

# Equipment of the Tactical Medical Provider

## OBJECTIVES

- Describe the uniform used by tactical medical providers (TMPs).
- Describe the importance of appropriate insignia and identification for each member of the tactical emergency medical support (TEMS) unit.
- List and describe types of extreme weather garments worn by TMPs in various weather conditions.
- List and describe the tactical personal protective equipment and ballistic equipment designed to protect TMPs.
- Describe the tactical medical equipment and supplies for the tactical environment.
- List and describe additional medical equipment to consider.

## Introduction

When engaged in tactical special operations, all Special Weapons and Tactics (SWAT) and tactical emergency medical support (TEMS) units must be properly equipped to succeed in the mission. Each member of the SWAT and TEMS unit must be prepared and ready to perform his or her role as expected. As the TMP, you will need to bring a fairly substantial variety of medical equipment and gear to save lives. This chapter discusses the medical equipment and gear you will be carrying into the tactical environment.

## The Tactical Medical Provider Uniform

Generally, SWAT and TEMS uniforms are composed of a poly-cotton blended, durable ripstop cloth material that may be selected as appropriate for the regional weather. Thin, permeable, summer-weight, as well as thicker, winter-weight battle dress uniform (BDU) pants and shirts are available. Most SWAT and TEMS units wear a black or dark-colored T-shirt or undergarment underneath the BDU shirt. This undergarment should be made of insulating wicking material (eg, polypropylene or Thermax) that rapidly draws sweat away from the body to prevent heat and cold injuries. Avoid cotton. Some SWAT units utilize outer and inner fire-resistant Nomex coveralls or clothing to help minimize burns in the event of fire or explosion.

Most SWAT units have their TMPs wear the same color and style of uniform as they do. This minimizes recognition errors during high-risk operations, prevents terrorists or criminals from specifically targeting TMPs, and encourages a sense of camaraderie. Some SWAT units mark the exterior uniform and helmet with a small and subtle camouflaged

### At the Scene

Depending upon the SWAT unit's preference, there may be a need for one or two uniforms per officer. Many SWAT units ask that tactical officers and TMPs make use of two uniforms, including a designated training uniform and a second uniform for actual callouts.

medical marking (eg, a subdued Star of Life, green cross, or caduceus) that allows others at the scene, at close range, to identify the TMP. These patches can be attached with Velcro in order to allow for their quick removal in certain circumstances. Other SWAT units choose not to identify their medical personnel for security reasons. If used, the medical insignia and identifying patches should be similar to the SWAT officers', and should also potentially include a small, camouflaged medical insignia identifying the TMP as medical personnel **Figure 4-1**. Bright red crosses or other noncamouflaged patterns causing the TMP to stand out in the field are considered by some experts to be inappropriate in the tactical environment.



**Figure 4-1** The insignia and identifying patches should be similar to those of the SWAT officers, discreetly identifying the TMP as medical personnel. It should be possible to quickly remove these patches if necessary.

### Additional Insignia

Law enforcement insignia patches are nearly always worn on the TMP uniform. They should accurately and easily describe the unit a member is associated with; this is especially important in regions where multiple jurisdictions may be involved at a scene. Insignia patches are commonly found on the shoulders of the TMP uniform, and are often also located on the front and back of the outer material covering the ballistic vest. Additional patches including nameplates are located elsewhere on the uniform. Each TMP should be personally known to each of the tactical officers; therefore, nameplates are not generally useful on the outermost layer of the uniform during actual callouts.

The outer medical vest may also have markings designating an individual as a MEDIC (TMP), MED (tactical physician), or other health care provider in the tactical environment. For TEMS units that support more than one SWAT unit, at least one separate and unique uniform should be worn for each SWAT unit. Otherwise, removable Velcro patches are effective for allowing TEMS units to switch insignias and/or identification when working with multiple SWAT units.

### Safety

There is controversy surrounding whether the last names of SWAT and TEMS unit personnel should be sewn to the outermost layer of their uniforms. Due to the contact these personnel regularly make with criminal suspects, felons, and/or emotionally upset relatives, it may not be a good idea to have a name visible during actual callouts.

### Extreme Weather Garments

As a TMP, you should have several uniforms that appropriately match the environmental conditions you expect to face in the tactical environment. Proper clothing will enable you to function comfortably and safely. Uniform considerations for damp or rainy weather, for instance, include camouflaged rain ponchos or outer coverings, backpack rain covers, and waterproof hats. Extreme weather garments include:

- **Footwear.** Waterproof, quiet boots, providing good ankle support and all-around traction for use inside buildings and outdoors. A hardened front boot style should be considered, to prevent toe injuries.
- **Socks.** Two layers: an inner, thin, wicking, liner sock and an outer, thick sock.
- **Underwear.** Cotton briefs are acceptable, but other cotton clothing should be avoided. All other underclothing should be a modern synthetic style with wicking ability.
- **Cold weather gear.** Includes appropriate insulated hats, gloves, neck gaiters, insulated clothing, parkas, boots, and a four-layer system that allows clothing layers to be removed or added to match the weather conditions.
- **Wet weather gear.** Waterproof uniform, consisting of either a poncho or raincoat and rain pants. Waterproof bags should be considered for protection of medical gear and backpacks. All medical supplies (eg, tourniquets and bandages) inside medical packs should be sealed in waterproof bags or cases.
- **Hot weather gear.** Lightweight, nonabsorbing, rapidly evaporating clothing material for shirts and pants will enhance cooling if hot, humid weather is present. Ribbed liner shirts should be worn under ballistic vests. Hats will help block radiation from the sun.

## Cold Weather Gear

A cold weather uniform should include a wind- and waterproof four-level system. Using a multiple-layer system of clothing provides you with a means of adapting to changes in climate and other environmental conditions. The suggested four-layer system includes:

1. A first inner liner layer of long underwear made of sweat-wicking synthetic material
2. A second layer of a thicker “pile” synthetic jacket and pants
3. A third layer of insulated goose down or modern equivalent (parka and pants providing an air-space layer for insulation) in extreme cold
4. A fourth outer layer of a wind- and waterproof jacket and pants

Insulated hats that fit under a helmet are important, as well as clothing that can be worn over the neck (eg, a neck gaiter), face (eg, a face mask), or clothing to cover the entire head and neck with only the nose and eyes showing (eg, a **balaclava**). Insulated, waterproof gloves and footwear are especially important. Electric or air-activated heat packs may provide additional warmth to feet and hands in severely cold weather. You need to maintain normal sensation and functioning of your hands at all times; a hot pack stored in your pocket will help to keep your hands and fingers warm and ready to use.

## Warm Weather Gear

Appropriate clothing should be worn in hot weather. This includes breathable, light-colored clothing; ventilated, ribbed inner liners worn under ballistic vests (to increase air circulation and evaporation of sweat); and other special shirts to be worn under ballistic vests that promote cooling of the body.

### Safety

Cotton is comfortable, but should be avoided in cold and hot climates. “Cotton kills” is a phrase that refers to the heavy sweat absorption by cotton clothing during physical exertion. In the winter, sitting or standing for hours in a wet shirt can lead to hypothermia. In hot weather, evaporation under ballistic vests and uniforms is ineffective and will lead to overheating and potentially heatstroke. Modern, synthetic, sweat-wicking undergarment clothing should be used year-round.

Such shirts are made of modern fabrics that help to absorb sweat and increase its evaporation rate, thus enhancing cooling rates and decreasing heat injuries.

## Tactical Personal Protective Equipment

**Tactical personal protective equipment (TPPE)** is designed to protect you from both medical threats and violent threats in the tactical environment **Figure 4-2**. It includes gear from ballistic helmets to protect the head from trauma to nitrile gloves to protect the body from bloodborne pathogens. It is critical to wear TPPE during both training and actual callouts because individuals tend to perform as they have trained. In other words, if you use TPPE during training, when a true callout occurs you will be prepared to properly utilize this protective gear.

During training and callouts, always wear TPPE that protects your body against physical harm, takes appropriate standard precautions, and ensures respiratory protection.

**Table 4-1** is an inventory of standard TPPE. Chapter 25, “Hazardous Materials and Clandestine Drug Labs,” covers



**Figure 4-2** The ballistic helmet and vest are elements of the tactical personal protective equipment.

**Table 4-1** Tactical Personal Protective Equipment Inventory

- Ballistic vest with shoulder protection
- Ballistic helmet
- Black balaclava
- Eye protection
- Ear protection
- Inner gloves
- Outer gloves
- Medical protective gear
- Kneepads
- Air-purifying respirator (APR)
- Canteen or hydration system
- Flashlight

the specific protective gear to wear during callouts involving hazardous materials.

