This chapter describes the assessment and treatment of injuries to the skin encountered in the wilderness. Objectives:

- Understand the importance of identification and thorough visualization of wounds in the backcountry
- Be able to describe the various types of wounds
- Describe the actions necessary for hemostasis
- Discuss methods to prevent infection
- Understand closure options for wounds in the wilderness
- Be able to identify wounds that require evacuation from the backcountry
Case 1

You are the medical expert of a group on a multi-day trek. You come across an individual who has a blood-soaked shirt wrapped around his forearm. He states he was free climbing about 6 hours earlier that day and fell. You examine his forearm and note an actively bleeding, four centimeter laceration that appears to contain exposed muscle tissue.

1. What are the principles of examination of this wound?
2. What steps should you take to attempt to achieve hemostasis?
3. What is the most important step to prevent infection?
4. If you have the supplies, should you attempt closure?
5. Does he require evacuation? What factors determine the need to evacuate patients with wounds from the backcountry?

Case 2

You are the medical expert on a mountaineering expedition, when one of the individuals suffers a splash burn from the oil in a kerosene lamp. You assess the patient, beginning with a primary survey. You note no airway compromise or respiratory distress. The rest of the examination is normal with the exception of a full-circumference burn of much of the left forearm, totaling about 5% total body surface area (TBSA). Most of the burn is erythematous with blisters, but about 2% TBSA is off-white and insensate.

1. What is the proper initial treatment for this burn?
2. Which burns require evacuation?
3. When is an escharotomy necessary?
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Background

Injuries to the skin are among the most common problems encountered in the wilderness. In the backcountry, where it may be difficult to keep an injury clean or covered properly, even a simple abrasion can become a serious problem.

When evaluating any wound it is important to thoroughly examine and document the dimensions of the wound. Documentation should include a description of:

- Type of wound (abrasion, laceration, etc.)
- Location
- Dimensions (width, length, and depth)
- Presence or absence of foreign body
- Bone, tendon, or joint involvement

If the wound is overlying or adjacent to a joint, it must be examined through a full range of motion to look for evidence of disruption of the joint capsule. Other principles to keep in mind when examining all wounds include:

- Full exposure of affected area, or entire body if necessary
- Hemostasis
- Examination of distal neurovascular and musculoskeletal function
- Cleaning and control of infection
- Definitive wound care to preserve function of the injured part

Examination in the wilderness can be challenging; light may not be adequate. A headlamp is an excellent hands-free tool to improve visualization in the wilderness (as well as in a clinic’s examination room).

Pathophysiology

General

An understanding of the processes involved in wound formation and repair is essential in order to properly direct treatment and determine the need for evacuation.

- The moment one’s skin is disrupted, the wound becomes invaded with potentially infectious bacteria. Contaminants may include skin flora (especially concerning if the patient is colonized with methicillin-resistant Staph. aureus (MRSA)), or bacteria that reside in the penetrating object. Other virulent organisms include Clostridium species from soil, Pseudomonas residing in footwear or water sources, and oral flora from various bites, including Pasteurella, Eikenella, and streptococcus.
- Early thorough irrigation and protection from the environment is essential. This may be difficult in the clinical setting, let alone the backcountry. As time progresses following injury, without intervention, bacteria growth quickly increases to a point where primary closure is no longer a reasonable approach. This is a common dilemma in the backcountry, as an injured individual may not have access to immediate adequate treatment. There is no single time limit that determines whether a wound can be closed primarily or must be placed on antibiotics. Instead, multiple factors determine the likelihood of infection and must be considered when deciding on definitive treatment and administration of antibiotics. These include:
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- Time from injury
- Body location
- Degree of contamination
- Type of forces applied
- Immunocompetency of the patient

Head and facial wounds heal especially well, even with closure up to 100 hours from time of injury.

Abrasions

Abrasions are typically caused by falls against a hard surface. As the individual falls and/or slides, friction causes the outer layers of the skin to rub off, or abrade.

