they wiggle their fingers and toes? The examiner should also palpate the entire spine checking for deformity and tenderness.
      
      1. If the athlete has any neck or back pain, the examiner should instruct the athlete to keep his/her head still and have another person hold the athlete’s head still as a reminder.
      
      2. The athlete should be placed on a backboard with a cervical collar on, and be immediately transported to a medical facility.
      
   iii. Shock – in order to detect if someone is in shock, vital signs should be taken. Nail bed perfusion should be noted as well as the color of their skin and their responsiveness during the history taking process.
      
      1. Pulse – a normal pulse rate per minute for adults is between 60-80 beats per minute and in children from 80-100 beats per minute. A rapid but weak pulse could indicate shock.
      
      2. Respiration – the normal breathing rate per minute is approximately 12 breaths in adults and 20-25 in children. Shallow breathing may indicate shock.
      
      3. Blood pressure – a normal blood pressure for adults is 120/80 mm Hg. A lowered blood pressure could indicate shock.
4. Body temperature – a normal body temperature is 98.6° F. Temperature is measured with a thermometer. Changes in body temperature can be reflected in the skin. Cool, clammy and pale skin could indicate shock.

5. Pupils – the pupils are extremely sensitive to situations affecting the nervous system. If one or both pupils are dilated, the athlete may be experiencing shock. The pupils’ response to light should also be noted.

d. A total body survey (TBS) should then be conducted using the following format.
   i. The examiner should palpate the entire body noting any tenderness, deformity, or swelling.
      1. Entire skull and facial bones.
      2. Pupils – equal size and normal reaction to light (head injury).
      3. Fluid coming from the ears or nose (skull fracture).
      4. Ask them to bite down with their teeth, check for pain and normal alignment (jaw fracture).
      5. Cervical spine.
      6. Clavicles, one at a time.
      7. Sternum – push down with side of hand.
      8. Ribs – push down and in from the sides.
      9. Arms and hands – one at a time, have athlete squeeze your fingers at the same time (neurological check).
     10. Move one arm (if not injured) over the chest to be able to palpate the thoracic and lumbar spine.
     11. Push on all four quadrants of the stomach (internal bleeding).
     13. Palpate each leg and foot separately; have the athlete push down and up with their feet against resistance (neurological check).
     14. Take blood pressure, respiration rate, and pulse rate.
   ii. During the total body survey, the examiner should be gathering additional information about the injury and the athlete.

V. After the TBS, the examiner can then do a more thorough assessment of the major complaint areas through a musculoskeletal evaluation (HIPS).

Musculoskeletal Evaluation
   a. A logical process must be used to evaluate accurately the extent of musculoskeletal injuries. It is this part of the survey that usually comprises the largest portion of the total athletic injury assessment procedure. An ordered sequence of procedures is used to assess the nature, site, and severity of an athletic injury.
   b. When an injury occurs, early and accurate assessment is essential in developing an effective treatment and rehabilitation program.
   c. The importance of using a detailed and properly sequenced checklist in the assessment procedure cannot be overemphasized. By following a
consistent pattern in your evaluation procedures, you are less likely to forget a procedure or miss an important detail.

d. This evaluation can be divided into four basic steps. These can be easily remembered by the acronym HIPS, which stands for HISTORY, INSPECTION, PALPATION, and SPECIAL TESTS.

e. Each step is important and should be carried out thoroughly and efficiently to accurately assess an athletic injury. Not all of the procedures discussed under each step of the HIPS evaluation will be carried out with each athletic injury. The nature, type, and severity of the injury will determine the evaluation techniques to be used.

f. HISTORY

  i. Obtaining an accurate history of an injury is one of the most important steps in the secondary survey portion of the total athletic injury assessment process. Taking a history involves finding out as much information as possible about the actual injury and the circumstances surrounding its occurrence. This is accomplished by talking with the injured athlete or others who have observed the injury. Information gained in a thorough history can provide important clues in determining which structures may be injured and which assessment techniques will be appropriate as the examination continues.

  ii. Knowledge of the mechanism of common injuries is extremely important in determining the possible injuries of athletes.

  iii. When obtaining a history, the examiner should:

    1. Be calm and reassuring.
    2. Express questions that are simple and not leading.
    3. Listen carefully to the athlete’s complaints.

  iv. The main purpose of the history step is to find out as much information as possible about an injury and the circumstances surrounding its occurrence.

  v. Examples of questions:

    1. Chief complaint and present problems?
    3. If pain is present, its location, character, duration, variation, aggravation, intensity, radiation, and course?
      a. If possible, point to the painful area with one finger.
      b. Nerve pain tends to be sharp and/or burning.
      c. Bone pain is localized and piercing.
      d. Muscle pain is often dull, aching and referred to another area.
      e. Pain that subsides during activity usually indicates a chronic inflammation.
      f. Pain that increases in a joint throughout the day indicates a progressive increase in swelling.
g. Is the pain increased or decreased by specific activities or stresses?
4. Has the problem occurred before? If so, when, and how was it treated?
5. How long have the symptoms been apparent?
6. Joint responses – giving way, instability?
7. Any sounds at the time of injury?
   a. Sounds such as a snap, crack or pop at the time of injury often indicate bone breakage.
   b. Areas of the body that have abnormal amounts of fluid may produce sloshing sounds when gently palpated or moved.