## The Ballistic Vest

The **ballistic vest** is constructed of materials that are designed to defend against small arms projectiles and shrapnel. The design and size used is normally dictated by the expected threat (eg, caliber of weapon) and whether the vest is to be worn open as an outer level, worn under normal clothing, or concealed. Some civilian EMS and fire service personnel routinely wear ballistic vests for protection against gunshot wounds as they respond to calls in dangerous areas with high crime threats. The use of ballistic vests by law enforcement officers is nearly universal and is mandatory by most agencies.

**Soft body armor**, a ballistic-resistant fabric worn concealed under the uniform or over the uniform, is made from polyethylene fiber. Examples of soft body armor include Spectra, made by Allied-Signal, Inc; Kevlar, made by DuPont; and Twaron, made by AkzoNobel.

The National Institute of Justice (NIJ) has tested, defined, and rated ballistic vest threat levels (from the lower Type IIA to the highest Type IV vest), which are designed to defeat specific projectiles fired from specific types of weapons. The following threat protection levels are available for soft armor:

- **Type IIA.** Type IIA armor can usually stop a 9-mm full-metal-jacketed bullet fired from a 4-inch barrel, as well as a .357 Magnum, semijacketed, soft-point bullet fired from a 4-inch barrel. Other nonmandated rounds that this threat level may stop include most non-full-metal jacketed

9-mm rounds, several .44 Magnum rounds, and 12-grain, 00 buckshot.

- **Type II.** Threat protection Level II is stronger than IIA and will stop the mandated 9-mm full-metal-jacketed bullet fired from a 5-inch barrel, as well as the .357 Magnum, semijacketed, soft-point bullet fired from a 6-inch barrel. This vest will likely stop nonmandated rounds such as 12-grain shotgun slugs and a variety of 9-mm full-metal-jacketed bullet rounds.
- **Type IIIA.** Threat protection Type IIIA stops the mandated 9-mm full-metal-jacketed bullet fired from a 16-inch-barreled carbine, as well as the .44 Magnum fired from a 6-inch barrel.

Some tactical officers may use **hard body armor inserts**. These rigid inserts are usually made of steel, ceramics, aluminum, or titanium and are used for added frontal-torso protection in addition to soft body armor. Hard body armor is available in the following threat protection levels:

- **Type III.** Threat protection Type III with a hard insert is designed to protect against the common M-4/AR-15 rifle round and also the center-fire rifle rounds.
- **Type IV.** Threat protection Type IV is the highest and thickest level of protection, and it protects against the armor-piercing (AP) round as usually fired from a hunting rifle, M-1 Garand, or other rifle.

Type III and Type IV armor require rigid metal and/or ceramic plates to be effective against rifles and some very fast pistol rounds, and are quite heavy. Many of the older styles of Type IV hard body armor are not used routinely due to their heavy weight (over 40 lb total vest weight). Newer vests and plates continue to improve and lighten as companies improve upon the technology. Some of the newer Type IV vests weigh 17.5 lb and have proven effective in Iraq against multiple hits from automatic weapons including the commonly available AK-47 or SKS rifles.

Another type of protective vest is the **stab-resistant ballistic vest**, which is made primarily for prison guards. It is designed to be resistant against puncture from knives, improvised edged-weapons (shanks), and other pointed or edged weapons (screwdriver). The NIJ Standard–0115.00, *Stab Resistance of Personal Body Armor*, categorizes stab-resistant body armor as “edged blade” or “spike class.” Edged-blade class body armor protects the wearer against high-quality or engineered blades, including kitchen and sporting knives. This threat is more frequently encountered on the street. Spike class body armor protects the wearer against

## Safety

Some bullet-resistant vests will not stop knives from being thrust through the ballistic material. Be aware of the capabilities and limitations of your unit's body armor.

improvised weapons, such as those commonly used by correctional facility inmates. Most ballistic vests are not knife resistant unless specified.

For your safety, you should wear a ballistic vest. Federal Bureau of Investigation (FBI) statistics show that the odds of surviving a shootout are 14 times higher if body armor is worn. The minimal protection level recommended for general law enforcement officers is Type II body armor—rated against most pistols, shotguns, and some automatic weapons (including the Maschinenpistole 5 [MP-5] submachine gun commonly used by SWAT units). As a TMP, you should wear nothing less than Level II body armor. SWAT and many TEMS units utilize the heavier but more bullet-resistant Type III vests, with some units utilizing ceramic or other plates (Type IV) to defeat rifle rounds.

## The Ballistic Helmet

Ballistic helmets are worn to help protect the scalp, skull, and brain from trauma **Figure 4-3**. The helmet is used in many occupations and works quite well in protecting the wearer from small bumps and scrapes when working in confined spaces or structures with low overhead (such



**Figure 4-3** The ballistic helmet protects the head from traumatic injuries caused by bullets, blows, or shrapnel.

as an armored vehicle doorway). Certainly one of the most dangerous threats is a fired bullet, and the Type III helmet is able to effectively stop or deflect all but the most powerful rifle bullets. The Type III helmet protects against explosions with accompanying shrapnel, as well as possible blows from sticks, knives, or other weapons.

The weight and bulk of a helmet may be an inconvenience. Newer materials and suspension systems, however, have resulted in lighter and more comfortable helmet styles. The suspension system is important because it holds the outer helmet securely in the proper position and separates the skull from the helmet. A bullet striking the helmet will often bounce off but, in doing so, may deform the helmet inward. This may result in significant head injury (eg, significant concussion, skull fracture, or worse) if there is insufficient gap between the skull and the inner helmet.

In a tactical environment you can usually position yourself behind hard cover for safety, but you may need to occasionally glance around corners or edges of trees, resulting in exposing part of your head. In addition, many head injuries might occur while getting into or out of armored vehicles. These and other head injuries may be prevented through the use of ballistic helmets. An ideal helmet is bullet resistant and lightweight, allows access to the ears so that a stethoscope and radio can be used, and has a secure and comfortable four-point helmet harness system, with a ballistic face shield. The ballistic face shield is mounted to the front of the helmet and is designed to protect the face from rocks and debris.

## The Balaclava

Many authorities recommend the use of a balaclava for protection of the face, head, and neck **Figure 4-4**.



**Figure 4-4** The balaclava protects the face, head, and neck from the elements, in addition to protecting the identity of the wearer.

There are three reasons to use this device. The first is to provide protection against fire and explosions in the event of a methamphetamine laboratory or chemical fire (especially if the balaclava is made of Nomex, a fire-resistant cloth material). The second is to provide some warmth and protection against cold elements. The third is to conceal the identity of SWAT and TEMS unit personnel from suspects and the news media. If suspects can identify exactly who was at the scene, they may threaten revenge in the form of future violence. Although most callouts end with no serious injuries, if the suspect is highly prone toward violence, it may be prudent to protect the identity of all involved in the tactical operation.

## Eye Protection

Eye protection is extremely important in the tactical environment. Acuity of vision is critical when shooting or performing medical tasks. The loss of an eye or impaired vision will result in disability and an individual's removal from the SWAT unit due to visual limitations. If dust, other materials, or traumatic injury causes pain and/or loss of vision in the midst of a mission, a SWAT or TEMS unit personnel may be rendered useless. This may result in unnecessary injury or death. Therefore, it is extremely important to not neglect this important asset. Eye goggles or glasses with shatter-resistant polycarbonate lenses are essential to protect eyes from flying debris, dust, bullet fragments, direct trauma, and many other hazards. For the TMP, eye protection should also block any blood or body fluids that may be coughed or splashed into the face while providing medical care.

There are basically two ways to protect the eyes: minimize threats from trauma by maintaining vigilance against threats to the eyes and taking evasive action, and wearing impact-resistant eyewear or goggles. The best goggles are devices that protect the eyes from flying debris and objects coming from all directions, including the sides. A wrap-around design is effective to this end,

### Safety

An extra pair of goggles or protective glasses should be kept close by in case the first pair is broken or misplaced.

though it does create distortion of vision around the edges of the lens. Protective goggles should be tight enough to seal out dust particles and flying empty brass casings (from a SWAT officer's weapon). Protective eyewear should be fitted appropriately in order to stay on during high-performance operations (eg, rappelling, parachuting, windblast incidents). Protective eyewear should also be large enough to ensure a clear view of the surroundings.