Lacerations

Lacerations may be caused by multiple forces. Information about the cause of the laceration will help guide treatment.

- Shear forces are most common; a sharp object cuts through the skin. Shear force injuries also have the best healing properties, as underlying tissue is minimally disrupted.
- A crush injury occurs when one strikes a blunt object, as in the forehead striking the ground. This leads to tissue devitalization and increased risk for infection.
- Stretching forces that lead to lacerations are the most likely to cause underlying nerve and tissue damage.

Blisters

Blisters result from frictional forces exerted on the skin surface, leading to separation of the epidermis and fluid collection. If friction continues without intervention, these enlarge and rupture, leading to painfully exposed lower epidermal layers.

Burns

Minor burns lead to local necrosis and release of inflammatory mediators. When more than 15%-20% of the body surface area is involved, the effects become systemic, and increasingly likely to lead to cardiac failure.

Causes of burns with varying degrees of severity include the following:

- Scald burns due to splashes or immersion in hot fluid
- Flame burns
- Flash burns due to explosions
- Contact with hot materials
- Electrical burns – thermal burns due to high-intensity heat
- Chemical burns caused by corrosives

Clinical Presentation

Abrasions

These “road rash” injuries can range from minor scrapes that involve the epidermis only and
require minimal attention, to injuries that cause major skin disruption, as seen in high-speed crashes. The more serious injuries may involve muscle tissue and be serious enough to require skin grafting. Most abrasions result in minimal blood loss, but can be very painful due to the exposure of many nerve endings.

Lacerations

Cuts of the skin have multiple presentations:
- Linear or abnormal lacerations due to shear, blunt, or stretching forces
- Puncture wounds are lacerations with depth greater than length. These have a higher risk of infection and retained foreign body. Due to the depth and unknown pathway, they are more difficult to examine.
- Amputations are lacerations in which tissue is excised. Most are very minor and include the very distal extremities. In minor cases, re-implantation is neither possible nor necessary
- Animal bites may cause puncture or laceration. Because of the oral flora of the animal, and tissue damage due to teeth, these are at high risk of infection. Treatment of envenomation is covered in another chapter.

Blisters

- Blisters that develop in the backcountry most commonly form due to frictional forces while hiking. Improperly broken-in or poorly fitting shoes are the most common etiologies.
- A blister is typically preceded by a "hot spot", which is a sore erythematous area formed from the frictional forces. Presentation may range from minor and even painless fluid collections to debilitating injuries that may require evacuation. Complications include cellulitis and osteomyelitis, occasionally resulting in sepsis and death.

Burns

Burns are categorized by size - quantified as the percentage of body surface area involved - and by depth.

Burn size

- The "Rule of Nines" can be used to estimate the percentage of the total body surface area (TBSA) that has been burned.
  
<table>
<thead>
<tr>
<th>Body Part</th>
<th>TBSA Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each arm</td>
<td>9% of TBSA</td>
</tr>
<tr>
<td>Each leg</td>
<td>18% of TBSA</td>
</tr>
<tr>
<td>Front of trunk</td>
<td>18% of TBSA</td>
</tr>
<tr>
<td>Back of trunk</td>
<td>18% of TBSA</td>
</tr>
<tr>
<td>Head and neck</td>
<td>9% of TBSA</td>
</tr>
<tr>
<td>Groin</td>
<td>1% of TBSA</td>
</tr>
</tbody>
</table>

- As a rough guide, the area of an individual’s palm represents approximately 1% TBSA. Using this, the patient’s palm can be used to estimate the percentage of their body area burned.

Burn depth

Burns have classically been described in terms of degrees (first, second, third). However, the accepted approach in burn centers is a classification according to need for surgical intervention: superficial partial-thickness, deep partial –thickness, and full-thickness burns. The classifications will be presented together here for aid in comprehension:
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First Degree Burns

The epidermis is reddened, and the victim feels pain. A common example of a first-degree burn is sunburn. While painful, this is the easiest type of burn to treat and evacuation is generally unnecessary.

