

+ CASE PRESENTATION +

It is a chilly afternoon with moderate cloud cover. You have just entered the mid-mountain lodge and are looking forward to a well-earned bowl of hot soup when you are summoned to respond to a skier who has fallen approximately 30 feet from a chairlift. The skier reportedly landed on a rock pile and is unconscious. You notify dispatch that you are responding.

Upon arrival, you see that the patient has fallen into a ravine, and that extrication will require specialized equipment and other rescuers. Two other OEC Technicians are already on scene and have initiated care of the patient. One of the technicians is Peter, the newest member of your patrol, who has been assigned to you for mentoring. He is at the patient's head while the other technician is assessing the patient for injuries. You note that Peter is wearing only a sweater and a lightweight outer shell.

As you approach, Peter looks up, smiles nervously, and then gives you a brief report on the patient's condition. As he speaks, you note that he is shivering slightly. It is then that you realize that Peter is not wearing a hat and that his gloves appear to be soaked. A light, freezing rain begins to fall.

Do you have one patient to address, or two?

Anatomy and Physiology

homeostasis the body's ability to regulate its inner environment to ensure stability and to respond to changes in the outside environment.

3-1 Describe how the body regulates temperature.

The human body is an amazing organism that is capable of adapting to a variety of conditions in order to maintain **homeostasis**, the tendency toward stability of body systems. Such adaptation can be passive or active and includes temperature regulation, responses to stress, and defense against disease.

Temperature Regulation

One of the most basic adaptive features of the human body is internal temperature regulation. Body temperature regulation occurs automatically and is controlled by the brain's hypothalamus (Figure 3-2), using neural feedback mechanisms from temperature receptors located throughout the body.

Figure 3-2 The hypothalamus is in the region of the brain that is active in regulating the automatic body responses, such as "fight or flight."

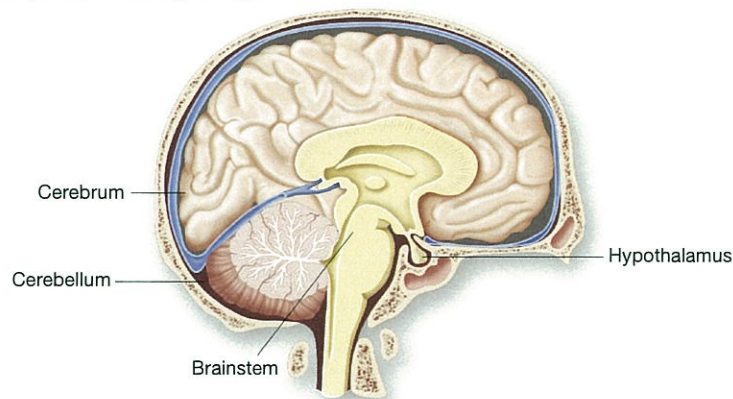




Figure 3-9 This jogger is maintaining physical condition. OEC Technicians need to be in good physical and mental condition to meet the demands of the job. Preseason training is a must!
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problems, including inclement weather, interference by bystanders, equipment failure, and emotionally disturbing situations. As you mentally adapt to changing conditions and stress, you will be better able to concentrate on making critical decisions and providing life-saving treatment.

Physical Fitness

Physical fitness benefits overall well-being by reducing stress, improving cardiovascular and respiratory function, reducing blood pressure, enhancing physical endurance, strengthening muscles and bones, reducing cancer risks, and controlling weight (Figure 3-9). To prepare yourself for the mental and physical rigors associated with rescue work, it is recommended that you develop an exercise routine. The routine need not be intense and can involve such activities as swimming, walking, hiking, or cycling. If you are starting a new exercise routine, begin slowly to avoid injury. Depending on your age and overall health, you may decide to consult a physician before embarking on a new workout routine. As progress is made, you can add new activities and include variations in your routine.

Sleep and Fatigue

A lack of proper rest can cause a host of health-related problems. Sleep deprivation and fatigue may reduce both mental and physical awareness, as well as harm the immune system. Try to maintain a regular sleep schedule. Ideally, humans should receive 7–9 hours of uninterrupted sleep each night. Being well rested reduces fatigue and promotes recovery from physical exertion. Fatigue can affect mood, reduce the ability to adjust to new environments, and impair judgment, which can lead to errors in caring for patients.