The color of the lenses should be chosen to suit the environment. Yellow- or amber-colored lenses improve night vision and resolution, while dark lenses improve vision on bright, sunny days. Dark lenses can also provide protection against less-lethal light-emitting diode (LED) disorientation devices. If the callout scenario may involve going into the shade, a forest, or inside a building, then dark lenses should be avoided because the dark color will hinder clear vision. Clear lenses are often the best overall color because they allow true vision without color disturbance or excessive darkness of vision.

Most of the newer tactical goggles have polycarbonate or "impact-resistant" lenses that provide a shatter-resistant shield against most low- and intermediate-speed projectiles. Some crowd-control or riot gear will have large polycarbonate face shields that attach to helmets, allowing ballistic protection against smaller-caliber handgun bullets and explosive shrapnel. You will be best served by wearing comfortable eye protection with polycarbonate lenses that allow clear vision.

One dangerous problem with some goggles and glasses is that they can obstruct vision when they become fogged up with moisture. Test all equipment, including eye protection, under realistic training conditions. Use antifog ointment and/or spray and work with your eye protection to make sure it functions well during different types of scenarios. If fogging continues, then better eye protection with increased ventilation should be utilized.

### Safety

The reflection of sunlight or bright lights off of goggles and other protective eyewear can potentially reveal a SWAT unit's position to suspects. You can minimize this effect by using semicurved lenses that wrap around the eyes and onto the lateral aspect of the cheek, and also by choosing goggles that are coated with nonreflective material on the frame and also over the shiny lenses.

### Safety

If corrective lenses are needed, then prescription protective glasses are available.

## Hearing and Ear Protection

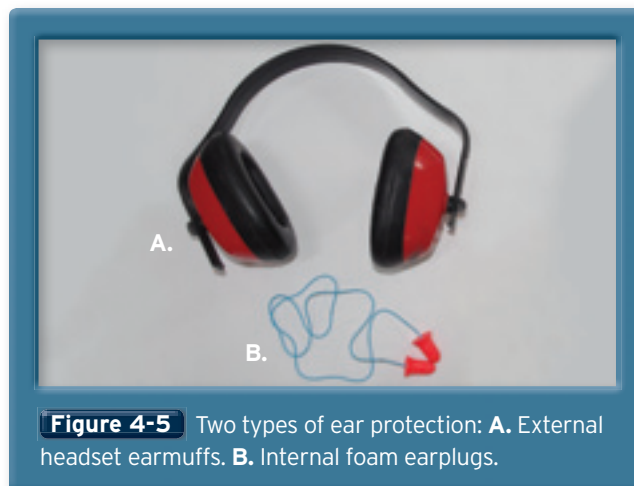
As a TMP, you will have repeated exposure to high-decibel noise in the form of gunfire; noise-flash distraction devices (NFDDs) or “flash-bangs;” explosive breaching; and other loud sources. For example, most SWAT units are now using 5.56-mm caliber rifles with Messier 4 (M-4)-style, the Armalite model 15 (AR-15), or M-16 rifles that have a harsh muzzle blast. This can immediately cause a lasting ear-ringing and decreased hearing for several minutes, with inevitable long-term hearing damage. Without sound suppressors, the tactical officer and the TMP are suddenly exposed to 160 to 170 decibels of noise during rifle fire. This effect is even more intense when rifles or pistols are fired within the often small confines of a building.

Repetitive exposure to loud noise can cause hearing loss, which becomes worse with every loud noise encountered. Hearing damage is not usually repairable by the body, and so the result of repeated loud noise exposure is accumulative hearing loss. The damage may eventually require early retirement. The ability to hear surrounding threats in the tactical environment is critical, as is the ability to listen in on radio or other communication channels. Therefore, it is very important to take all practical measures to properly protect hearing during training and callouts.

Several methods of hearing protection may be utilized. Small foam earplugs are simply rolled between the fingertips to compress, inserted into each ear, and then allowed to expand and seal the ear canal to help block loud noise. Even better protection can be obtained with custom, ear-molded earplugs that provide a tight seal and block noise significantly. With custom, ear-molded earplugs, plastic material is inserted into the ear canal and outer ear and allowed to harden into a set of reusable plugs. The other primary method of

### Safety

Hearing loss has affected many veterans returning from Iraq and Afghanistan. Exposure to excessive noise levels is a common threat in the tactical environment, and steps should be taken to protect your hearing and the hearing of your fellow SWAT and TEMS personnel. The Occupational Safety and Health Association (OSHA) standard CFR 1910.95, *Occupational Noise Exposure*, mandates that employers provide hearing conservation programs.



**Figure 4-5** Two types of ear protection: A. External headset earmuffs. B. Internal foam earplugs.



**Figure 4-6** External headset earmuffs.

hearing protection is the use of external headset earmuffs **Figure 4-5**. These may be simple or electronic, and may reduce the sound intensity by 15 to 35 decibels **Figure 4-6**.

Commercial earplugs and earmuffs are available that have electronic “cut-off” switches that block loud noise within a few milliseconds. They allow for normal or amplified hearing and are able to shut off during gunfire or loud noise signatures.

Many units train with ear protection, but then deploy on actual callouts without any ear protection. This is not ideal, and there are increasingly better options to protect hearing and operationally deploy with systems that allow tactical hearing while protecting the ears. Some electronic headset earmuffs have internal radios and headset microphones built in **Figure 4-7**. These electronic headset earmuffs may also have the ability to plug into the unit’s radios, allowing for simultaneous ear protection, external electronic noise detection, and radio communication. The electronic headset earmuffs should



**Figure 4-7** Some earmuffs have an electronic “cut-off” switch that protects the wearer from loud noises.



**Figure 4-8** The disadvantage of darker nitrile gloves is that blood is not easily seen on them; this may lead to contamination and bloodborne pathogen exposure.

## Safety

You should receive training in hand and arm signals, in the event that radio communication is cut off or unavailable.

be compatible with the helmets and communication equipment. Although more expensive, these devices work very well and are increasingly utilized by SWAT units.

## Gloves

The use of gloves is critical for protection against bloodborne pathogens. Depending upon the weather conditions, you will typically wear **nitrile gloves** for protection against bloodborne pathogens during a mission **Figure 4-8**. Nitrile gloves tend to be utilized by TMPs more often as they are more durable and chemical-resistant, and also come in dark colors to aid with camouflage. Over the top of these gloves you may choose to wear leather, Nomex, or perhaps puncture-resistant Kevlar-based gloves. The advantages of having two layers of gloves is that the more delicate inner glove may be protected during patient or downed-officer searches and weapons removal, removal of outer clothing, and normal wear-and-tear during tactical operations. When delicate hand sensation is required (eg, for starting an intravenous [IV] line or performing some other medical procedure), then the outer leather or other type gloves can rapidly be removed and the nitrile inner glove remains for protection against bloodborne pathogens.

During extremely cold weather, many TMPs utilize more bulky mitten-style gloves with air-activated heat packs inside to keep their hands warm. These air-activated heat packs are inexpensive and last for 4 to 6 hours, generating nontoxic heat. Obtain a large supply of these heat packs and distribute them to tactical officers before and during cold weather operations to help maintain warmth.

## Medical Protective Gear

Before initiating medical care of victims, you must first protect yourself and then ensure the protection of your unit. This protection must include **personal protective equipment (PPE)** that will prevent accidental exposure to infectious diseases transmitted in the blood, sputum, vomit, or other body fluids. Standard precautions must be taken into consideration when deciding upon the PPE to don. Proper PPE includes effective head covering, eye protection, and a face mask that will prevent bodily fluids from contaminating your eyes, nose, or mouth. As mentioned previously, gloves should be used—ideally in a two-glove, double-layer system—to improve the barrier and allow you to change external gloves between patients or procedures while continuously wearing one pair of inner gloves.

If decontamination or a particularly bloody victim is involved, then a plastic or fluid-impermeable apron or coverall Tyvek uniform may be useful to prevent blood and chemicals from soaking through a cloth uniform to the underlying skin. Waterproof boots or shoe coverings should also be considered. Sturdy leather boots with

## Safety

You cannot visually or physically determine if the patient has a communicable disease. You must simply assume that patients do have these diseases and make the necessary steps to prevent exposure.

a Gortex inner liner are more practical in the TEMS setting to prevent water, blood, and fluids from soaking through.

Any abrasion or open sore on your skin should be well covered and waterproofed before the mission in order to prevent communicable diseases from being introduced into that wound. Collodion is a clear ointment that covers abrasions well. Opsite IV clear covering or other clear membranes may be used as well. Common sense and proper preparation will go far in preventing exposure to serious infections such as tuberculosis, hepatitis, and human immunodeficiency virus (HIV).