Partial Thickness (Second Degree) Burns

Superficial partial-thickness
- The epidermis and superficial dermis are injured. The skin is blistered, and exposed dermis is red.

Deep partial-thickness
- Extend into deep layer of the dermis, damaging hair follicles and sweat glands. The skin is blistered and the exposed dermis is pale white to yellow. Like full-thickness burns, the center may be insensate.

Full Thickness (Third and Fourth Degree) Burns

Third degree
- All layers of the skin have been burned including blood vessels and nerves. The flesh may be charred, but the victim feels no pain from a full-thickness burn because the nerve endings have been destroyed. Painful second-degree burns may surround the full-thickness burn. Full-thickness burns require skin grafting.

Fourth degree
- These injuries extend through the skin to the subcutaneous fat, muscle, or bone. These are universally life-threatening.

Treatment

General Considerations

Exposure
Adequate exposure and visualization through a full range of motion is essential for proper examination for foreign bodies and of extent of injury.

Hemostasis
- 1st line of action: Direct pressure. Application of direct pressure controls bleeding from most wounds. Using the cleanest material available, control bleeding by applying pressure to the source of bleeding. Larger wounds may require direct pressure for several minutes. Scalp wounds may require direct pressure for 30 to 60 minutes, continuously, in order to achieve hemostasis.
- 2nd line of action: Pressure points and elevation. If direct pressure does not stop bleeding after about 20 minutes, attempt to elevate the limb above the heart and apply pressure to the pressure points in the victim’s armpits (axillary artery) or groin (brachial artery).

- Last resort: Tourniquets. If the first two methods do not stop the bleeding, and if the victim is in danger of bleeding to death, use a tourniquet. Tourniquets should typically be used ONLY AS A LAST RESORT. Tourniquets are to be used only if the wound is on a limb. Very rarely, a tourniquet may be the first line of control necessary in a life-threatening proximal limb
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traumatic amputation, as may be seen in the face of high-energy explosives. However, most traumatic amputations involve the digits and distal extremities and can be controlled with a combination of direct pressure and pressure points.

A tourniquet is a band applied around an arm or leg so tightly that all circulation below the band is cut off. To make a tourniquet, take a strip of cloth at least 2 inches wide. Never use wire, twine, cord, or any other thin material that will cut the skin. Using an overhand knot, tie the material just proximal to the wound, as closely as possible. Be aware that everything below the tourniquet may require amputation. Place a stick or rod through the knot, and twist until the bandage is tight enough to stop the bleeding. Then secure the stick so the tourniquet won’t come loose. Write on the victim’s forehead the time you applied the tourniquet, and use caution when loosening the tourniquet. Treat the victim for shock.

Anesthesia

Anesthesia may be accomplished via multiple methods:

- **Topical anesthesia**
  Topical anesthesia has been shown to be somewhat effective for skin lacerations and is appropriate for backcountry medicine. There are two common formulations. The first is a combination of tetracaine, adrenalin, cocaine (TAC). The other is referred to as LET; a combination of lidocaine, epinephrine, and tetracaine. The solution is soaked into sterile gauze and massaged directly over the wound for 20-30 minutes. An area of blanching at the site of administration indicates adequate anesthesia. This may simultaneously assist in achieving homeostasis by a combination of direct pressure on the wound and vasoconstriction. Disadvantages include the potential for a slightly increased rate of infection and the fact that TAC and LET solution are not as versatile an analgesic as lidocaine alone, which can be used for both local and regional infiltration. Further, because of the cocaine, TAC is a controlled medication.

- **Local anesthesia**
  Local anesthesia using an injection of 1% lidocaine (without epinephrine) is the standard method for achieving soft tissue analgesia for closing a wound. This will have to be carried, along with syringes and needles into the back-country, which may not be feasible. However, syringes and needles themselves have multiple uses in wilderness medicine.