Food and Nutrition

The body must have energy in order to function. Energy is obtained from carbohydrates, fats, and proteins in the diet. The first fuels the body uses are carbohydrates: simple sugars and glycogen (a complex sugar stored in the muscles and liver). During periods of increased activity and reduced dietary carbohydrate intake, metabolic pathways that utilize stored fats sustain us, but peak performance during prolonged activity requires carbohydrate supplementation. In times of starvation, once fat is depleted, metabolic pathways use proteins from our tissues for energy. When our tissues' proteins are used, the body becomes weaker.

Being well nourished makes a significant difference in your ability to participate in strenuous outdoor activities such as rescue operations. You should anticipate the need for highly nutritious, lightweight, high-calorie foods if you are spending much time outdoors. On very strenuous rescues, eating something every hour may be needed to keep up with your body's caloric needs.

OEC Technicians should try to eat healthful, nutritious foods whenever possible (Figure 3-10). Good nutrition is recommended for overall fitness, optimal body function, and recovery from stress. Table 3-4 provides a summary of the USDA's daily recommendations for well-rounded meals. It is a good idea to have extra food available during a strenuous call. Nuts, dried fruit, and peanut butter and crackers are perennial favorites. A variety of "energy" bars are also available. Not all energy bars are the same. Packaging, taste, ingredients, carbohydrate content, and price vary considerably. Some products are intended to replace an entire meal, whereas others are intended to provide an energy boost until your next meal. If you decide to include energy bars as part of your routine, sample them ahead of time to ensure that the products you select are satisfactory.

Figure 3-10 The Food Pyramid. Orange: grains; green: vegetables; red: fruits; yellow: oil; blue: milk (including cheese and yogurt); purple: protein (meat and beans).
Copyright USDA



Table 3-4 Food Options & the USDA's Tips from the USDA

Food	Tips
Bread, cereal, rice, pasta	1/2 of grains should be whole
Vegetables	Variety is the key
Fruit	Primary focus as a food group
Milk, yogurt, cheese	Calcium assists in strong bones
Meat, poultry, fish, beans, eggs, nuts	Go lean with protein and vary with fish, beans, and nuts
Fats, oils, sweets	Use sparingly and use vegetable oil for lower cholesterol

Adapted from: <http://www.nal.usda.gov/fnic/Fpyr/pmap.htm>

Alcohol and Substance Abuse

You should avoid any substance that may compromise central nervous system function or lessen your sense of well-being. Alcohol, for example, can impair your thought processes, judgment, coordination, and decision-making abilities. Any resulting errors can place you, the patient, and others in immediate danger. Chronic substance abuse can injure organs such as the kidneys or liver and suppress your immune system. You should strive to be well rested, healthy, and substance-free before responding to any incident. Providing care while under the influence of any substance is unethical, dangerous, and fraught with medical and legal risks.

Proper Equipment

Proper preparation includes having the appropriate equipment. This section discusses the importance of proper gear selection. In outdoor rescue work, you need to carry gear in a first-aid pack for providing patient care plus personal gear for maintaining your own well-being.

First Aid and Survival Pack

As an OEC Technician, you should carry basic first-aid equipment to each incident. The selection of equipment and supplies will be influenced by various factors, including your personal preferences, availability of the equipment, and the type of incident. In some cases you may prefer to design your own custom pack. Your first-aid equipment will include, but not be limited to, the items listed in Appendix C.

+ 3-5 Describe how layering clothing can help preserve body heat.

Clothing

Select proper clothing for the work you will be performing. Be sure to factor in possible weather changes when selecting clothing. In choosing safe and proper attire, consider the climate, elevation, time of year, and a multitude of site-specific factors. It is important to have additional layers of clothing available should the air temperature suddenly drop or if you are caught in a storm. It is surprising how cold you can become due to a soaking rain or cool breeze. Because environmental conditions can change rapidly, consider carrying extra clothing in case those you are wearing become wet or unusable, or in the event that you need to share clothing with patients or others.

Many synthetic fabrics have been engineered to protect the body from the elements. These materials can wick perspiration away from the body, provide lightweight insulation, repel water, block the wind, or do a combination of all four. Wool is probably the best natural material used in winter clothing because it is an excellent insulator even when wet, although it does take a long time to dry. Cotton is one of

procedures. In general, infective waste should either be incinerated or decontaminated before disposal in a sanitary landfill. Where it is permitted, bulk blood, suctioned fluids, excretions, secretions, and infectious wastes that can be ground up may be carefully poured down a drain connected to a sanitary sewer.

