**Musculoskeletal Injuries/Splinting**

- Identify three types of forces that can act upon the body and how these forces can lead to injury.
- Identify four basic types of musculoskeletal injuries.
- List the signals of a serious musculoskeletal injury.
- Describe the general care for musculoskeletal injuries.
- Describe the reasons for immobilizing an injury to an extremity.
- List the general guidelines for splinting.

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**Muscular System**

- Muscles and tendons
  - Specialized tissue
  - Movement
- Controlled by nervous system
  - Paralysis

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**Skeletal System**

- Over 200 individual organs with an extensive blood supply
  - Protection and Movement
  - Storage
  - Bones meet at joints
    - Ligaments
  - Osteoporosis
    - Progressive weakening of the bones
    - Read Breaking Point
Musculoskeletal Injuries

- Most commonly caused by mechanical forms of energy that produce by:
  1. Direct force
     - causes injury at the point of impact and can be blunt or penetrating
  2. Indirect force
     - transmits energy through the body, causing injury away from the point of impact
  3. Twisting force
     - causes injury when one part of the body remains still while the rest of the body is twisted or turned away from it.

Injuries to the Musculoskeletal System

- Injuries to the musculoskeletal system can be classified according to the body structures that are damaged. Some injuries may involve more than one structure.
- Four basic types of musculoskeletal injuries are—
  - Fracture — a break or disruption in bone tissue.
    - May be open or closed
  - Dislocation — a displacement or separation of a bone from its normal position at a joint.
  - Sprain — a partial or complete tearing or stretching of ligaments and other tissues at a joint.
  - Strain — a stretching and tearing of muscle or tendon fibers.

Common Signals of Musculoskeletal Injuries

- Always suspect a serious injury when any of the following signals are present:
  - A snapping sound is heard.
  - There is pain, which is one of the most common signals in any muscle, bone, or joint injury.
  - The injured area may be very painful to touch or move.
  - There is significant bruising and swelling.
  - There is significant deformity. The area may be twisted or strangely bent.
  - It may have abnormal lumps, ridges and hollows.
  - The person is unable to move or use the affected part normally.
  - Bone fragments protrude from a wound.
  - Person feels bones grating.
  - The injured area is cold, numb and tingly.
  - Cause of the injury, such as a fall or vehicle crash, suggests the injury may be severe.
Care for Musculoskeletal Injuries

- Check first for any life-threatening conditions.
- Call 9-1-1 or the local emergency number if:
  - The injury involves the head, neck or back.
  - The injury impairs walking or breathing.
  - You see or suspect a fracture or dislocation.
  - You see or suspect multiple musculoskeletal injuries.
- Check for any non-life-threatening conditions and care for any other injuries.

General Care

- The general care for musculoskeletal injuries includes following RICE:
  - Rest
  - Immobilize
  - Cold
  - Elevate
- If you are unsure whether the injury is serious, care for it as if it is a serious injury.
- Take steps to minimize shock.
- Comfort and reassure the victim.

Injuries to the Extremities

- Injuries to an extremity—an arm or leg—are quite common.
- They can range from a simple bruise to a dangerous or severely painful injury, such as a fracture of the femur (thigh bone).
- The prompt care you give can help prevent further pain, damage and a life-long disability.
Injuries to the Extremities

Signals of a serious extremity injury include—

- Pain or tenderness.
- Swelling.
- Discoloration.
- Deformity of the limb.
- Inability to move or use the limb.
- Severe external bleeding.
- Loss of sensation, feeling or tingling.
- A limb that is cold to the touch.

Injuries to the Extremities

If you suspect a serious musculoskeletal injury, you must immobilize the injured part before giving additional care to:

- Lessen pain.
- Prevent further damage to soft tissues.
- Reduce the risk of serious bleeding.
- Reduce the possibility of loss of circulation to the injured part.
- Prevent closed fractures from becoming open fractures.