If one is not prepared with the above supplies, the wound may require treatment without the benefit of analgesia, affecting the way the wound is cleaned and closed.

Irrigation

High-pressure irrigation is the most important intervention to prevent infection and to decrease bacterial content, for most wound types.

- Irrigate the wound with a solid stream of disinfected water or saline. If available, use a syringe with a catheter tip (ideally, an 18 or 19 gauge needle) to create a high-pressure stream of water. If a syringe is not available, fill a plastic bag or hydration system with the cleanest fluid available (tap water has been shown to protect against infection as effectively as sterile saline). Poke a small hole in a corner of the bag, and then close the top of the bag to create a seal in order to force a stream of high-pressured water from the bag. A plastic water bottle with an adjustable top may also be used if a stream can be produced.
- Gently pull apart the wound edges and irrigate while holding the syringe or bag over the wound. Rinse the wound forcefully with the water, protecting your skin and eyes from fluid splashes. If a splash shield is not available, a 4x4 gauze pad can be taped at the opening of the irrigation system to help avoiding splashes. A general principle is to irrigate with at least
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60 mL of fluid per centimeter of injury, with a minimum of 200 mL. The more fluid used to irrigate the wound, the better.

Debridement

- It is important to remove visible foreign matter from the wound to avoid infection and skin tattooing. If possible, try to remove any devitalized tissue. This may be problematic, particularly if unable to adequately visualize the field. Debridement should be followed with another round of high-pressure irrigation.

Wound closure

In many backcountry situations, it is difficult to achieve adequate wound care as outlined above. If the provider is well-prepared, and resources are available, closure techniques may mirror those in a clinic and sutures may be used. However, in many situations this is not the case. Closure may be achieved most simply by using a micro pore tape, if available. The method follows:

- Remove a wound closure strip from its backing and tape the wound together. The tape should close the wound so the edges of the wound touch, but not so tight that the tape squeezes the wound tightly shut.
- If needed, cut away the hair around the edges of the wound with scissors so the tape will adhere better.
- Make sure the tape overlaps about 1 inch on each side of the wound. Use as much tape as needed, with each strip placed a couple millimeters apart.
- If micro pore tape is not readily available, one may use punch holes in duct tape using a safety pin to accomplish the same effect.

Sutures and staples can both be used effectively if continued cleanliness of the wound can be assured, and are more appropriate for large wounds and those in high-tension areas. Staples can be used anywhere except the face. Some believe that micro pore tape and staples will adequately close the majority of skin wounds in the wilderness. However, personal preference and packing limitations will dictate what closure material one decides to bring.

Skin adhesives (cyanoacrylates) may be used for closing small uncomplicated lacerations. The chemical is applied on top of the wound and serves as a bandage to close the wound. They are as effective as sutures for low-tension areas. They also produce an impenetrable barrier that requires a thoroughly cleansed wound. Skin glues are easy to transport, but still relatively expensive. If applying a cyanoacrylate product, do NOT use topical antimicrobials, as these petroleum-based products will dissolve the glue.

Dressing

Wound dressing is important for protection from the environment and prevention of infection. This may be accomplished in a number of ways. If a commercial non-stick pad or dressing is not available, improvise using a 4 x 4 pad covered in an antibiotic ointment. Cover this dressing with an absorbent gauze dressing, then secure with tape. If the injury is on a flexible part of the body – an elbow or finger, for example, immobilize the joint with a splint to prevent reopening of the wound.

Antibiotics

- Topical antibiotics are appropriate for all skin wounds. Multiple choices are available. Bacitracin or mupirocin are reasonable choices. Neomycin has resulted in multiple allergic reactions and is less ideal. Another ideal topical antimicrobial is honey. The osmolarity and
bacteriostatic compounds in unprocessed honey make it an extremely effective, inexpensive and readily available alternative for topical application.