## Kneepads

Kneepads are worn to protect the knees, especially when crawling or kneeling on the ground is necessary for treating patients. Kneepads protect the knees from blood or sharp materials (eg, rocks or glass) on the ground. Rocks and broken glass increase the chance of injury and accidental exposure to bloodborne pathogens

### Figure 4-9

In addition to kneepads, many TEMS units also utilize elbow pads in the event that they need to crawl on their bellies, elbows, and knees to approach



**Figure 4-9** Knee pads help to decrease pain and injury from prolonged kneeling.

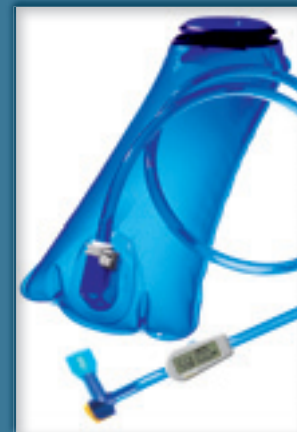
or treat patients. It is important that knee and elbow pads be fitted and tested extensively prior to their use in the tactical environment. A broad elastic band as well as appropriate, conforming plastics and foam are important. Some newer model elbow- and kneepads have a hard exterior with a gel insert. At the very least, elbow and knee protectors should allow for a full range of motion, should not cut off circulation, should not cause pain with extended wear, and should remain in place.

## Hydration Systems

Hydration systems are not really protective in terms of stopping or blocking a threat, but they are the only practical way to counter a common threat facing a SWAT unit **Figure 4-10**. Those threats are dehydration and overheating due to strenuous exertion in time-pressured, stressful, and dangerous situations. Heavy uniforms and loads of gear decrease effective evaporative heat loss and increase risks for heat injury.

Dehydration quickly leads to fatigue, dulled thinking, weakness, and a significant decrease in performance. In rare circumstances, it may lead to more severe heat illness and possible heatstroke. A small percentage of heatstroke patients, even if healthy, young, and fit, will die from this underestimated environmental threat. Performance suffers even if there is mild dehydration. Many make the mistake of waiting until they are thirsty before seeking water or other fluids. This is too late. Subtle fatigue and slowed thinking can result from mild dehydration, and if SWAT and TEMS unit personnel know they will be exerting themselves, they should initiate early hydration efforts in order to prevent it. Guidance for management of dehydration and heatstroke in the tactical environment is provided in Chapter 22, “Environmental Injuries.”

One of the common mistakes is simply not drinking enough. This is due to several factors, including trying to avoid urination, lack of planning, not having the capacity to carry



**Figure 4-10** A canteen or Camelbak-style hydration system provides hydration during callouts and training.

fluids on the mission, and fear of exposure. The human body needs more fluids during a stress response, so during the high-stress situation of a callout it is especially critical to remain hydrated. Good choices of fluids include a mixture of water and orange juice or athletic fluid-replacement drinks with a good combination of electrolytes. If possible, caffeine should be avoided because it causes more fluid loss by causing increased urination. Cool liquids taste better and are more rapidly absorbed.

Prehydrate before a mission and continue to drink plenty of appropriate fluids during the mission in order to maintain hydration. During peak performance, it is suggested that each tactical officer drink about 1 liter of fluids or more per hour. One of the essential functions of TMPs in these circumstances is to assist the command staff and SWAT unit with ensuring easy access to water, along with appropriate fluids containing replenishing electrolytes in order to prevent heat injuries and dehydration. The backpack style or Camelbak hydration systems have become standard issue, and all TEMS units should use these routinely.

## Gas Mask or Air-Purifying Respirator

The gas mask or **air-purifying respirator (APR)** is an essential piece of equipment that you must keep immediately available, remain comfortable with, and be operationally effective while using **Figure 4-11**. There are many chemicals and agents that the SWAT team may be exposed to such as booby-trap chemicals, toxic substances at a clandestine methamphetamine laboratory, riot control gas, and other law enforcement–related chemical agents.



**Figure 4-11** An APR provides protection from chemical agents.

If the SWAT unit introduces “gas” (ie, tear gas or another chemical) into the house where the suspect is located, then any suspect or tactical officer who enters the house will soon be contaminated with noxious chemicals. If any medical care is urgently needed for these individuals, you will quickly be overwhelmed and rendered ineffective by the severe pain, tearing, respiratory difficulty, and psychological effects if you are not wearing an APR.

Use of the APR requires proper training because it can cause mild claustrophobia, limit breathing, and hinder communications. If you are properly trained and comfortable with wearing a full-face APR with the appropriate filtration system, then medical care can be provided quickly and effectively in environments with hazardous atmospheres such as a chemical release from a tanker truck, intentional use of OC, or CS present at a scene with a downed officer.

## Flashlights and Illumination Tools

Many tactical callouts occur at night or inside poorly lit buildings. To operate safely in the tactical environment, you must arm yourself with knowledge of the tools and equipment that allow you to perform well in low-light conditions. This is accomplished by use of flashlights or other illumination tools, and possibly the use of **night vision equipment** or thermal imaging equipment. There are several categories of lights and ways illumination is used. There are simple handheld lights, as well as lights that can be attached to the head or helmet by a strap system.

Before a light is turned on at night or in low-light environments, its use should be authorized by the SWAT incident commander or leader. The use of a light could reveal the position and advertise the location of anyone using that light. In the dark, the suspect may not realize that the SWAT unit is approaching, but a sudden accidental release of light from even a quarter-second flashlight beam can result in dire consequences. You must be certain of the circumstances and tactics before using a light source.

You should have several illumination tools, including at least two handheld and two head-mounted

### Safety

Prescription lenses can be made and fitted into APR to ensure that vision is maintained.

flashlight systems. Weapon-mounted lights are a part of the weapon system and should never be used as a light source for TMPs or for procedures in the tactical environment. Discreet red or blue lenses should be used in at least one flashlight for low-light, stealth movement, which preserves night vision. SWAT and TEMS units should consider the use of night vision equipment and thermal imaging devices to aid tactical operations low-light environments.

### Night Vision Equipment

There are several types of night vision equipment. Night vision devices may have some utility for the TMP because they can assist in patient evaluation and possibly remote assessment in areas where light cannot be used due to nearby threats. Night vision monoculars, night vision binoculars, and night vision goggles are other devices that enable SWAT units to see in the dark. These devices require some slight degree of infrared or ambient light. In fact, with just starlight, they can be used to readily identify objects and people in darkness up to several hundred yards away. The use of a monocular will allow you to simultaneously “see” in the dark to safely navigate and approach the patient, and utilize your other eye for up-close medical procedures such as intubation, starting IVs with very faint near lighting, and other procedures. Through the use of night vision devices, you can assess downed officers from a distance.

An **infrared flashlight**, which emits light invisible to the human eye, may be used to illuminate the area, allowing you to discern the presence of objects and humans more than 400 yards away.

### Thermal Imaging Equipment

Thermal imaging devices cause objects (eg, human bodies and fire) that emit heat to appear whiter on a device screen. During law enforcement search-and-rescue operations or searches for escaped convicts, the use of thermal imaging devices can rapidly screen a section of woods or a field for warm human bodies. Fire departments routinely use **thermal imaging devices**

to search buildings for hot spots and to conduct rapid searches in smoke-filled rooms.

Recently technology has enabled these devices to be reduced in size so they can be easily held in one hand. The incredible sensitivity of this equipment allows the viewer to see very subtle temperature differences, making these devices ideal for search and rescue and identifying suspects in urban and woodland environments. They make nighttime missions much safer as suspects can be easily seen in most conditions. Both SWAT and TEMS unit personnel can utilize these devices to help identify where a suspect or a patient can be found.

## Essential Emergency Medical Gear: A Four-Level System

Overall, there is wide variation in the type and amount of medical equipment that may be brought to provide emergency care, and the method with which these supplies are carried or transported to the scene varies with each TEMS unit. As always, follow the standards of your agency. Medical gear is dependent upon the level of training of the TMPs, their experience and preferences, tolerance of size of load or backpack, type of mission, predicted number of patients in a worst case scenario, backup medical support, likelihood of rapid extraction and transportation, and the potential need for extended medical care. An overloaded, bulky TMP with too much gear may quickly wear down and be less able to carry or drag a downed officer through a building. On the other hand, a minimally equipped TMP with a single small fanny pack who enters a large building with multiple victims will rapidly require more gear and medical supplies, especially if sustained gunfire delays extraction of victims from the building. Careful planning and realistic attitudes along with personal preferences will determine what type of gear is carried.