Splinting

- To immobilize an extremity injury, you can use a splint.
- There are three types of splints:
  - Soft (fig 12-1)
  - Rigid (fig 12-2)
  - Anatomic (fig 12-3)
General Care to Splint

- Splint only if you can do it without causing more pain and you have to transport the person to seek medical attention.
- Support the injured part in the position in which you find it.
- Cover any open wounds with a dressing and bandage.
- Check the area below the injury site for feeling, warmth and color.
- Apply the splint to immobilize the joints or bones above and below the injured area.
- Secure the splint in place.
- Recheck below the injury site for feeling, warmth and color.
- Elevate the splinted part.
- After the injury is immobilized, apply ice or a cold pack.
  - Do not apply directly over an open fracture.
- Help the victim rest in the most comfortable position.
- Monitor the victim’s—
  - Level of consciousness.
  - Breathing.
  - Skin color.
  - Temperature.
- Take steps to minimize shock.

Upper Extremity Injuries

- The upper extremities are the parts of the body from the shoulder to the fingers.
- The bones of the upper extremity include the—
  - Collarbone (clavicle).
  - Shoulder blade (scapula).
  - Upper arm (humerus).
  - Forearm (radius and ulna).
  - Wrist (carpals).
  - Hand (metacarpals).
  - Fingers (phalanges).
Shoulder Injuries

- The shoulder consists of three bones that meet to form the shoulder joint:
  - Clavicle (most frequently injured shoulder bone)
  - Scapula
  - Humerus
- A person with a clavicle injury usually attempts to ease the pain by holding the arm against the chest.
- Dislocation of the shoulder joint is another common type of shoulder injury.
  - Like fractures, dislocations often result from falls or direct blows when the arm is in the throwing position.

Care for Shoulder Injuries

- Minimize any movement of the injured part.
- Control external bleeding with direct pressure.
- Splint the upper extremity in place. Check for feeling, warmth and color before and after applying a splint.
- Apply ice or a cold pack to the injured area.
- Take steps to minimize shock.

Upper Arm Injuries

- The upper arm is the upper extremity from the shoulder to the elbow.
- The humerus is the longest bone in the arm.
- When the humerus is fractured, the blood vessels and nerves supplying the entire upper extremity may be damaged.
Care for Upper Arm Injuries

- Support the injured area.
- Control external bleeding with direct pressure.
- Place the upper extremity in a sling and bind it to the chest. Check for feeling, warmth and color before and after applying the splint.
- Apply ice or a cold pack to the injured area.
- Take steps to minimize shock.

Elbow Injuries

- The elbow is a joint formed by the humerus and the two bones of the forearm, the radius and the ulna.
- Like other joints, the elbow can be sprained, fractured or dislocated.
- An injured elbow may be in a bent or straight position.

Care for Elbow Injuries

- Support the injured area.
- If the elbow is bent, even if it is deformed, splint with a sling and binder.
- If the elbow is straight, immobilize the elbow with rigid splints along the length of both sides of the arm, from the fingertips to the underarm.
Forearm, Wrist and Hand Injuries

- The forearm is the area between the elbow and the wrist.
- Injuries to the forearm, wrist and hand may involve the bones of the joints they form.
  - Because the radial artery and nerves are close to these bones, a fracture may cause severe bleeding or a loss of movement in the wrist or hand.
- The wrist is a joint formed by the hand and forearm.
- The wrist is a common site of sprains and fractures.
- The hand consists of many small bones: the carpals, metacarpals and phalanges.
- Most injuries to the hands and fingers also involve minor soft tissue damage.

Care for Forearm, Wrist and Hand Injuries

- Support an injured forearm or wrist by placing a soft or rigid splint underneath the forearm.
  - Place a bulky dressing in the palm of the victim's hand and wrap the hand with a roller bandage.
- For a possible fractured or dislocated finger—
  - Make a rigid splint by taping the injured area to a small object, such as an ice cream stick or tongue depressor.
  - You can also tape the injured finger to the finger next to it.