- Systemic antibiotic administration in the face of skin wounds is a subject constantly under debate. Adequate cleansing and protection from the environment are much more important factors in prevention of infection. As stated above, multiple factors must be considered when determining whether or not to administer systemic antimicrobials. Indications for systemic antimicrobials generally mirror those in the clinical setting:
  - Complex or mutilating wounds
  - Grossly contaminated with penetrating debris
  - Extensive lacerations of the ear and cartilage
  - Penetration of bone, joint, or tendon
  - Animal bites of extremities
  - Open wounds in patients with valvular heart disease, diabetes, or immunosuppression

- Additionally, wounds that cannot be adequately protected from the environment may benefit from prophylactic antibiotics.

- Any wounds with signs of infection should receive antibiotics. These include those with increasing:
  - Pain
  - Redness
  - Swelling
  - Pus
  - Fever

- Antimicrobial prophylaxis should be generally administered for 3 to 5 days. A longer course provides no better protection against infection, and increases the risk of resistance. Current acceptable choices for prophylaxis include a first-generation cephalosporin, amoxicillin-clavulanate, or clindamycin.

- Treatment for active infection should be administered for 7-10 days, and should be tailored to suspected organism and local resistance patterns.

- Dressing changes and wound checks should be performed at least once daily in the backcountry. Most infections begin within 48 hours, but aggressive and gas-forming infections may begin within hours.

**Abrasions**

Abrasions should be irrigated as described above. If anesthesia is required, topical anesthesia may be best, as it is usually difficult to infiltrate the entire area of an abrasion. Debridement is extremely important to prevent against permanent scarring due to retained foreign body. Dress and treat as indicated above.

**Amputations**

Once hemostasis has been achieved, determine if the amputated part is large enough to be re-implanted. Candidates for re-implantation include:

- Multiple digit amputation
- Single digit amputation proximal to the distal phalanx
- Injuries in children
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- Amputations involving the thumb

The amputated part should ideally be soaked in sterile gauze and placed in a bag, then transported on ice with the patient to definitive care as soon as possible.

Lacerations

Most lacerations can be treated as described under General Considerations above. Special considerations include:

Scalp lacerations
- The extent and severity of scalp lacerations are often initially obscured by surrounding hair that is matted with blood. Copious irrigation is often necessary to visualize the laceration. Hair may be trimmed if necessary, but this should be limited to the immediate area of the laceration, since the surrounding hair can later be twisted into strands and used to approximate the wound edges. Once the margins of the scalp laceration have been defined, local or topical anesthetics may be applied.
- Physical examination of a scalp laceration should assure the integrity of the galea aponeurotica tissue layer that overlies the skull. A significant galeal laceration or the presence of a de-gloving injury may mandate evacuation. This is especially true in victims with mental status changes, who may have an underlying skull fracture.
- Minor scalp lacerations can be effectively treated in the wilderness setting. After the application of analgesia and wound exploration, mechanical high-pressure irrigation should be employed. Surgical debridement of scalp wounds should be kept to an absolute minimum because it may be difficult to mobilize wound edges to cover the resulting soft tissue defect.
- Staples are effective in closing scalp lacerations, especially in patients with short hair that cannot be manipulated and adequately tied (usually less than three centimeters).
- Alternatively, place a piece of dental floss or 0-suture lengthwise along the wound. While alternating the strands of hair across the floss, have an assistant approximate the wound edges and tie the ends of the floss together.

Facial lacerations
- Superficial lacerations to the face may be managed in the wilderness. However, if injuries to the facial nerve or parotid or lacrimal ducts occur, primary closure should not be attempted, and evacuation should be considered.
- Analgesia for lacerations to the face can be achieved by topical, local, or regional blocks (if one is comfortable with these procedures). As with other lacerations, high-pressure irrigation is the method of choice for mechanical cleaning, and surgical debridement should be limited to obvious areas of necrotic tissue. The face has an excellent blood supply; consequently, wound closure using micropore tape or a skin glue is effective and often produces satisfying cosmetic results.