g. INSPECTION
   i. Along with gaining a knowledge and understanding of the athlete’s major complaint from a history, a general inspection is also performed, often at the same time the history is taken.
   ii. This step is purely observational!
   iii. Look for any obvious bleeding, deformity, swelling, discoloration, or other signs of injury.
   iv. Note general body alignment and posture of the athlete. Is the athlete holding a body part or grasping some body area?
   v. If the athlete is moving around, note their functional abilities. Is the athlete using the injured part or protecting it? Are they limping?
   vi. Some athletes try to disguise or minimize the extent of their injury. Observing the athlete’s face and eyes as they describe the injury may give further clues as to the extent of the pain. More pain may be reflected in the athlete’s face than they may be willing to admit.
   vii. When inspecting an injury, clothing and equipment that may obscure the area should be removed. Consider the athlete’s modesty in removing clothing and equipment.
   viii. Always compare the injured body part to the contralateral uninjured part and note any obvious differences. You must be aware of any pre-existing abnormalities in the uninjured body part cause by such things as congenital conditions or previous injuries.

h. PALPATION
   i. Palpation means to touch and feel the injured area. After the history and observation steps, you can gain additional physical information concerning the injury by carefully palpating the affected body area.
   ii. The three types of structures that should be systematically palpated are Bones, Muscles, and Soft Tissue.
   iii. There are several important points to remember as you palpate an injured athlete:
      1. Palpate in a tender manner to avoid unnecessary pain. If you cause the athlete unnecessary pain, they may become tense and uncooperative.
2. To accurately palpate an injured area it should be as relaxed as possible.
3. The intensity or pressure used with each palpation maneuver can be increased depending upon the athlete’s tolerance level and the severity of the injury.
4. It is good practice to begin palpating away from the injury site to encourage the athlete’s cooperation and confidence.
5. It is important that you visualize the structures that are under your fingers as you palpate. Are you feeling approximately where ligaments, muscles and other structures should be?
6. Remember to compare the contralateral areas.

iv. Pain is one of the most obvious and consistent symptoms of injury. It is especially important to locate areas that are most painful to touch. These are called areas of point tenderness and are usually found at the site of injury.

v. Another physical sign that can be recognized by palpation is swelling. Swelling may be localized at the injury site or diffused over a larger area. The amount of swelling is usually related to the severity of injury. However, there are cases in which serious injuries produce very limited swelling and minor injuries cause severe and extensive swelling.

vi. Additional information gained during palpation may be related to the temperature of the skin. Normal skin is moderately warm and dry. In palpating the site of an injury, any indication of an increase in skin temperature would suggest the occurrence of an inflammatory process. A decrease in skin temperature may be felt in areas of inadequate circulation.

vii. Deformity is another physical sign that may be discovered during palpation. The cause may be a fracture, dislocation, or the tearing of soft tissue.

i. SPECIAL TESTS

i. The special tests section of the HIPS evaluation includes four areas: Range of Motion, Stress Tests, Neurological, and Circulatory.

ii. Range of Motion – three types of range of motion should be assessed: Active, Passive, and Resistive.

1. Active movement is movement that is performed solely by the patient and indicates three factors – an ability and willingness to execute certain movements, muscular power, and range of active movement. Active movement may be normal, limited, or excessive. To initiate this type of movement, the athlete is asked to move the injured part through as full a range of motion as possible, and in all the ranges of motion at that joint. Note which movements, if any, cause pain and the amount and quality of pain that
results. Note any restriction of limitation in the active motion. Compare the active range of motion to the uninjured side.

2. Passive movement is movement that is performed completely by the examiner. With the athlete relaxed, the body part is moved through as full a range of motion as possible. Passive movements are used to evaluate the integrity of the non-contractile tissues at the joint. As the part is moved, the examiner determines what is felt at the end of the movement or “end feel”.

3. Resistive movements are used to determine the status of a particular muscle or muscle group. The athlete is asked to contract the part as much as possible, while the examiner provides resistance. Low initial resistance against movements is gradually increased depending on the athlete’s tolerance. Note the strength and site of pain at any point throughout the resisted range of motion. The following are some of the findings that resistive range of motion can provide:
   a. Weak and Painless – possible third degree strain.
   b. Weak and Painful – possible fracture at a joint site.
   c. Strong and Painful – possible tear of a muscle or tendon.

iii. Stress Tests

iv. Special stress tests have been designed for almost every body region as a means of determining specific injuries. These stress tests are commonly used to determine ligament stability, muscle imbalance, tightness of specific structures, joint function, and integrity of structures.

v. Neurological Exam

1. The neurological examination consists of reflex testing and sensation testing.

2. A deep tendon reflex is an involuntary contraction of a muscle in response to a tap on its tendon. Testing a reflex can provide an indication of the state of the nerve supplying that reflex. When evaluating reflexes, always test and compare each reflex bilaterally. Asymmetry between bilateral reflexes may indicate a loss or abnormality of nerve conduction and can be diminished, lost, or excessive. Common reflexes that should be checked are Biceps, Triceps, Patellar, and Achilles.

3. Testing for altered sensations is also an important part of the neurological exam. The examiner should run their hand or fingers over the skin of the injured area as well as the corresponding area on the uninjured side. Does the athlete feel any difference in sensation between the two sides? To
test for pain, apply the sharp and dull points of a pin to the skin and note whether the athlete correctly perceives the stimulus. Abnormal responses to sensory testing include sensations that are decreased, absent, or increased.

vi. Circulatory Exam
1. The circulatory exam includes three areas: Pulse, Blood Pressure, and Nail Bed Perfusion.
2. A pulse is defined as the alternate expansion and recoil of an artery caused by the intermittent ejection of blood from the heart. The pulse can be felt at numerous arteries throughout the body. Most commonly a pulse is taken at the carotid artery, brachial artery, radial artery, femoral artery, and at the dorsipedal site. It is important to take a pulse distal to the injury to determine if the extremity has sufficient circulation. If no pulse is found distal to a severe injury, a medical emergency exists. A normal adult pulse is 60-80 beats per minute.
3. The athlete’s blood pressure should be taken during the assessment process. Remember that a normal adult blood pressure is 120/80 mm Hg.