Bed Linens, Blankets, and Contaminated Clothing

Any nondisposable linen or clothing that is contaminated with blood or other body fluids should be placed into and transported in red hazard bags or containers that prevent leakage. Personnel involved in the bagging, transport, and laundering of contaminated clothing should wear gloves. The clothing should be washed and dried according to manufacturer instructions. Boots and leather goods may be brush-scrubbed with soap and hot water using Standard Precautions. Most items can simply be laundered, but use caution with certain specialty items, such as ski jackets. Follow the clothing label instructions to avoid damage to these items.

Spills

While observing Standard Precautions, first remove visible spilled material using disposable towels or other appropriate means (Figure 3-23a). If splashing is anticipated, wear protective eyewear and an impervious gown or apron that provides an effective barrier to splashes. Then decontaminate the spill area using an EPA-approved germicide or a 1:10 solution of household bleach, and decontaminate your equipment and supplies as well (Figure 3-23b). Wash your hands following the removal of gloves. Where snow is contaminated with blood or other bodily fluids, remove the contaminated snow by shovel to an area away from the public and treat it with one of the previously mentioned solutions; then treat the shovel with the same solution. As an alternative, you may use one of the commercially available “spill kits” to assist with the

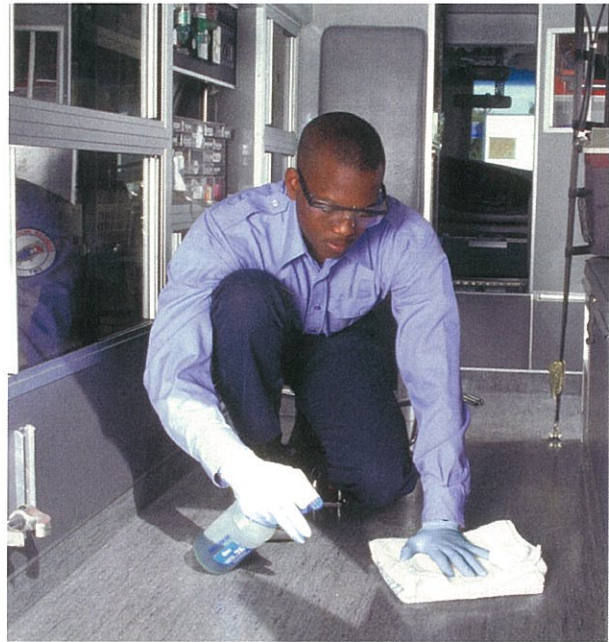


Figure 3-23a A bodily fluid spill requires a special cleaning and disinfection process.

Figure 3-23b Safe workplace procedures include the use of facilities for cleaning contaminated equipment and supplies.



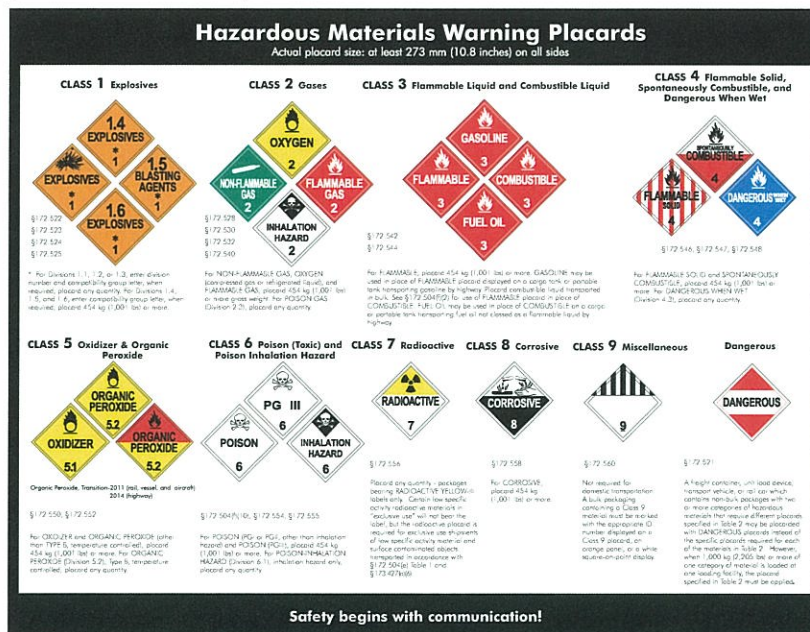
Figure 3-28 A mass casualty incident—
a chairlift accident.
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teams that are trained to manage these scenes safely. Your job is to prevent yourself and others from becoming contaminated by the substance. As a general rule, you should stay uphill and upwind from any potentially hazardous material.