The following is a four-level system based on tactical combat casualty care (TCCC) principles (see Chapter 11) and is commonly used by TEMS units throughout the world:

- **Level 1.** Level 1 gear is used by both SWAT and TEMS unit personnel and is essentially a basic trauma kit composed of simple, practical items. Commonly, this includes a trauma bandage and a tourniquet. Additional items may include a **nasopharyngeal airway**, personal nitrile

### Safety

Infrared markers can be useful for identifying SWAT officers in the dark, such as a small flashing infrared flashlight marker that clips to the shoulder or helmet.

gloves, and a **cardiopulmonary resuscitation (CPR) mask**.

These items allow SWAT officers to provide self-aid and buddy-aid immediately, and are universally carried by all SWAT officers and TMPs in the same location on their load-bearing gear.

- **Level 2.** Level 2 gear is the TMP's medical vest/belt/thigh pack that is attached to the body during the entire mission

#### Figure 4-12

- **Level 3.** Level 3 gear is the medical backpack. The backpack can remain with TMPs most of the time and is usually not carried on the back but set on the ground or just outside of the building during entries.
- **Level 4.** Level 4 gear is an advanced medical pack, which typically remains secured and is brought to the scene when callouts occur. It is a large and bulky item that is best maintained at the command center or in the SWAT vehicles for use with sustained in-field operations or more advanced on-site medical care.

## Level 1

Each member of the SWAT and TEMS units should carry an **individual first aid kit (IFAK)** that contains a few simple but effective first aid devices and that is located in the same area of the body on each TMP. **Table 4-2** summarizes the typical contents of an IFAK.

Every SWAT officer and TMP should carry these items in an easy-to-access pouch that is attached to the front of their body where it can be reached and utilized within seconds. In fact, most SWAT officers already have one of the ideal kinds of first aid pouches, which is the double-magazine pouch. A 4-inch tactical compression



**Figure 4-12** Level 2 gear is attached to the body for the entire mission.

## Controversy

What medical gear should be used for inner perimeter tactical missions? This is a controversial question because a wide range of opinions exist. One side of the thinking is that only the most simple and most efficient basic airway and hemorrhage control methods are needed for rapid stabilization and extraction. On the other side of the discussion is the opinion that a variety of medical gear and supplies should be carried for treating multiple patients for prolonged periods of time. In a setting where immediate extraction may not be tactically possible due to threats or lack of transportation, some feel that any advantage at the point of injury will increase the odds for a positive outcome. Another approach to gear selection and packing takes into consideration the equipment necessary for commonly performed as well as time-intensive procedures. Units that follow the third approach will create a suggested packing list during preplanning tailored to their particular tactical environments.

## Table 4-2 Typical Contents of an IFAK

- 1 tactical tourniquet
- 1 tactical compression bandage
- #28 F nasopharyngeal tube
- Nitrile gloves (2 pairs)
- CPR mini-mask
- Band-Aids
- Acetaminophen (Tylenol)
- Ibuprofen
- Other minor first aid items

Data from Greenberg MJ and Wipfler EJ. Building a TEMS team. *ACEP Section of Tactical Emergency Medicine Newsletter*, 2005; 1(4): 3-5.

dressing, a tactical tourniquet, and a small waterproof bag with gloves and other small items can fit within this pouch. **Figure 4-13**. **Tactical compression dressings** are gauze that is already attached to elastic wrapping with prerigged cinching and fastening devices. They should be vacuum-packed, sterile, lightweight, and easily deployed. **Tactical tourniquets** are lifesaving devices. Use of a tourniquet is discussed in more detail in this chapter. The same style of tactical tourniquet should be chosen and used by everyone on the unit. SWAT



**Figure 4-13** An IFAK should be carried at all times.

officers should attach their Level 1 IFAK gear in the same place so there is no delay when another person provides medical care. TMPs should carry identical Level 1 gear, as well as extra bandages and tourniquets in their other packs.

## Level 2: Medical Vest With Utility Pouches, Belt, and Thigh Packs

Levels 2, 3, and 4 equipment are to be used only by the TMP. Level 2 medical gear is attached to the TEMS unit personnel at all times while operational. Note an important point: The Level 2 medical vest should be sized large enough to fit over or incorporate a Level III or IV ballistic vest. Some Level 2 medical equipment may be attached to a belt with thigh pouches so it can be picked up as a single unit, thus ensuring that it can be rapidly donned without forgetting any items. See **Table 4-3** for a list of Level 2 gear, which includes a vest, thigh pack, and belt.

## Level 3: Tactical Medical Backpack

Level 3 gear is carried in a medium to large-sized backpack, and brought with the TMP when needed. It should be *close by at all times* during training and callouts. **Table 4-4** lists the Level 3 gear stored in a tactical medical backpack.

## Level 4: Tactical Medical Advanced Life Support Kit

The Level 4 medical pack is kept locked in a controlled environment until the callout and then is taken out of storage and placed into the SWAT raid truck or van. This kit is to remain near or at the command center or tactical operations center (TOC). The contents may include narcotics and other controlled substances

that must be properly locked and controlled under federal DEA guidelines. In addition, exposure of these controlled medications to high heat or extreme cold should be prevented. It is important to protect oral and IV antibiotics, paralytics, and other sensitive medications.

**Table 4-5** lists the equipment generally included in the Level 4 advanced medical supply kit.

## Additional BLS Trauma Management Kit

Many SWAT units also keep a simple BLS trauma kit in the SWAT van or raid vehicle at all times. The purpose is to have available to the tactical officers a ready source of simple first aid materials and dressings that can be used by the SWAT officer if the TMPs are not available. This equipment is also a source of additional medical supplies should the mission require response to a mass-casualty incident.

A supplementary BLS kit contains simple medical supplies that can be used by anyone trained in simple first aid and TCCC, and may be expanded or contracted in size depending upon the expected length of the mission, number of people involved, and the expected types and number of casualties. This kit can contain any of a number of items including but not limited to medical dressings, trauma bandages, over-the-counter (OTC) medications for common medical complaints, backboards, litters, decontamination supplies, and other items. Each medical unit will need to discuss the possible types of missions and the limitations of the storage arrangements. The SWAT van may be subject to extreme heat or cold, and the exact contents will vary depending upon the local needs and preferences of the medical and tactical personnel.

## Tactical Medical Supplies

The medical supplies used in a callout will vary depending upon the situation, types of patients involved, mechanism of injury or degree of illness, and location. The following section describes specific supplies that are commonly used in the tactical environment.

## Tactical Compression Bandages

Tactical compression bandages are designed to be used anywhere on the body where a cut or other injury has resulted in skin damage with bleeding **Figure 4-14**. They are elastic, and thus can be used for the head, neck,

**Table 4-3** Minimum Level 2 Tactical Medical Gear

Medical Vest With Utility Pouches	Thigh Pack
<ul style="list-style-type: none"> <li>• 1 stethoscope</li> <li>• Nitrile gloves (2 pairs)</li> <li>• 1 face mask with clear eye shield</li> <li>• Trauma scissors (1 pair)</li> <li>• Medical tape (1 roll)</li> <li>• 1 folding knife</li> <li>• 2 tourniquets</li> <li>• 2 combat compression dressings</li> <li>• Minor wound medical kit: alcohol wipes, Virex wipes, Band-Aids, Steri-Strips, Benzoin, Bacitracin, and/or other antibiotic ointment</li> <li>• OTC medications: acetaminophen (Tylenol), ibuprofen (Motrin or Advil), and antacid tablets (Tums) for minor complaints</li> <li>• Eye protection: goggles, clear polycarbonate glasses</li> <li>• Ear protection: foam earplugs, custom earplug inserts, or earmuffs (standard or electronic noise-canceling)</li> <li>• Personal ID, law enforcement badge</li> <li>• Cell phone, pager, portable radio with tactical headset</li> <li>• Flashlights (× 2, lithium-battery powered): 1 handheld and 1 headlight</li> <li>• Binoculars, night-vision monocular, and/or NVGs</li> <li>• Pen and weatherproof pad of paper for notes</li> <li>• Documentation: list of each tactical officer's abbreviated name, medical history, and allergies</li> <li>• Digital camera (for evidence preservation, documentation, interesting cases, and future education)</li> <li>• Personal dosimeter (in scenarios where the risks of radiation contamination are present)</li> <li>• Handcuff keys and cutting device for plastic handcuffs</li> <li>• Extra batteries in backpack</li> </ul>	<ul style="list-style-type: none"> <li>• Airway management kits: <ul style="list-style-type: none"> <li>– Oral intubation gear: endotracheal (ET) tubes (6.5 and 7.5), 1 stylet, adult oropharyngeal airway, laryngoscope with #3 blade, 10 cc syringe to inflate the ET cuff, device to secure ET tube to the mouth or neck area, double-lumen airway tube (King airway or Combitube) along with appropriate syringes to inflate cuffs with air</li> <li>– Bag-mask device or a mouth-to-mask ventilation system</li> <li>– Surgical airway kit: Betadine solution, cricothyrotomy hook, scalpel, 6.5 ET tube or tracheostomy tube, 4-inch × 4-inch gauze strips, strap to secure to neck</li> <li>– 4 Cook or 14-G, IV, 3.5-inch needles (for chest decompression)</li> <li>– Additional compression trauma bandages</li> <li>– Asherman Chest Seal (ACS) (× 4)</li> </ul> </li> </ul>
	<p><b>Belt (may be attached to the bottom of the vest)</b></p> <ul style="list-style-type: none"> <li>• Multitool (with pliers, small saw, screwdrivers, other tools)</li> <li>• Handheld, vibratory metal detector</li> <li>• APR (with NBC filter properly sealed)</li> <li>• Handcuffs or flex cuffs, defensive pistol and holster, extra magazines, pistol light, expandable baton, and pepper foam (if issued and/or approved)</li> </ul>

Data from Greenberg MJ and Wipfler EJ. Building a TEMS team. *ACEP Section of Tactical Emergency Medicine Newsletter*, 2005; 1(4):3-5.