j. Nail bed perfusion can also help to indicate circulatory problems. Squeezing the finger or toe nail bed distal to the injury site will blanch the nail (turn it white), and on release there should be a rapid return of a pink color.

k. Decisions Made from a HIPS evaluation
i. The examiner can make any of the following decisions after completing a thorough musculoskeletal examination:
   1. The seriousness of the injury.
   2. The type of first aid and immobilization.
   3. Whether or not the injury warrants referral to a physician for further assessment.
   4. The appropriate follow-through and treatment for this injury.

l. Additional Information
i. Injuries that are serious or need physician care should be referred for additional medical attention. If the examiner is unsure of the injury, the athlete should be referred for a physician’s evaluation.
ii. The physician is legally responsible for the diagnosis and course of treatment of an injured athlete. He or she may have to acquire additional information to make a final assessment.
iii. X-rays – an x-ray examination assists the physician in determining fractures and dislocations, or any other bone abnormality that may be present.
iv. Arthroscope – the fiber optic arthroscope is commonly used by orthopedic surgeons to view a joint and perform minor surgical procedures. The arthroscope is minimally invasive, and requires anesthesia and a small incision.
v. Magnetic Resonance Imaging (MRI) – MRI surrounds the body with powerful electromagnets, creating clear images of both soft tissue and bones, for accurate, non-invasive diagnosis of injuries and diseases.

VI. Management of Acute Injuries
a. The role the person providing first aid includes the prevention of further injury, reduction of pain, and stabilization of the injury. Also of importance is the control of bleeding and management of swelling, splinting, and handling and transportation of the injured athlete.
b. Of major importance with musculoskeletal injuries in the initial control of bleeding, swelling, muscle spasm and pain. The acronym for this process is R-I-C-E (Rest, Ice, Compression, and Elevation).

i. Rest
1. Rest is essential for many injuries. This can be achieved by immobilization of the injured body part, or the use of a cane or crutches.
2. Immobilization of an injury for the first 2-3 days after injury helps to ensure the healing of the wound without complication. Movement too early may increase bleeding, and possibly prolong recovery.

ii. Ice
1. Cold, primarily ice in various forms is an effective first aid method. Cold reduces pain and muscle spasms. Cold is a stronger stimulus than pain from many minor injuries; therefore, the sensation of cold on an injury will override the feeling of pain.
2. Cold application also decreases swelling that occurs following an injury because it slows circulation by constricting blood vessels.
3. Prolonged application of cold can however, cause tissue damage.
4. Cold applied to a healthy athlete will feel uncomfortable. For best results, ice should be applied over a towel or other covering on the skin. Frostbite is a danger when cold is applied. A good rule of thumb is to apply a cold pack to a recent injury for a 20-minute period and repeat every 1-2 hours throughout the waking day.
5. Depending on the severity and site of the injury, cold may be applied intermittently for 24-72 hours. If in doubt about the severity of any injury, it is best to extend the time RICE is applied.

iii. Compression
1. Placing external pressure on an injury assists in decreasing blood flow to the site of the injury. Compression assists the
body’s healing process by reducing circulation to the area during the acute injury stage.

2. A compression wrap can also help support injured tissues and provide comfort to the athlete. Many types of compression are available.

3. An elastic wrap (Ace bandage) can provide the appropriate compression as can horseshoe pads combined with adhesive tape. Elastic wraps come in various sizes ranging from 2” to 6”. The smaller the body part to be wrapped, the smaller and shorter the wrap required.

4. A compression elastic wrap should always be started distally, and should be wrapped toward the heart. The wrap should overlap itself by about _ its diameter. No gaps should be left as these would serve as an escape for swelling. The wrap should be stretched to about 70% of its maximum length to give adequate compression. Excessive pressure will not minimize swelling and will probably slow the healing process.

5. After any wrapping or taping, the athlete should be checked for comfort as well as signs of impaired circulation (numbness, tingling, discoloration, or loss of pulse).

iv. Although cold is applied intermittently, compression should be maintained throughout the day.

v. Elevation

1. Along with cold and compression, elevation reduces internal bleeding. By elevating the affected body part above the level of the heart, bleeding is reduced, and venous return is encouraged, further reducing swelling. Care must be taken that the elevated part is in a secure, supported and comfortable position.

2. Many studies now agree that elevation may be the best method of reducing swelling, even more than ice or compression.

3. Remember that for elevation to be effective, the injured body part must be above the level of the heart.

vi. RICE Schedule

1. Evaluate the extent and severity of the injury.

2. Apply ice to the injury.

3. Hold ice pack firmly against the injury site with an elastic wrap.

4. Elevate the injured body part (when secure and stable) above the level of the heart.

5. After 20 minutes, remove the ice pack.

6. Reapply compression to the injured part.

7. Elevate the injured body part.
8. Reapply the ice pack in 1 to 2 hours, and depending on the degree of injury, continue this rotation until injury resolution has taken place and healing has begun.