Torso lacerations

Torso lacerations require evaluation for fascial penetration. If the anterior fascial layer is penetrated, the injury should be considered not as a skin injury, but rather as an injury to the underlying region, that is, the chest or abdomen, and the patient should be immediately evacuated.

Extremity injuries

Management of extremity lacerations in the wilderness requires careful judgment because of the potential involvement of underlying structures. This is especially true with the hand, where critical
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Structures lie perilously close to the surface. Therefore, a detailed neurovascular evaluation of all extremity lacerations should be performed, throughout the range of motion, as tendon ruptures may easily be missed. Any evidence of neurovascular functional compromise with a hand wound mandates evacuation.

Puncture Wounds

Puncture wounds should generally NOT be irrigated as this may further push in contamination. Instead, the surface should be thoroughly scrubbed, and the wound should be dressed as indicated above, without attempts at closure. Puncture wounds should be evaluated more frequently than simple lacerations, as they are at higher risk of infection.

Animal Bites

Animal bites should be cleaned, debrided and dressed as described. However, they should only rarely undergo definitive closure as they are at high risk for infection. Specific treatment is dealt with in Chapter 14.

Blisters

- If a small blister or hot spot forms, protect the area by cutting a hole the size of the blister in a piece of moleskin. Then secure the moleskin over the blister to act as a shield to the area. Anchor the moleskin with benzoin or a similar product, and secure with tape. Build up several layers of moleskin or mole foam if necessary. Do not open or puncture small blisters.
- If the blister is large (quarter-sized) or ruptured, wash the area and puncture the base of the blister with a sterile needle or safety pin. Debride the external flap of skin from the blister, apply an antibiotic ointment and cover the blister with a sterile dressing. This can be protected with moleskin or mole foam.
- Inspect daily for infection. If an intact blister becomes infected, drain and debride it and seek medical attention.

Superficial Burns (First Degree Burns)

- Treat first-degree burns with aloe vera gel.
- For comfort, cool the area with damp wet cloths.

Partial Thickness and Full Thickness Burns

- Gently clean the burn with cool water to remove loose skin and debris.
- Trim away all loose skin with scissors.
- Blisters larger than the size of a quarter, or those that appear as though they will burst, may be drained and debrided.
- Apply a thin layer of antibacterial ointment (Silvadine, bacitracin, or honey) to the burn and cover with a non-adhering, sterile dressing. Change the dressing at least once a day.
- Do not ice burns for more than 15 minutes, as this will cause more damage due to a decreased blood supply to the area.
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Burns that compromise blood flow or respiratory drive

A severe full-thickness burn over the chest or extremity may produce an eschar, which can result in respiratory or circulatory embarrassment. If the patient with a burn over the chest wall develops respiratory distress, or with a circumferential extremity burn develops circulatory compromise during evacuation, an incision through the subcutaneous tissue in the proper planes can save life or limb. However, one should be familiar with these techniques of escharotomy before attempting to utilize them.

Prevention

As skin injuries are among the most common ailments in the wilderness, simple preventative measures can be taken to decrease the risk of and from them. A significant risk factor for wounds in the backcountry is alcohol or drug use. Alcohol use should be kept to a minimum in the backcountry and entirely prohibited around risky activities. Improper knife handling and care is also responsible for an excessive number of skin injuries. Adequate lighting in the wilderness, should be used as much as possible to avoid falls and other injuries. Tetanus is a life-threatening infection, and many wounds in the wilderness are considered tetanus-prone. ALL individuals should have their tetanus immunization updated before participating in wilderness activities.

Evacuation Guidelines

Evacuation of patients with wounds should occur when necessary to preserve life, limb, function and when spread of infection cannot be controlled. An individual with even a minimally infected friction blister of the foot may require evacuation, whereas a forearm abscess with surrounding cellulitis may be monitored if the proper tools and antibiotics are available.