Most resort facilities utilize and store hazardous substances, including cleaning solvents, fertilizers, petroleum-based products, and explosives. Hazardous materials stored at your facility may be identified by safety placards (Figure 3-29). Your facility also should have readily available information concerning any hazardous materials that are on site. In the United States, this information is available on the manufacturer's **material safety data sheet (MSDS)**. The MSDS for a given substance

Figure 3-29 The Department of Transportation (DOT) requires the use of placards to identify materials as flammable, radioactive, explosive, and/or poisonous.
U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration



describes known health risks and provides information on the safe handling of the substance. When you respond to a scene involving hazardous materials, first ensure your own personal safety. In major HazMat situations, it is recommended that you stay at least 250 feet from the scene. If you are downwind, it is recommended you stay 500 feet away. You may need to delay care of patients until the scene is secured by trained HazMat personnel. Delaying the care of patients is difficult to do and against our instincts, but it is the best option in a HazMat incident.

MSDSs provide an overview of the materials, including instructions for handling, storing, decontamination, and emergency care. If you work in an area that has a high potential for a HazMat situation, consider taking additional specialized training. For more information about hazardous materials, refer to Chapter 35, Special Operations and Ambulance Operations.

material safety data sheet

(MSDS) a form that contains relevant information pertaining to a specific substance, with a focus on the hazards it poses to workers.

Crime Scene Management

OEC Technicians may occasionally encounter crime scenes. If you discover a potential crime scene, notify law enforcement immediately. The responding law enforcement officer is in charge of the crime scene. If no law enforcement personnel are present, do not assume that the scene is safe to enter. If a law enforcement officer is present, do not approach the scene until the officer notifies you that it is safe to do so.

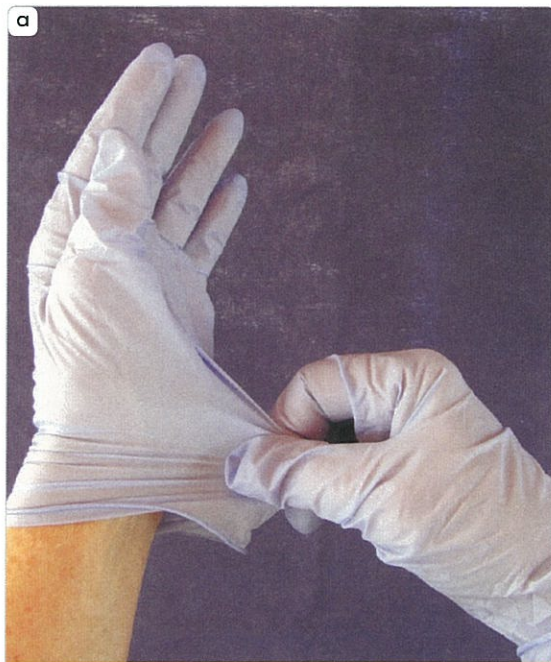
Take care to follow instructions so that you do not disturb the scene. Make sure the area is cordoned off (Figure 3-30■), and that members of the public do not enter the scene. Take precautions not to remove, move, or otherwise disturb anything in the environment, except as is absolutely necessary to provide critical care to patients. Any mishandling of evidence can make it inadmissible in court. To avoid this problem, it is important to create an accurate “paper trail,” or “chain of custody,” accounting for the location of the evidence at each step, from the time of its discovery to its presentation in court. Let law enforcement personnel handle any materials that could be used as evidence.

Examples of crime scenes include sites at which homicides, hostage situations, domestic violence, and assaults occurred. If you have any doubt about how to proceed, consult with the law enforcement officer in charge of the scene. For more information about crime scenes, refer to Chapter 35, Special Operations and Ambulance Operations. See Table 3-8■ for additional tips concerning crime scene preservation.