9. Keep the injured body part elevated above the level of the heart.

VII. Emergency Splinting

a. Sometimes it is difficult to tell whether an injury is a fracture, dislocation, sprain, or strain. Since you cannot always be sure which of these an injured athlete may have, always care for it as a fracture. When in doubt, splint.

b. Any suspected fracture should always be splinted before the athlete is moved. Transporting a person with a fracture without proper immobilization can result in increased injury to the athlete, and shock. It is possible that a mishandled fracture could cause death.

c. Splinting is the process of immobilizing a body part. Any material that can immobilize a fractured bone can be used (rolled up newspaper, magazines, and pieces of wood).

d. The purposes of splinting are:
   i. To immobilize a possibly fractured part of the body.
   ii. To lessen pain.
   iii. To prevent further damage to soft tissues.
   iv. To reduce the risk of serious bleeding.
   v. To reduce the possibility of loss of circulation in the injured part.
   vi. To prevent closed fractures from becoming open ones.

e. The basic principles of splinting are:
   i. Splint only if you can do it without causing more pain and discomfort to the victim.
   ii. Splint an injury in the position you find it.
   iii. Apply the splint so that it immobilizes the fractured bone as well as the joints above and below the fracture.
   iv. Check the circulation before and after splinting.
   v. If at all possible, do not move the athlete until they have been splinted.

f. If there are no splinting supplies available, splint the broken part to another part of the body. For example, a broken arm can be splinted to the chest, and a fractured leg can be splinted to the other, uninjured leg.

g. Fractures of the ankle or leg require immobilization of the foot and knee. Any fracture involving the knee, thigh, or hip needs splinting of all the lower limb joints and one side of the trunk.

h. Fractures around the shoulder complex are immobilized by a sling and swath bandage, with the upper limb bound to the body securely. Upper arm and elbow fractures must be splinted, with immobilization effected in a straight-arm position. Lower arm and wrist fractures should be splinted in a position of forearm flexion and should be supported by a sling. Hand
and finger dislocations and fractures should be splinted with tongue depressors, gauze rolls, or aluminum splints.

i. Injury of the head, neck, and back are serious and difficult to care for. Once a head, neck, and/or back injury has been recognized, an ambulance should be immediately summoned. Primary emergency care involves maintaining normal breathing, treating for shock, and keeping the athlete quiet and in the position found until medical assistance arrives. Any movement of the athlete should include a backboard. This stabilization must be maintained throughout transportation, and through any hospital procedures, until the injury is cleared.

VIII. Crutches

a. When an athlete has a lower limb injury, weight bearing may be contraindicated. Situations of this type call for the use of a crutch or a cane.

b. Very often, an athlete is assigned one of these aids without proper fitting or instruction in their use. An improper fit and usage can place abnormal stresses on various body parts. Constant pressure of the body weight on the crutch’s axillary pads can be painful. This pressure on the nerves and blood vessels in the area can lead to temporary or even permanent numbness in the hands. Faulty mechanics in the use of crutches or canes could produce chronic low back and/or hip strain.

c. For a correct fit the athlete should wear low-heeled shoes and stand with good posture and the feet close together.

d. The crutch length is determined by first placing the tip 4 inches from the outer margin of the shoe and 2 inches in front of the shoe. The crutch can be adjusted to the athlete’s height.

e. The underarm crutch brace should be positioned 1 inch (two-finger widths) below the anterior folds of the axilla (armpit). Next, the hand brace is adjusted so that it is even with the athlete’s hand and the elbow is flexed at approximately a 15-20-degree angle.

f. Many elements of crutch walking correspond with walking. The technique commonly used in sports injuries is the tripod method. In this method, the athlete swings through the crutches without making any surface contact with the injured limbs or by partially bearing weight with the injured limb.

g. The following crutch walking sequence should be used:

   i. The athlete stands on one foot with the affected foot completely elevated or partially bearing weight.

   ii. Placing the crutch tips 12-15 inches ahead of the feet, the athlete leans forward, straightens the elbows, pulls the upper crosspiece firmly against the side of the chest, and swings or steps between the stationary crutches.

   iii. After moving through, the athlete recovers the crutches and again places the tips forward.
h. Once the athlete is able to move effectively on a level surface, negotiating stairs should be taught. As with level crutch walking, a tripod is maintained on stairs.
   i. In going upstairs, the unaffected support leg moves up one step while the body weight is supported by the hands. The full weight of the body is transferred to the support leg, followed by moving the crutch tips and affected leg to the step.
   ii. In going downstairs, the crutch tips and the affected leg move down one step followed by the support leg. If a handrail is available, both crutches can be held by the outside hand, and a similar pattern is followed as with the crutch on each side.

IX. Head and Neck Injuries
   a. The following steps should be followed when stabilizing an athlete with a head, neck, and/or back injury:
      i. Establish whether the athlete is breathing and has a pulse.
      ii. Secure a spine board for transportation of the athlete.
      iii. Place all extremities in axial alignment.
      iv. Rolling the athlete over (if they are lying prone) requires four to five persons. The neck must be stabilized and must not be moved from its original position. Each person is responsible for one of the athlete’s body segments.
      v. Place the spine board close to the side of the athlete.
      vi. The athlete should be rolled on to the board as one unit.
      vii. On the board, the athlete’s head and neck should continue to be stabilized.
      viii. Do not remove the helmet (if wearing one) but the facemask can be cut away for possible CPR.
      ix. Secure the athlete to the spine board.
      x. If the athlete is face up, the athlete should be lifted straight up as a unit while the spine board is slid underneath. The athlete is slowly lowered straight down onto the board. The head and neck should be stabilized throughout the entire maneuver.