**Figure 4-14** Apply a compression dressing to stop bleeding.

torso, and extremities. They are available in dark green and other colors that blend into the tactical environment.

There are several tactical bandages to choose from. Some of the more popular types include:

- Emergency Bandage (Israeli Combat Dressing)
- Olaes compression bandage
- Original H & H CINCH tight
- Bloodstopper

The compression bandage is effective and is an important part of the tactical medical gear. Although some of these bandages can be twisted with a built-in rigid 3- or 4-inch stick-like device to twist the bandage very tightly (windlass-type device) and thus turn into

**Table 4-4** Minimum Level 3 Tactical Medical Gear

<ul style="list-style-type: none"> <li>• A backup advanced airway management kit, which includes:             <ul style="list-style-type: none"> <li>– A second set of Level 2 airway supplies</li> <li>– Magill forceps (1 pair)</li> <li>– 1 laryngoscope with #1 and #3 blades (pediatric and adult sized)</li> <li>– Full size range of ET tubes (pediatric through adult sizes)</li> <li>– Curved hemostats</li> <li>– 1 scalpel</li> <li>– 1 cricothyrotomy hook</li> </ul> </li> <li>• An assortment of IV catheters (including 14, 16, 18, 20, and 22) and IV starting kits</li> <li>• Two 1-liter IV fluid bags (one LR, one D<sub>5</sub>½NS), 2 blood tubing IV lines with in-line hand pump, and 1 pressure bag for IV fluids</li> <li>• Disposable hot and cold packs as well as air-activated hot packs</li> <li>• Additional trauma dressings, tourniquets, gauze bandages, and chest seals</li> <li>• 1 stretcher and/or litter (made of fabric, allowing one-man drag extraction)</li> <li>• 2 SAM splints</li> <li>• Additional standard protection supplies (gloves, masks, eye protection)</li> </ul>	<ul style="list-style-type: none"> <li>• 50 feet of 400-lb parachute cord</li> <li>• Emergency thermal blankets, lightweight poncho</li> <li>• Second backup headlight, handheld flashlight</li> <li>• Sunblock lotion and insect repellent</li> <li>• GPS unit for orienteering and calling in medevac/helicopter</li> <li>• OTC medications: acetaminophen (Tylenol), ibuprofen (Motrin)</li> <li>• Advanced cardiovascular life support (ACLS) medications (stored in a crush-proof box): atropine, epinephrine, lidocaine, nitroglycerine sublingual spray, baby aspirin 81-mg tabs</li> <li>• 6 or more Mark 1 NAAK kits: high-dose atropine, Benadryl</li> <li>• Consider narcotic and other advanced pain medications</li> <li>• Antibiotics</li> <li>• Large, full-size white bed sheet (for making mass-casualty emergency dressings, an improvised field table to keep track of gear during patient care, and slings)</li> <li>• Medical waste bags and 1 disposable sharps hard plastic container</li> </ul>
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Data from Greenberg MJ and Wipfler EJ. Building a TEMS team. *ACEP Section of Tactical Emergency Medicine Newsletter*; 2005; 1(4): 3-5.

**Table 4-5** Minimum Level 4 Tactical Medical Gear

<ul style="list-style-type: none"> <li>• Assorted medications</li> <li>• Assortment of syringes and needles, alcohol wipes</li> <li>• Suture kits (× 2), skin glue, skin staplers (× 4), wound care supplies</li> <li>• Gauze, basin, nitrile gloves, suture material, Betadine swabs</li> <li>• Sterile saline (two 1-L bottles) for irrigation and/or cleaning of wounds</li> <li>• Additional IV fluid (two 1-liter bags each 0.9% normal saline [NS], D<sub>5</sub>½NS), IV lines, IV starting kits</li> <li>• Dental kit: mirror, dental floss, clove oil, topical anesthesia, tongue blades, stoma wax, temporary filling material, cyanoacrylate glue (× 14)</li> <li>• Additional trauma supplies: antiseptic towelettes, compression elastic bandage, trauma pads, eye</li> </ul>	<ul style="list-style-type: none"> <li>• dressing, rigid eye shield, cotton swabs, SAM splints, triple antibiotic ointment, Band-Aids, tape, nonstick gauze, moleskin/blister kit, irrigation syringes and solution, Betadine scrub brushes, extra cold packs, heat packs, Cook pneumothorax kits, thermometer, extra stethoscope, trauma scissors</li> <li>• Patient information tags, triage tags</li> <li>• Two emergency thermal blankets</li> <li>• Strobe light and smoke markers for designating a landing site</li> <li>• Medical waste bags, disposable sharps hard plastic container</li> <li>• SKED or other portable stretcher that can be kept in the raid/SWAT vans</li> </ul>
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a makeshift tourniquet, these do not work as well as designated tourniquets.

## Tactical Tourniquets

A tactical tourniquet is a medical device that is used to stop arterial and venous bleeding from the arms and legs (extremities). Tactical tourniquets compress the blood vessels so that no blood flows past the device, thus significantly slowing or stopping hemorrhage.

The number one cause of preventable death in combat is extremity hemorrhage. Remember that bleeding must be stopped as soon as possible. If you are close to an injured tactical officer and can rapidly and safely apply a compressive dressing to the extremity wound and effectively stop the bleeding, then a tourniquet may not be necessary.

However, if a SWAT officer is alone or separated from his or her unit and has a serious gunshot, knife wound, or other serious trauma to an arm or leg, then a tourniquet should be applied immediately after the suspect is neutralized. If the SWAT officer wrongly attempts to apply direct pressure or a standard compression dressing and serious bleeding continues, then the SWAT officer is at risk of becoming weak and unconscious and potentially bleeding to death. The main advantage of using a tourniquet is that when properly applied, the bleeding is stopped and management of the wound is completed for the short term.

Currently, it is highly recommended by experts that tourniquets be carried by every SWAT and TEMS unit personnel. You should carry several tourniquets. There are many different styles of tourniquets available including:

- Combat Application Tourniquet (CAT)
- Special Operations Forces Tactical Tourniquet (SOFTT)
- Mechanical Advantage Tourniquet (MAT)
- NATO, Delfi EMT tourniquet

It is important for each SWAT officer to have the knowledge, equipment, and skill to utilize a tactical tourniquet on his or her own leg or arm or on others nearby if it is indicated. If a formal tourniquet is not available but urgently needed, then improvised tourniquets from clothing or other material may work.

## Clotting Agents, Hemostatic Bandages, and Hemorrhage Control

There are multiple agents and bandages that are designed to stop or slow down serious blood flow from injury, including **hemostatic agents** and bandages. Hemostatic agents assist with controlling bleeding by

### Controversy

Many hemostatic agents have yet to be thoroughly and scientifically investigated, and at the time of publication of this text, many are considered controversial **Figure 4-15**. However, there are first-hand accounts of some of these agents working; in theory and according to some animal studies, these agents do work to some degree. Medical directors and TEMS unit commanders should explore up-to-date research studies involving these agents and validate for themselves the usefulness and indications for using these hemorrhage control products. New agents will inevitably be developed, and only through careful, unbiased research will it be determined what actually works best in the tactical environment.



**Figure 4-15** Combat Gauze™ is one type of hemostatic bandage.

enabling the formation of a blood clot. There is some controversy surrounding these items, so obtain the proper training if your agency uses these items and follow the protocols of your agency.