Lower Extremity Injuries

- The lower extremity is the part of the body from the hip (pelvis) to the toes.
- The bones of the lower extremity include the—
  - Pelvic bones.
  - Thigh bone (femur).
  - Kneecap (patella).
  - Lower leg (tibia and fibula).
  - Ankle (tarsals).
  - Feet (metatarsals).
  - Toes (phalanges).
The thigh is the lower extremity from the pelvis to the knee. The femoral arteries are the major suppliers of blood to the lower extremities. When the femur is fractured, the blood vessels and nerves may be damaged. If a femoral artery is damaged, the blood loss can be life threatening.

Signals of a fractured femur include the following:
- Deformity
  - The injured leg will be noticeably shorter than the non-injured limb.
  - The injured leg may also be turned outward.
- Severe pain.
- Inability to move the lower extremity.

Stabilize the injury in the position found.
Help the person rest in the most comfortable position.
Apply ice or a cold pack.
Take steps to minimize shock, remembering that a fractured femur can result in serious internal bleeding and the likelihood of shock is considerable.
- Keep the person lying down and try to keep him or her calm.
- Use rolled towels or blankets to support the leg in the position you found it.
- Keep the person from becoming chilled or overheated.
- Monitor the person’s breathing and general condition.
- Watch for changes in the person’s level of consciousness.

The knee comprises the lower end of the femur, the upper ends of the tibia and fibula and the patella.
The patella is a free-floating bone that moves on the lower front surface of the thigh bone.
Sprains, fractures and dislocations are especially common in athletic activities that involve quick movements or exert unusual force on the knee.
Deep lacerations around the area of the knee can cause severe joint infections.
Care for Knee Injuries

- Control external bleeding with direct pressure.
- Immobilize the injured area.
  - If the knee is bent and cannot be straightened without pain, support it on a pillow or folded blanket in the bent position.
  - If the knee is on the ground, the ground will provide support.
  - If you decide to splint and the knee is straight, secure it to the uninjured leg.
  - A splint should start at the hip and also extend past the foot.
- Call 9-1-1 or the local emergency number.

Care for Knee Injuries

- Check for feeling, warmth and color before and after splinting.
- Apply ice or a cold pack to the injured area.
- Take steps to minimize shock.

Lower Leg Injuries

- The lower leg is the area between the knee and the ankle.
- A fracture in the lower leg may involve the tibia, the fibula or both bones. Sometimes both bones are fractured simultaneously.
- Lower leg fractures may cause—
  - Severe deformity in which the lower leg is bent at an unusual angle.
  - Pain.
  - An inability to move the leg.
Care for Lower Leg Injuries

- Control external bleeding with direct pressure.
- Call 9-1-1 or the local emergency number immediately.
- While waiting for EMS personnel to arrive, immobilize the injured area and help the victim rest in the most comfortable position.
- If the victim's lower extremity is supported by the ground, do not move it.
  - Use rolled towels or blankets to support the leg in the position you found it.
  - Use several wide cravats placed above and below the injury site to immobilize the area.

- Check for feeling, warmth and color before and after applying the splint.
- Apply ice or a cold pack to the injured area.
- Take steps to minimize shock.

Ankle and Foot Injuries

- The ankle is a joint formed by the foot and the lower leg.
- The foot consists of many small bones—the tarsals, metatarsals and phalanges.
- Ankle and foot injuries are commonly caused by twisting forces.
- Injuries range from minor sprains with little swelling and pain to fractures and dislocations, which may have great pain.
- Foot injuries may also involve the toes.
Care for Ankle and Foot Injuries

- Support the injured area in the position found.
- Control external bleeding.
- Check toes for feeling, warmth and color before and after splinting.
- Use a soft splint to immobilize the entire ankle or foot.
  - Secure the splint with two or three cravats.
- Elevate.
- Apply ice or a cold pack.
- Call 9-1-1 or the local emergency number.

Closing

- You can care for musculoskeletal and soft tissue injuries to the extremities by giving care that focuses on minimizing—
  - Pain.
  - Shock.
  - Further damage to the injured area.
- Immobilize the injured area, apply ice or a cold pack and take steps to minimize shock.
- Control any external bleeding.
- Reassure the victim.
- Care for any life-threatening conditions and call 9-1-1 or the local emergency number if necessary.

- Questions?