X. Control of Bleeding
   a. Bleeding or hemorrhage refers to the loss of blood from arteries, capillaries or veins. Bleeding may be internal or external. Loss of blood may initially cause weakness and progress to shock and death if the bleeding is not controlled.
   b. There are three types of bleeding:
      i. Arterial – loss of blood from an artery which carries oxygenated blood from the heart through the body. The blood spurts with each heartbeat and is bright red. Arterial bleeding is usually severe and hard to control and needs immediate attention.
      ii. Venous – loss of blood from a vein which carries deoxygenated blood from the body back to the heart. It has a steady flow which
can be heavy and the color is dark red. Venous bleeding is easier to control than arterial bleeding.

iii. Capillary – loss of blood from capillaries which are the smallest blood vessels. The blood flow is usually slow and steady. The threat of infection is greater than with arterial or venous bleeding.

c. The average adult has 6 liters of blood circulating through their body at any one time. The acute loss of 10% of the circulatory blood volume (600 ml) may be critical.

d. External bleeding is bleeding that can be seen coming from a wound. Some examples are bleeding from abrasions, incisions, lacerations, puncture wounds, amputations, open fractures, or nosebleeds.

e. There are several methods for controlling bleeding. In most cases bleeding stops naturally after 6-10 minutes because of the body’s clotting mechanism. However, sometimes the damaged vessels may be too large that clots cannot block them.

f. The purposes of first aid for external bleeding are:
   i. Stop the bleeding.
   ii. Prevent infection.
   iii. Prevent shock.

g. To control bleeding:
   i. Apply direct, local pressure on the wound with a dressing. Pressure stops the physical flow of blood and permits normal blood clotting to occur. A dressing is a clean covering placed over the wound that protects it and helps control the bleeding by absorbing the blood and allowing it to clot. Once you put a dressing on a wound, do not remove it. If bleeding continues, add new dressings on top of the old ones. The less a bleeding wound is disturbed, the better the chances of stopping the bleeding.
   
   ii. If a fracture is not suspected, elevate the wound above the level of the heart and continue to apply direct pressure.
   
   iii. If the bleeding still has not stopped, the next step is to apply pressure at a pressure point. Pressure points are over the major pulse points of the body. Because most wounds are supplied by more than one major artery, compression of a major artery rarely stops bleeding completely from a wound distal to the artery. Pressure point control can aid temporarily in the control of severe bleeding, but it should not be the primary or sole method of bleeding control. Continue to apply direct pressure and elevate the wound.
   
   iv. The final step to control bleeding is to apply a pressure bandage. A bandage is used to hold a dressing in place, restrain movement, and help stop bleeding. Apply pressure while wrapping the bandage over the dressing to keep pressure on the wound and slow the bleeding. Take the pulse and examine the fingertips or toes in the injured limb after wrapping the bandage to make sure the bandage is not too tight that it slows or stops circulation.
v. The use of a tourniquet to stop bleeding is rarely necessary. Tourniquets, if they are used improperly, can crush the soft tissue of an injured extremity and cause permanent damage to nerves and blood vessels. Application of a tourniquet will not be discussed further.

h. Infection can develop within hours or days of any injury.
   i. The signs and symptoms of infection are:
      1. Pain or tenderness at the wound.
      2. Redness, heat, or swelling at the wound.
      3. Pus beneath the skin or in the wound.
      4. Red streaks leading away from the wound.
   ii. An infection can cause a person to feel ill.
   iii. If any of these signs or symptoms develops, the victim should seek immediate medical help.
   iv. To reduce the threat of infection, wear gloves or wash your hands before caring for a wound. Wash minor wounds that are not bleeding severely with soap and water before applying the dressing. Do not try to clean major wounds that are bleeding severely, since this will cause additional bleeding.

i. A nosebleed is a common injury in sports.
   i. A person may lose enough blood in a nosebleed to cause shock.
   ii. The blood seen coming from the nose may represent only a small amount of the total loss, since much blood passes down the throat into the stomach as the athlete swallows. A person who swallows a large amount of blood may become nauseated and may vomit.
   iii. The following techniques are successful in stopping most nosebleeds:
      1. Apply pressure by pinching the nostrils together.
      2. Keep the athlete in a sitting position with the head tilted forward whenever possible so that the blood trickling down the back of the throat will not be aspirated into the lungs.
      3. Keep the athlete quiet. Anxiety will tend to increase the blood pressure and the nosebleed will worsen.
      4. Apply ice over the nose. Local cooling is helpful in controlling bleeding.
   iv. If these measures fail to control the nosebleed, the athlete should be transported promptly to the emergency room. An athlete who suffers from frequent nosebleeds should be evaluated by a physician to determine the cause of the nosebleeds so that appropriate treatment may be initiated.

j. Although, not usually visible, internal bleeding can be very serious. The athlete with severe internal bleeding may go into shock before the loss of blood is realized. A bruise or contusion indicates bleeding into the soft tissues and may be seen after a slight or severe injury.
   i. Internal bleeding can result from crushing injuries, punctures, injuries from blunt objects, tears in internal organs and blood
vessels, bruised tissues, and fractured bones. If the victim is not properly checked, internal bleeding may go unnoticed.

ii. Signs and symptoms of internal bleeding include:
   1. Bruised, swollen, or rigid abdomen.
   2. Bruises on chest or signs of fractured ribs.
   4. Wounds that have penetrated the chest or abdomen.
   5. Fractures of the pelvis.
   6. Abnormal pulse and difficult breathing.
   7. Cool, moist skin.

iii. There is little one can do in the field to control internal bleeding. If the sports medicine professional suspects internal bleeding based on the mechanism of injury or the athlete’s signs and symptoms, basic life support should be provided and the athlete should be transported to the emergency room immediately.