## Occlusive Dressing With a Relief Valve (ACS or Equivalent)

Medical care for penetrating trauma to the chest often should include application of a one-way valve-type dressing such as the Asherman Chest Seal (ACS), Bolin Chest Seal, or an occlusive dressing taped or secured on three sides **Figure 4-16**. If a patient is sweating or bleeding from a wound, tincture of Benzoin may be needed to secure an ACS to the patient's skin. All of these dressings work by preventing air from entering the chest directly through the wound, but allow the escape of air pressure. Chapter 18, "Thoracic and Torso Injuries," covers penetrating trauma to the chest in detail.



**Figure 4-16** The Asherman Chest Seal is used to occlude large holes in the chest wall with a one-way valve dressing.



**Figure 4-17** Carry appropriate decompression needles such as these 3.5-inch or longer IV catheters with an inner needle for chest decompression when indicated.

## Chest Decompression Devices

The number two cause of preventable death from battlefield combat injuries is tension pneumothorax. Assessment and treatment of a tension pneumothorax is covered in detail in Chapter 18, “Thoracic and Torso Injuries.” It is important for appropriately trained and certified personnel to carry several decompression needles to treat this condition **Figure 4-17**. The types of needles are discussed in detail in Chapter 18.

## Airway Devices

The TEMS unit should carry a variety of airway devices. These devices range from simple oxygen masks to surgical airways. Unfortunately, it is common knowledge amongst criminals to shoot police officers where they

## Controversy

Most states require ALS training and certification in order to perform a needle chest decompression. However, the US military is training many of its nonmedical soldiers to perform this procedure on fellow soldiers who have penetrating chest injury and unstable vital signs. This signifies a change in conventional medical care, in which a medical procedure that is normally viewed as “advanced” is actually being taught to nonmedically trained personnel.

do not have protective armor, such as the face and neck. This and other factors result in SWAT officers being at high risk for a gunshot to the neck or face that may cause immediate airway obstruction. All TMPs should keep airway devices that will enhance their ability to obtain and maintain an airway in these settings.

Ideally, TMPs are certified and prepared to provide an immediate surgical airway by performing a surgical cricothyrotomy. The tools needed include:

- An airway tube (ET tube)
- A sharp knife/scalpel
- A cricothyrotomy hook
- Betadine or alcohol skin prep

You must also be proficient in the use of many other airway devices, including intubation and proper ET tube placement, and blind insertion airways such as the King airway and Combitube. These procedures and indications are described in Chapter 14, “Advanced Airway Management.”

## Safety

Methicillin-resistant *Staphylococcus aureus* (MRSA) bacteria is a strain of staph bacteria that is resistant to many of the broad-spectrum antibiotics commonly used to treat infections and can be fatal. To avoid MRSA:

- Frequently and thoroughly wash your hands.
- Use hand sanitizer gels or lotions when handwashing is not possible.
- Avoid sharing towels, sheets, athletic equipment, razors, or clothing.
- Shower after SWAT training.
- Keep any wounds covered with a sterile dressing.

## Automated External Defibrillator

The automated external defibrillator (AED) is a medical treatment device that has been proven to save lives **Figure 4-18**. If a person suddenly collapses and is noted to be unresponsive and without a pulse, it is likely that person is experiencing a lethal abnormal electrical rhythm or cardiac arrhythmia.

Unfortunately, over the years there have been multiple sudden deaths from cardiac arrhythmias during SWAT unit training, annual physical training, and SWAT unit tryouts. In some instances, tactical officers overexerted themselves and then suffered a cardiac arrest due to a sudden heart attack or lethal arrhythmia, and they likely died a preventable death due to lack of an AED at the location of training. All fire and police agencies are well advised to bring an AED whenever there is physical training or significant physical exertion. In addition, there are occasional circumstances at SWAT callouts where a bystander or other person suffers a heart attack and collapses due to the stress.

Statistically, if a bystander or TMP properly uses an AED on a collapsed victim with ventricular tachycardia or fibrillation, there is an 80% chance of survival if the patient is shocked within 5 minutes of collapse. If the AED is not nearby and its use is delayed until 8 minutes after cardiac arrest, that person has only a 20% survival

rate. There is a big difference in survival between 2 and 8 minutes; therefore the AED should be kept immediately available. *Note that this is a state-law required piece of equipment for most EMS and TEMS agencies.* In addition, nearly all fire trucks and rescue trucks carry AEDs, and many police agencies now routinely carry these in the trunks of their squad cars.

The only disadvantage is that the average AED is heavy at 6 to 12 pounds in weight, and this weight and bulk prevent the routine carrying of this device. Smaller units are available that may fit into a backpack. Indeed, the actual need for an AED inside of the inner perimeter is quite rare, and some feel that the best location is to keep it in a secure location nearby at the command center or in the standby ambulance. The patient can be urgently brought to that location, or someone can run and obtain the AED if needed. Some newer AED units are less than 2 pounds and may be more practical to carry.

## Oxygen Tanks

Most tactical medical emergencies can be handled without the use of oxygen. Tactical officers are generally very fit athletes, and if a gunshot wound occurs, the primary airway and breathing problems are mechanical, such as an obstructed airway or collapsed lung. Most of these patients can be ventilated with a 21% environmental oxygen level without any problems for the short duration of time it takes to reach a hospital or the ambulance. The risk-to-benefit ratio of bringing an oxygen tank inside of the outer perimeter is high, therefore it is usually not worth it.

A high-pressure oxygen tank is a risk for a lethal outcome as the pressure contained inside is often over 3,000 psi. This high pressure will cause a tremendous release of energy and, essentially, an explosion will occur if a bullet or metal explosion fragment strikes the tank and punctures it. The oxygen will also increase the risk of a flash fire with resultant burns.

The decision whether or not to carry oxygen into the tactical environment is dependent on the agency. The oxygen tank is usually kept at the command center or nearby ambulance and is not utilized in the tactical environment. If an elderly patient with chest pain or a severely asthmatic patient is encountered, they can either be moved to an ambulance or the oxygen can be brought to him or her in a safer location.

## Stretchers and Extraction Gear

Extraction and rapid transportation of the critically injured tactical officer is one of the primary responsibilities



**Figure 4-18** AEDs can save lives, and therefore all SWAT officers and TMPs must be familiar with their use. Keep an AED nearby for immediate use during all training activities and callouts.



**Figure 4-19** A sling-link extraction webbing system can be used to extract a critically injured patient.

of the TEMS unit **Figure 4-19**. After abolishing threats, the injured tactical officer may need to be rapidly moved out of harm's way to a point behind hard cover. There are many techniques and devices designed to extract and transport these patients. These include a simple body drag by grabbing the “drag handle” on the upper back of tactical vests; grabbing the downed tactical officer by an arm or foot and dragging him or her; using one-, two-, or four-man carries **Figure 4-20**; using webbing harness drags and carries; using stretchers (soft nylon, collapsible, semirigid, and rigid); and newer techniques such as attaching a short drag line to the TMP's belt



**Figure 4-20** A four- or six-man litter carry is not practical inside a building with narrow doorways and halls, but is easier when moving an injured victim outside and across open terrain.

and attaching it to the downed tactical officer and dragging the tactical officer using the legs and lower body, allowing both hands to be free to provide armed response to any attackers. Having several gear options and techniques to use in extracting and transporting patients is ideal. Further discussion may be found in Chapter 16, “Extraction and Evacuation.”

## Field-Expedient Decontamination Equipment

TMPs should be prepared to perform emergency decontamination at all times. The unexpected booby trap of sulfuric acid spilled onto tactical officers or the accidentally discovered methamphetamine lab with caustic contamination may require rapid removal of the SWAT officer's gear and uniform followed by field expedient decontamination with plenty of water and possibly soap. A common garden hose and on-site arrangements for water and decontamination should be planned and prepared for in advance. Chapter 24, “Weapons of Mass Destruction,” covers decontamination in detail.

## Personal Dosimeters

Although statistically this might be considered an unlikely event, the threat of a radioactive material being placed next to a conventional explosion and scattering radioactive debris (a dirty bomb) in a large area is a modern reality. Tactical officers and TMPs may be able to detect many radioactive material threats by carrying a small (several inches) electronic, personal dosimeter on their load-bearing vest **Figure 4-21**. There are several varieties of these devices, and some of the more advanced units can actually “count” the amount of radiation that the wearer has been exposed to, thus indicating when a maximum recommended dose (exposure) has been reached. Those types of units are called personal dosimeters.

