33

Environmental Emergencies
Figure 33-1  Mechanisms of heat loss.

**MECHANISMS OF HEAT LOSS**

**Convection**
Body heat is lost to surrounding air, which becomes warmer, rises, and is replaced with cooler air.

**Radiation**
Body heat is lost to the atmosphere or nearby objects without physically touching them.

**Respiration**
Heat is lost through exhalation of warm air and inhalation of cold air.

**Evaporation**
Perspiration or wet skin results in body heat lost when the liquid evaporates.

**Conduction**
Body heat is lost to nearby objects through direct physical touch.
Table 33-1  Stages of Hypothermia

<table>
<thead>
<tr>
<th>CORE BODY TEMPERATURE</th>
<th>FAHRENHEIT</th>
<th>CELSIUS</th>
<th>SYMPTOMS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>99°F–96°F</td>
<td>37.0°C–35.5°C</td>
<td>Shivering.</td>
</tr>
<tr>
<td></td>
<td>95°F–91°F</td>
<td>35.5°C–32.7°C</td>
<td>Intense shivering, difficulty speaking.</td>
</tr>
<tr>
<td></td>
<td>90°F–86°F</td>
<td>32.0°C–30.0°C</td>
<td>Shivering decreases and is replaced by strong muscular rigidity. Muscle coordination is affected and erratic or jerky movements are produced. Thinking is less clear, general comprehension is dulled, possible total amnesia exists. Patient generally is able to maintain the appearance of psychological contact with surroundings.</td>
</tr>
<tr>
<td></td>
<td>85°F–81°F</td>
<td>29.4°C–27.2°C</td>
<td>Patient becomes irrational, loses contact with the environment, and drifts into a stuporous state. Muscular rigidity continues. Pulse and respirations are slow and cardiac dysrhythmias may develop.</td>
</tr>
<tr>
<td></td>
<td>80°F–78°F</td>
<td>26.6°C–20.5°C</td>
<td>Patient loses consciousness and does not respond to spoken words. Most reflexes cease to function. Heartbeat slows further before cardiac arrest occurs.</td>
</tr>
</tbody>
</table>
Figure 33-2  Local cold injuries. (© Charles Stewart, MD, and Associates)
Figure 33-3  Rewarming the frozen part.
Figure 33-4  In heat-emergency cases where the patient's skin is hot (and either dry or moist), aggressively cool.
SCAN 33-1 WATER RESCUE WITH POSSIBLE SPINAL INJURY  HEAD-CHIN SUPPORT: Two Rescuers in Shallow Water
When there are two rescuers present, perform the head-chin support technique to provide in-line stabilization of a
patient in shallow water.
Scan 33-1 (continued) Water Rescue with Possible Spinal Injury

HEAD-SPLINT SUPPORT: One Rescuer in Shallow Water
(1) When you find a patient face down in shallow water, position yourself alongside the patient.
Scan 33-1 (continued)  **Water Rescue with Possible Spinal Injury**  HEAD-SPLINT SUPPORT: One Rescuer in Shallow Water  (2) Extend the patient's arms straight up alongside his head to create a splint.
Scan 33-1 (continued)  Water Rescue with Possible Spinal Injury  HEAD-SPLINT SUPPORT: One Rescuer in Shallow Water  

(3) Begin to rotate the torso toward you.
Scan 33-1 (continued)  Water Rescue with Possible Spinal Injury  

HEAD-SPLINT SUPPORT: One Rescuer in Shallow Water  
(4) As you rotate the patient, lower yourself into the water.
Scan 33-1 (continued) Water Rescue with Possible Spinal Injury  HEAD-SPLINT SUPPORT: One Rescuer in Deep Water

(1) When you find a patient face down in deep water, position yourself beside him. Support his head with one hand and the mandible with the other.
Scan 33-1 (continued)  Water Rescue with Possible Spinal Injury

HEAD-SPLINT SUPPORT: One Rescuer in Deep Water  (2) Rotate the patient by ducking under him.
Scan 33-1 (continued) Water Rescue with Possible Spinal Injury
HEAD-SPLINT SUPPORT: One Rescuer in Deep Water
(3) Continue to rotate until the patient is face up.
Scan 33-1 (continued)  Water Rescue with Possible Spinal Injury  HEAD-SPLINT SUPPORT: One Rescuer in Deep Water  (4) Maintain in-line stabilization until a backboard is used to immobilize the patient’s spine.
Figure 33-5  Proper positioning of a scuba-diving accident patient.
Figure 33-6  First try to reach and pull the patient from the water. If that fails, throw him anything that will float and tow him from the water. If that fails, row to the patient.
Figure 33-7  Throw the patient any object that will float.
Figure 33-8  Safe ice rescues require proper equipment.
Figure 33-9a  (A) Black widow spider. (B) Brown recluse spider. (© Joseph T. Collins/Photo Researchers, Inc.)
Figure 33-9b  (A) Black widow spider. (B) Brown recluse spider. (© Breck P. Kent)
Figure 33-10  Brown recluse spider bite.
**Figure 33-11a** The pit vipers include (A) water moccasin, (B) rattlesnake, and (C) copperhead. The coral snake (D) is also poisonous. (© Alan and Sandy Carey/PhotoResearchers, Inc.)
Figure 33-11b  The pit vipers include (A) water moccasin, (B) rattlesnake, and (C) copperhead. The coral snake (D) is also poisonous. (© CK Lorenz/Photo Researchers, Inc.)
Figure 33-11c  The pit vipers include (A) water moccasin, (B) rattlesnake, and (C) copperhead. The coral snake (D) is also poisonous. (© Phil A. Dotson/Photo Researchers, Inc.)
Figure 33-11d  The pit vipers include (A) water moccasin, (B) rattlesnake, and (C) copperhead. The coral snake (D) is also poisonous. (© J. Collins/Photo Researchers, Inc.)