XI. Shock
   a. The first hour after a severe injury is the most important. A major problem occurring within this time frame is shock. Once shock reaches a certain dangerous level, the victim cannot be saved.
   b. Shock is the failure of the cardiovascular system to keep adequate blood circulating to the vital organs of the body (such as the brain, heart, and lungs). Shock develops as a result of the body’s attempts to correct damage from severe injury.
   c. Lack of adequate blood flow to the brain and the spinal cord for more than 4-6 minutes will result in permanent damage. Permanent damage to the kidneys will result after 45 minutes. The heart requires constant blood flow or it will not function properly. No part of the body can exist without adequate blood flow for an indefinite period of time.
   d. Shock can be caused by bleeding, poisoning, insect bites and stings, snakebites, electrical shock, burns, severe injuries, psychological trauma, heart attack, and other medical conditions.
   e. The following signs and symptoms are common to all forms of shock:
      i. Nausea and vomiting.
      ii. Restlessness and anxiety.
      iii. Weak, rapid pulse.
      iv. Low blood pressure (systolic pressure is usually below 90 mm Hg.)
      v. Cold, wet, clammy skin.
      vi. Profuse sweating.
      vii. Paleness that changes to cyanosis.
      viii. Shallow, labored, rapid, or irregular gasping respirations.
      ix. Dull, lusterless eyes with dilated pupils.
      x. Drowsiness and sluggishness.
      xi. Loss of consciousness in cases of rapidly developing or severe shock.
f. Any athlete who exhibits any of the signs or symptoms of shock should be immediately transported to a medical facility. While in the process of arranging transportation, the following measures should be taken:
   i. Monitor airway, breathing, and circulation.
   ii. Place the athlete on their back and elevate the feet and legs 8-12 inches (if no head/neck injuries or leg fractures are suspected).
   iii. If you suspect the athlete has a head/neck injury, keep them lying flat and wait for EMS.
   iv. Prevent loss of body heat by putting blankets over and under the person. Do not overheat the athlete. It is better than the athlete be cool than too warm.
   v. Accurately record the athlete’s pulse, blood pressure, and other vital signs. Maintain a record of them at 5-minute intervals.
   vi. Do not give the individual anything to eat or drink.

XII. Seizures
   a. Seizures are very common occurrences, but they are not completely understood. When seizures recur, and there are no underlying causes that can be treated directly, a person is said to have epilepsy. Epilepsy refers to any of the disorders caused by abnormal focus of electrical activity in the brain that produces seizures.
   b. A seizure or convulsion is characterized by generalized, uncoordinated muscular activity and changes in the level of consciousness which last for variable periods of time. Seizures can vary in form from severe convulsions to simply blacking out for a few seconds. A state of sleepiness or unconsciousness follows the seizure.
   c. Not all seizures are caused by epilepsy. They may occur as a result of a recent or old brain injury, a brain tumor, infection, fever, diabetes, or simply a genetic predisposition.
   d. Seizures are generally classified according to the degree and location of abnormal activity in the brain.
   e. Some individuals have an aura (sensation) before the onset of a seizure. Auras can be sound and vision hallucinations, a strange taste in the mouth, abdominal pain, numbness, or a sense of urgency to move to safety.
   f. A person having a seizure cannot control it.
   g. The first important step in the management of a seizure is to protect the athlete from accidentally inflicting self-injury.
      i. The athlete should be helped to lie down on the ground away from danger.
      ii. The athlete’s head, arms, and legs should be protected, but not rigidly restrained.
      iii. Clothing should be loosened.
      iv. Nothing should be forced into the athlete’s mouth.
   h. Following a seizure, the muscles relax. Check the athlete’s airway, breathing, and circulation. A person recovering from a seizure is likely to
be drowsy and disoriented. They need rest and reassurance. Stay with them until they are fully conscious and aware of the surroundings. Also look for any injuries that may have occurred during the seizures.

i. If you know the athlete has epilepsy, it is usually not necessary to call EMS unless:
   i. The seizure lasts longer than a few minutes.
   ii. Another seizure begins soon after the first.
   iii. The athlete does not regain consciousness after the jerking movements have stopped.

j. EMS should be called when someone having a seizure also:
   i. Is pregnant.
   ii. Carries identification as a diabetic.
   iii. Appears to be injured.
   iv. Is in the water and has swallowed large amounts of water.

k. Epileptic’s participation in sports has been controversial over the years. Most experts now agree that epileptics should not be restricted from participating in physical exercise. When epileptics do participate in sports, proper seizure control is mandatory, as is supervision during sports participation. The responsibility of determining whether an epileptic child can participate in sports is a joint responsibility of parents, physician and child.

XIII. Other Soft Tissue Injuries

a. Blisters – a blister usually forms when heat generated by the skin rubbing against a hard or rough surface causes the layers of skin to separate. Fluid then accumulates between the layers.
   i. Those athletes who use their hands extensively to use implements such as a bat, racket, club, or bar are prone to blisters. Feet are also prone to blistering when they are forced to slide back and forth within a shoe that is making sudden changes of position.
   ii. The athlete will experience feeling a “hot spot”, a sharp, burning sensation as the blister is formed. Blister prevention is of the most importance.
   iii. Once developed, blisters can be a real problem for the athlete. Leave the blister intact. If the blister is already open or torn, keep the blister clean to avoid infection. A sterile dressing should be placed over the blister.

b. Contusions – a contusion is the bruising and destruction of soft tissue cells as the result of a direct blow. Blood vessels are broken, causing internal bleeding. As a result of the bleeding and leakage of cellular fluids, swelling results. Discoloration of the skin (a bruise) often accompanies the contusion.
   i. Untreated and unprotected contusions can lead to a more serious condition.
   ii. Treatment includes cold, compression, elevation, and the use of padding for protection.
c. Abrasions – an abrasion is the scraping away of the outer layers of the skin. Bleeding is limited due to the rupture of small veins and capillaries. Infection can occur.
   i. Initial management includes cleaning the wound and keeping it clean and dry.
d. Lacerations – a laceration is a jagged, irregular cut or tear in the soft tissues. The bleeding should be controlled and the wound should be cleaned. Apply a clean dressing and watch for signs of infection.