Another threat is the silent release or distribution of radioactive dust or other material in a large crowd, which would silently expose many to radiation. Use of a device such as the personal dosimeter may be the only way to notify authorities of the terrorist incident. A nuclear explosion would of course be devastating, and

TEMS units and other public safety officials would need to be able to detect and manage individuals who have radioactive dust particles contaminating their clothing, cars, and other personal items.

## Additional Equipment to Consider

### Surgical Equipment

Although rare in the prehospital setting, there may occasionally be a need for surgical procedures. In most circumstances, if a tactical officer suffers a significant injury (such as a large laceration) he or she will be replaced by another tactical officer and be sent to a local hospital for proper sterile wound care. Under bright lights, with x-rays possible to rule out any deep injuries, tendon lacerations, or metal, glass or other foreign bodies, and with cleaner surroundings, the surgical repair may be done more cleanly and easily. However, sometimes the wound is small, or the tactical officer involved is of substantial importance to the mission, or the distances to the hospital are too long and therefore the wound repair may be more ideally bandaged or repaired outside of the hospital. If this is a possibility, then the TEMS unit should carry wound care and surgical supplies such as a small scalpel, suture material, staples, local anesthetic medicine, and syringes and be prepared to perform wound care and repair.

### Emergency Ultrasound

The modern, small, portable ultrasound machine can be used in many ways for emergency medical diagnosis and procedures. Portable ultrasound machines operate on battery and plug-in AC electrical current, and some models can be hooked up to a small laptop computer. Ultrasound is very safe to use, and can be used to detect intra-abdominal bleeding (ruptured spleen or liver, internal bleeding), cardiac tamponade, and congestive heart failure; evaluate for pulseless electrical activity (PEA), penetrating trauma, hemothorax, pneumothorax, foreign bodies, pregnancy complications, and deep vein blood clots; diagnose fractures; and assist with medical procedures (central IV lines, drainage of abscesses, joint aspiration), among many other uses.



**Figure 4-21** A personal dosimeter.

Although the cost of a durable portable ultrasound unit is still in excess of \$8,000, they are now less expensive than a standard EMS cardiac Lifepak 12 monitor and can be quite useful in assessing a patient with acute illness or injury. Increasingly, emergency medical professionals such as physicians, flight paramedics, and nurses use ultrasound in daily care. In large mass-casualty incidents (MCIs), emergency ultrasound has been used effectively and accurately to screen hundreds of people for severe trauma and triage in primitive prehospital conditions. The utility of this device in normal SWAT search warrants and simple incidents is limited due to the short transportation times, but for extended or remote operations, this device would be worthwhile to consider.

### Metal Detector

The first priority of a tactical officer is to make the scene safe. When dealing with potential criminals, the suspect should be thoroughly searched for weapons before any medical care is initiated. The obvious knife or gun found in a front pocket is easy to identify and remove. What is more difficult to find is the small handcuff key or bobby pin sewn into the suspect's pant's posterior (the back surface of the body) beltline that is hidden and easily missed by a "pat-down" search, yet later may result in the death of a police officer transporting that suspect to jail. Even worse is the small hidden pistol that has been placed in the groin/crotch area of a male or female suspect—an area that some SWAT officers and TMPs may be hesitant to touch during the search due to social attitudes or stigmas. This is especially true when searching a suspect of the opposite gender. Allegations of sexual misconduct can stem from SWAT officers who search the groin area, and therefore proper technique and witnesses should be utilized to perform a thorough search.

Because of the wide variety of weapons, including keys, razor blades, hypodermic needles, bobby pins, and other threats, a handheld metal detector is a key piece of equipment that TMPs and tactical officers should utilize to thoroughly search suspects, hostages, or other persons who may represent a threat. The most optimal unit is a small, handheld, 9-volt battery-powered metal detector unit that does not "beep" or have a visible or auditory alarm. Instead, this vibratory metal detector wand is used by holding it about one-half inch away from the clothing of a suspect; when metal is detected, the device vibrates silently and gently **Figure 4-22**. This offers the tactical advantage of allowing the searching person to find objects, but does not inform the suspect that the object has been found.



**Figure 4-22** A small, battery-powered metal detector may be used to search suspects.

## Safety

A handheld metal detector will not detect plastic composites. A number of commercial sharp-edged weapons are composite and are not detectable by metal detectors.

If a metal detector with an auditory alarm sounds, the suspect may realize that his or her weapon or “last-ditch” ability to escape has been detected. This may precipitate a violent struggle as the suspect attempts to obtain the gun, knife, or other weapon and escape. If a suspected weapon is detected silently, then the surrounding SWAT officers can quietly discuss this and use a safe tactic to appropriately remove the weapon.

## Ready for Review

- The uniform and clothing worn by TMPs and tactical officers should be protective, comfortable during normal and extreme weather, and blend with the local environment. The proper selection of cold and hot weather clothing will enhance mission success.
- Insignia and individual identification may be used during training and for visualization during close conversation distance, but in general, should not be seen during a callout.
- Medical markings may increase the likelihood of being targeted and should be minimally visible.
- Extreme weather clothing and protective gear include a four-layer system of clothing during cold weather operations designed to wick away sweat and prevent unnecessary cooling and thus decrease cold injuries. Protective gloves, hats, gaiters, and balaclavas all have benefits and should be used when needed.
- Hot weather clothing is light, breathes easily, and also wicks away body perspiration.
- PPE carried by TMPs should be used appropriately for all patients. It is impossible to determine by external appearance which patients are carriers of bloodborne pathogens and which are not.
- Ballistic protective gear is essential for training and callouts, and includes body armor, helmets, face shields, and other equipment.
- The mission requirements and medical threats should guide the medical equipment and resources used. Medical gear should be attached or carried in a reliable, tactically quiet, secure method. This may include vest/belt/thigh pouches, backpacks, or a medical kit stored nearby for immediate access if needed.
- SWAT officers and TMPs should all have an IFAK on their person at all times.

## Vital Vocabulary

**air-purifying respirator (APR)** A gas mask worn to filter particulates and contaminants from the air.

**balaclava** Black or camouflage-colored stocking-hat type of head cover that slips over the head and neck, covering the entire head except for the eyes, nose, and possibly mouth.

**ballistic vest** Designed to stop many types of bullets, help defeat shrapnel, and resist puncture by other projectiles; worn underneath other protective garments and gear.

**cardiopulmonary resuscitation (CPR) mask** A portable face mask used as a standard precaution to protect emergency care providers administering rescue breaths to a patient.

**hard body armor inserts** Rigid inserts made of steel, ceramics, aluminum, or titanium that are used for added frontal-torso protection in addition to soft body armor; available in threat protection Levels III and IV.

**hemostatic agents** Agents that assist with controlling bleeding by enabling the formation of a blood clot.

**individual first aid kit (IFAK)** A medical kit that contains the essential first aid supplies for a tactical officer or TMP, and is usually located on the vest or in a cargo pocket that is supposed to be carried in the same location.

**infrared flashlight** Device that emits infrared light, which is invisible to the human eye; may be used to illuminate an area, allowing SWAT and TEMS officers to discern the presence of objects and humans more than 400 yards away.

**nasopharyngeal airway** An airway adjunct inserted into the nostril of a casualty who is not able to maintain a viable airway.

**night vision equipment** Devices that enable humans to see in the dark, using infrared or ambient light to identify objects and people up to several hundred yards away.

**nitrile gloves** Inner gloves, made of synthetic latex. They are more durable and chemical-repellant than rubber gloves, and do not cause problems for officers or citizens with latex allergies.

**personal protective equipment** Protective equipment that OSHA requires to be made available to emergency medical providers. In the case of infection risk, PPE blocks entry of an organism into the body.

**soft body armor** A ballistic-resistant fabric worn concealed under the uniform or over the uniform, made from polyethylene fiber.

**stab-resistant ballistic vest** A vest designed to be resistant against puncture from knives, shanks, and other pointed or edged weapons.

**tactical compression dressings** Gauze that is already attached to elastic wrapping with prerigged cinching and fastening devices; should be vacuum-packed, sterile, lightweight, and easily deployed.

**tactical personal protective equipment (TPPE)** Personal protective equipment designed to protect TMPs from medical and violent threats in the tactical environment, including clear goggles, protective mask, nitrile gloves, and head and boot protection.

**tactical tourniquet** A medical device used to stop arterial and venous bleeding from the arms and legs (extremities) and compresses the blood vessels so that no blood flows distal to (past) the device, thus significantly slowing or stopping hemorrhage.

**thermal imaging devices** Electronic devices that detect differences in temperature based on infrared energy and then generate images based on those data; commonly used in obscured environments to locate victims and/or suspects.