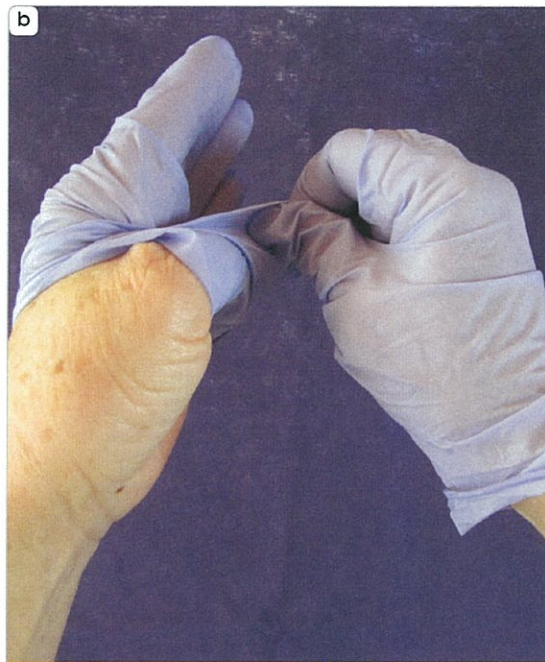
+ 3-11 Describe chain of custody.



Figure 3-30 A crime scene.

OEC SKILL 3-1**Removing Contaminated Gloves**

Glove Removal— Using your dominant hand, grasp the exterior of the opposite glove at the wrist.
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Carefully fold the glove over and peel it back, turning it inside out.
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Once removed, hold the glove in your gloved dominant hand.
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continued



Chapter Review

Chapter Summary

This chapter has presented a tremendous amount of information that will serve you well in your future as an OEC Technician. Although there is much anatomy and physiology yet to learn, you have learned about the “fight or flight” response and the basics of the immune system. You also learned about how the body regulates temperature and the various mechanisms of heat exchange (conduction, convection, radiation, and evaporation), and how those topics apply to rescue situations.

Proper preparation is an essential part of being an effective rescuer and aids your performance at a rescue scene. Preparation occurs before you respond to a call for help and includes not only proper mental and physical preparedness, but also knowledge of and experience with different environments and weather extremes. To maximize performance, it is critical that you obtain sufficient sleep and avoid poor nutrition and substance abuse.

You also have learned about the importance of proper equipment selection. When responding to a rescue situation, you need to arrive with the correct equipment. Although Appendix C will guide you in preparing a well-stocked first-aid kit, this chapter provided a solid basis for being prepared for the unexpected. What you carry on each of your trips into the backcountry should include enough gear to enable you to survive for at least 24 hours without assistance.

You also learned that your primary shield and front line of defense against the elements is your clothing. In addition to shelter and clothing, a key priority is remaining hydrated. Always plan on carrying more water than you expect to need. It is important to know how to purify water if you procure water from the environment. Proper skin and eye care is also essential.

As a rescuer you are likely to be exposed to a variety of infections. This chapter listed and briefly discussed many of those dis-

eases, as well as the five modes of disease transmission. Strategies to mitigate your risk from infectious diseases include implementing Standard Precautions, body substance isolation (BSI), and the proper use of personal protective equipment (PPE). This section concluded with a discussion of occupational exposures and decontamination.

As an OEC Technician, you will need to perform a proper scene size-up on every scene that you encounter. Each scene size-up consists of four components: scene safety, mechanism of injury (MOI) or nature of illness (NOI), the number of patients involved, and an anticipation of needed resources. Some special circumstances may be encountered, such as HazMats, crime scenes, and the presence of media. The primary message of this section is scene safety.

The chapter concluded with an overview of the effects of stress on OEC Technicians, including a review of the symptoms of stress, effective stress management techniques, and professional resources that may be useful. OEC Technicians will find that supporting others following a stressful situation is a valuable component of being a team player.

The contents of this chapter have been presented in a manner that is intended to support each OEC Technician's overall well-being and success. While not every scenario can be anticipated or predicted, OEC Technicians that have done their due-diligence in being as prepared as possible are more likely to be successful than are those who are less-well prepared. The more prepared OEC Technicians are, the more likely they are to achieve positive patient outcomes.

Remember...

1. Rescuer safety is always the #1 priority.
2. Manage the four mechanisms of heat exchange to your advantage.
3. Adequately prepare yourself for rescue operations.
4. Physical fitness, adequate sleep, and proper nutrition are important.
5. Your personal pack should include appropriate first-aid gear and personal gear.
6. Learning the Rule of Threes may save your life.
7. Standard Precautions, BSI, and PPE are essential for preventing the transmission of disease.
8. “Dirty to dirty and clean to clean” is helpful in removing disposable medical gloves.
9. The scene size-up includes an assessment of scene safety, the mechanism of injury, the total number of patients involved, and the need for additional resources.
10. Look for dangers at a rescue scene and be aware of changing scene dynamics.
11. Request assistance in HazMat and crime-scene situations.
12. Do not be afraid to ask for help if you are having difficulty coping with stress.