XIV. Muscle, Tendon, and Ligament Injuries
a. Strains – a strain is a stretch, tear, or rip in a muscle or tendon. Most often a strain is produced by an abnormal muscular contraction.
   i. A strain may range from a minute separation of connective tissue and muscle fibers to a complete tendinous avulsion or muscle rupture.
   ii. Capillary and blood vessel hemorrhaging will result.
   iii. Strains are graded as first, second, or third degree injuries.
      1. The first-degree strain is accompanied by local pain, which is increased by tension on the muscle, and a minor loss of strength. There is mild swelling, ecchymosis and local tenderness.
      2. The second-degree strain is similar to a first-degree but has moderate signs and symptoms and impaired muscle function.
      3. A third-degree strain has signs and symptoms that are severe, with a loss of muscle function and commonly a palpable defect in the muscle.
   iv. The muscles that have the highest incidence of strains in sports are the hamstrings group, gastrocnemius, quadriceps group, hip flexors, hip adductor group, spinalis group of the back, deltoid, and rotator cuff group of the shoulder.
b. Tendinitis – gradual onset of diffuse tenderness because of repeated micro-traumas and degenerative changes. Obvious signs of tendinitis are swelling and pain that move with the tendon.
c. Sprains – one of the most common and disabling injuries seen in sports.
   i. A sprain results from a traumatic twisting that results in stretching or total tearing of the stabilizing ligaments.
   ii. Sprains are also classified in three degrees of severity.
      1. A first-degree sprain is characterized by some pain, minimum loss of function, mild point tenderness, little or no swelling, and no abnormal motion when tested.
      2. With a second-degree sprain, there is pain, moderate loss of function, swelling, and in some cases, slight to moderate instability.
      3. A third-degree or severe sprain is very painful, with major loss of function, marked instability, tenderness, and swelling.
XV. Heat Illnesses

a. High temperatures and elevated humidity can negatively impact athletic performance, adversely affect health, and even threaten life. While environmental heat problems most often strike football players, all athletes are susceptible.

b. Exercise generates heat, which the body must dissipate. If too much heat is retained by the body, cells will literally cook and the athlete can die. The body cools itself mainly through the sweating mechanism; heat is carried away from the body as perspiration evaporates.
   i. There are approximately 2 million sweat glands in the human body.
   ii. Sweat production increases sharply with increasing temperature and may result in the loss of 2-8 liters of water in a 24-hour period.

c. This cooling process can be interrupted in two ways:
   i. The humidity can be so high that sweat does not evaporate
   ii. The thermoregulatory system of the athlete can be disrupted, causing sweating to cease.

d. It is important to prevent heat-related problems. This can be done by pre-hydration and re-hydration. Heavy fluid intake before, during, and after practices and games will help insure that athletes function effectively and safely.

e. Aside from skin disorders such as sunburn, three specific heat illnesses or syndromes can result from thermal exposure. Each is normally caused by the same set of circumstances – strenuous activity in a combination of hot and humid weather.
   i. Although the cause of these heat-related conditions is the same, each represents a different bodily reaction to excessive heat, with their own signs and symptoms and treatment procedures.
   ii. It is important to remember that heat cramps and heat exhaustion can lead to heat stroke. This is especially true when working with athletes. Athletes are more likely to continue working out or exercising even though symptoms may be developing.
   iii. Athletes in a sport such as football are required to wear heavy protective equipment and uniforms that cover much of the body and add to the problem of heat dissipation.
   iv. Athletes are also engaged in strenuous activity and may even be limited in the number of breaks, availability of water, and the intensity of the exercise sessions. All of these factors are important to the development of heat-related illnesses.
   v. Free intake of fluid during games and practice sessions should be encouraged, but large amounts at any one time should be avoided.

f. Heat cramps
   i. Heat cramps are the least serious of the three heat illnesses. These cramps are painful spasms of skeletal muscles.
ii. Heat cramps result from a fluid volume problem and can normally be prevented by providing unlimited amounts of water to athletes throughout activity in hot weather.

iii. When heat cramps do occur, they normally accompany strenuous physical activity and profuse sweating in hot weather.

iv. The most common muscles involved are the calf muscles or abdominal muscles, but any of the voluntary muscles can be affected. Heat cramps may be mild, with slight cramping, or they may be severe and incapacitating, with intense pain.

v. Athletes suffering heat cramps are normally alert and oriented to their surroundings. The skin will be wet and warm as a result of excessive sweating. The body temperature, pulse, and respiratory rate should be normal or slightly elevated.

vi. In most cases, heat cramps are not a serious problem and can be relieved by slowly stretching the contracted muscle. The athlete should be encouraged to drink liquids. Many times the athlete will resume activity after alleviation of the muscle spasms, however, a severe episode of heat cramps may require the athlete to avoid further exertion for a longer period of time, possibly 12-24 hours.

vii. Conditioning and acclimatization to the heat also help reduce the incidence of heat cramps.

viii. Should heat cramps frequently recur in the same athlete, additional assessment of specific causes is appropriate and medical referral may be necessary. Remember, athletes who suffer heat cramps should be closely observed as this condition may precipitate heat exhaustion or heat stroke.

g. Heat exhaustion

i. Heat exhaustion is the most common condition caused by exertion in hot weather. It is also known as heat prostration.

ii. Heat exhaustion is characterized by profuse sweating, which makes the skin wet, cool, and clammy. The skin may appear pale or gray. The athlete also experiences a headache, weakness, dizziness, fatigue, nausea, alteration of consciousness, and possibly a loss of consciousness.