Burn evacuation guidelines mirror those that require treatment in a burn center:

- Partial thickness burns greater than 10% TBSA
- Full thickness burns greater than 1% TBSA
- Partial or full thickness burns involving the face, hands, feet or genitals
- Electric burns
- Burns complicated by smoke inhalation. (The victim's airway may become obstructed from severe swelling in the throat).
- Burn victims that are medically ill

Questions

1. Which type of wound is least likely to become infected, thus would be the best candidate for backcountry closure?
   a. A shear force leading to a 1 cm forearm laceration
   b. A crush injury caused when a non-helmented mountain biker strikes the ground with his forehead
   c. A puncture wound through the plantar surface of the foot caused by a piece of broken glass at a campground
   d. A stab wound to the abdomen inflicted by a pocket knife.
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2. All of these would be acceptable topical antimicrobials except which ONE?
   a. Bacitracin
   b. Mupirocin
   c. LET
   d. Unprocessed honey

3. Which burn does NOT require evacuation?
   a. A camper wakes up when his tent has caught on fire, after not properly putting out his campfire. He is able to evacuate from the tent, but is coughing frequently and has singed nose-hairs.
   b. A patient with burns on the forearm after attempting to treat a snakebite by placing jumper cables adjacent to the area and starting their car.
   c. A patient with 4 centimeters of erythema on the dorsum of the forearm after brushing against hot firewood.
   d. A patient with diabetic neuropathy and blistering of the plantar surface of the foot after stepping on hot coals.

4. Which is necessary to document when examining a wound in the wilderness?
   a. Location, extent, and depth of the wound
   b. Presence or absence of foreign body
   c. Bone, tendon, or joint involvement
   d. Distal neurovascular status
   e. All of the above

5. Which wound requires evacuation?
   a. A 6 cm laceration of the head secured with staples
   b. A puncture wound that has developed surrounding erythema and is extremely painful to walk on, despite the administration of prophylactic antibiotics
   c. A 3-day old 2 cm arm laceration that has developed some purulent drainage in an afebrile patient who is subsequently started on clindamycin
   d. A 4 cm leg laceration that has been irrigated, has no foreign body, bone, tendon, joint involvement, and is secured with sutures

6. Which is the best way to treat a simple friction blister?
   a. Clean the area, cut a ring of moleskin, adhere with benzoin and cover with athletic tape, and lamb’s wool if necessary.
   b. Ignore it; most blisters pop or stop hurting sooner or later
   c. Cut a ring of moleskin, adhere with benzoin, cover with tape and place on prophylactic antibiotics
   d. Evacuate all friction blisters

7. For which wound should a tourniquet be used as the primary method of hemostasis?
   a. An amputation of the little finger at the level of the distal phalanx
   b. An amputation of the leg at the level of the knee, sustained in a high-speed 4-wheeler collision
   c. A rapidly bleeding scalp laceration that continues despite 30 minutes of pressure
   d. A radial artery laceration that continues despite 30 minutes of direct pressure

8. What is the best way to transport amputated digits?
   a. In milk
   b. In the mouth
   c. In the patient’s pocket
   d. Wrapped in sterile saline-soaked gauze, placed in a bag and transported on ice

9. Which wound would be the best candidate for antibiotics?
   a. A 2 cm laceration of the palm due to a clean pocket knife 4 hours ago
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b. A 3 cm scalp laceration that occurred 6 hours ago
c. A 1cm laceration over the index finger metacarpal-phalangeal joint, obtained in a fight the night before
d. A 1 cm facial laceration that occurred 12 hours ago

10. Which best describes a superficial partial-thickness burn?
   a. A large burn with exposed muscle and bone
   b. A painful area of erythema without blistering or tissue loss
   c. A painful area of erythema with blistering.
   d. A burn that includes the dermis and epidermis with a central painless white area.

Answers:
1. a
2. c
3. c
4. e
5. b
6. a
7. b
8. d
9. c
10. c