iii. Heat exhaustion is normally not life threatening, but proper medical care is required. The athlete should be taken out of the hot environment and should lie on their back with the feet elevated. Remove as much equipment and uniform as possible. The body should be cooled by sponging or toweling the athlete with cool water.

iv. If the athlete is conscious, allow them to drink cool fluids. The athlete should feel better in a short period of time. If symptoms persist or worsen, the athlete should be transported to a medical facility.

v. Athletes suffering from heat exhaustion should be withheld from further activity for the remainder of that day and closely observed.
h. Heat stroke
   i. Heat stroke is the least common of the heat-related illnesses, but is the most serious.
   ii. The body’s sweating mechanism is shut off to conserve depleted fluid levels. The body temperature then rises rapidly to dangerous and possibly fatal levels. The body temperature may go over 106°F.
   iii. Heat stroke may develop suddenly or progress from heat cramps and/or heat exhaustion.
   iv. Heat stroke is a severe medical emergency. This condition must be recognized and treated immediately.
   v. Heat stroke is characterized by hot, dry skin and a rising temperature. The athlete’s skin is reddened or flushed. The athlete is irritable, aggressive, emotionally unstable, hysterical, apathetic, and disoriented. As the temperature rises, the pulse becomes very rapid and strong and the blood pressure falls. Initially the athlete may experience headache, dizziness, and weakness, which are often followed by convulsions and unconsciousness. The athlete will not be sweating!
   vi. The immediate care for an athlete exhibiting the signs and symptoms of heat stroke is to reduce the body temperature as quickly as possible by any means available. This may include immersing the athlete in cold water, placing ice or cold towels around the body, or sponging the body with cool water. Remove clothing and equipment to prevent the retention of body heat.
   vii. The usual treatment for shock should also be administered, but cooling the body temperature to below 100°F is the priority.
   viii. If the athlete is conscious, allow them to drink cool water. Athletes suffering from heat stroke are critically ill and must be transported to an emergency room as quickly as possible.

XVI. Cold Injuries
   a. Effects of cold
      i. When exposed to cold, the body attempts to increase internal heat production by increasing muscular activity, such as shivering, and by increasing the basal metabolic rate at which food stored within the body is burned. Heat loss is decreased by reducing the circulation of blood to the skin, muscles, and extremities.
      ii. Cold injury occurs in two ways.
         1. The core temperature is maintained, but the temperature decreases in the skin, muscles, and extremities resulting in local injuries that include frostbite.
         2. The core temperature and the temperature in the skin, muscles, and extremities both decrease, and all of the body processes slow down. This condition is known as hypothermia and may be fatal if not treated.
iii. Body parts freeze when not enough heat is available to counteract external cold resulting in local injury. Predisposing factors include:
   1. Inadequate insulation from cold and wind.
   2. Restricted circulation because of tight clothing, especially footwear.
   3. Fatigue.
   4. Poor nutrition.
   5. The use of alcohol.

iv. The most commonly affected body parts are hands, feet, ears, and exposed parts of the face. All of these areas are located far from the heart and are normally subjected to rapid heat loss.

v. Freezing temperatures affect the cells in the body in a predictable fashion. A cell is mostly water, which becomes cool and eventually freezes and is no longer able to function. The ice crystals that result then destroy the cell.

b. Duration of the exposure, the temperature to which the skin has been exposed, and wind velocity are the three most important factors to consider when determining the severity of a local injury.

c. Frostbite
   i. Frostbite usually involves the skin and the underlying superficial tissue. The affected person often does not notice it, and frequently a companion first perceives it.
   ii. The skin appears white and waxy and is firm to the touch, but the tissue beneath it is soft and resilient.
   iii. The person should be taken indoors, protected from the cold and subjected to slow, gentle warming. Effective warming techniques include the steady pressure of a warm hand, blowing warm breath, or holding the part in an armpit. For more serious frostbite, the body part can be placed in running cool water – never hot water!
   iv. The affected area should not be rubbed with snow or by the hand.
   v. When the injured area thaws, it is first numb; then it turns blue or purple. Some swelling may also be seen. Blisters may form, and throbbing, aching, and burning may last for weeks in severe cases. The skin may remain permanently red, tender and sensitive to re-exposure to cold, so these susceptible areas should receive extra protection.

d. Hypothermia
   i. Severe body cooling, or hypothermia, can occur at temperatures well above freezing. It is usually caused by exposure to low or rapidly dropping temperatures, cold moisture, snow, or ice.
   ii. Hypothermia is aggravated by hunger, fatigue, and exertion, and may be associated with other local cold injuries like frostbite.
   iii. Generalized body cooling progresses through the following five states:
      1. Shivering, which is the body’s attempt to generate heat.
2. Apathy, sleeplessness, listlessness, and indifference which may accompany rapid cooling of the body.
3. Unconsciousness, with a glassy stare, a very slow pulse rate, and slow respiratory rate.
4. Freezing of the extremities.
5. Death.

iv. Shivering usually begins at a core temperature of 95° F and as the cooling process proceeds, clumsiness, fumbling, stumbling, falling, slow reactions, mental confusion, and difficulty in speaking follow. Death may occur within 2 hours of the onset of the first symptoms.

v. Hypothermia is an acute, high priority, medical emergency and requires immediate transfer of the athlete to a medical facility.

vi. The basic principles of emergency care are:
1. To prevent further heat loss by removing the athlete from the cold and wind, and replacing wet clothing.
2. To re-warm the athlete as rapidly and safely as possible by providing external heat in any way possible (hot water bottles, immersion in a tub of warm water, electric blankets, camp fires, or body heat from rescuers).
3. To be alert for complications. Shock and cardiac arrhythmias are commonly seen in serious cases. Vital signs must be monitored.