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Part 14: First Aid

The American Heart Association (AHA) and the American Red Cross (ARC) cofounded the National First Aid Science Advisory Board (Table) to review and evaluate the scientific literature on first aid. The goals of the National First Aid Science Advisory Board were to reduce morbidity and mortality due to emergency events and to analyze the scientific evidence that answers the following questions:

- What are the most common emergency conditions that lead to significant morbidity and mortality?
- In which of these emergency conditions can morbidity or mortality be reduced by the intervention of a first aid provider?
- How strong is the scientific evidence that interventions performed by a first aid provider are safe, effective, and feasible?

This critical review of the scientific literature resulted in a Consensus on Science for First Aid With Treatment Recommendations, from which these guidelines are derived.¹ The critical review and evaluation of the literature identified areas for future scientific research.

Background

From the perspective of the 21st century, the need for first aid training seems self-evident, but the history of organized first aid spans only 120 years. There is evidence, though, that Native Americans practiced first aid and taught it. For example, Sioux medicine men of the Bear Society were noted for treating battle injuries, fixing fractures, controlling bleeding, removing arrows, and using a sharp flint to cut around wounds and inflammations.²

Modern first aid evolved from military experience when surgeons taught soldiers how to splint and bandage battlefield wounds. Two British officers, Peter Shepherd and Francis Duncan, are said to have been the first to expand the concept to civilians and develop the first curriculum in first aid.³ Training in first aid began in the United States in 1903 when Clara Barton, president of the ARC, formed a committee to establish instruction in first aid among the nation's industrial workers, where, under dangerous conditions, accidents and deaths were all too frequent. In 2000 the first evidence-based guidelines in first aid were developed by the AHA in collaboration with the International Liaison Committee on Resuscitation (ILCOR).⁴ Many organizations have developed training programs in first aid.

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What Really Works in First Aid?

Members of the National First Aid Science Advisory Board reviewed morbidity data from the Centers for Disease Control and Prevention and first aid texts and reviewed published studies to identify and evaluate the scientific basis for first aid recommendations. Previous studies⁵⁻⁷ have noted the paucity of scientific evidence to support many interventions in prehospital emergency care. Many first aid practices rest on an equally precarious scientific foundation. The information presented here represents a consensus of evaluation of the evidence on common first aid interventions.

Definition of First Aid

The National First Aid Science Advisory Board defined first aid as assessments and interventions that can be performed by a bystander (or by the victim) with minimal or no medical equipment. A first aid provider is defined as someone with formal training in first aid, emergency care, or medicine who provides first aid. First aid assessments and interventions should be medically sound and based on scientific evidence or, in the absence of such evidence, on expert consensus. Administration of first aid must not delay activation of the emergency medical services (EMS) system or other medical assistance when required. The board recognizes that certain conditions that can be treated with first aid may not require EMS involvement or assistance by other medical professionals. The National First Aid Science Advisory Board strongly believes that education in first aid should be universal: everyone can learn first aid and everyone should.

The National First Aid Science Advisory Board recognized that the scope of first aid is not purely scientific and is related to both training and regulatory issues. The definition of scope is therefore variable, and it should be defined according to circumstances, need, and regulatory requirements.

These 2005 First Aid Guidelines differ from the recommendations in the First Aid section in the *ECC Guidelines 2000* in the increased number of topics, the inclusion of representatives from many organizations involved with First Aid education in discussions leading to the guidelines, and the cosponsorship by the AHA and ARC. An important byproduct of these discussions is to again emphasize the paucity of evidence to guide first aid interventions. Very little research is being conducted in first aid, and many of the following recommendations have had to be made by extrapolation from the experience of healthcare professionals. It is important to recognize the limitations of the evidence so that research can be undertaken and future guidelines can be based on a larger body of scientific evidence.

Calling for Help

The single most important information for a first aid provider is to know how to get help. Rescuers should learn how and when to access the EMS system, how to activate the on-site

Organizations Represented on the National First Aid Science Advisory Board

American Academy of Orthopaedic Surgeons
 American Academy of Pediatrics
 American Association of Poison Control Centers
 American Burn Association
 American College of Emergency Physicians
 American College of Occupational and Environmental Medicine
 American College of Surgeons
 American Heart Association
 The American Pediatric Surgical Association
 American Red Cross
 American Safety and Health Institute
 Army Medical Command
 Australian Resuscitation Council
 Canadian Red Cross
 International Association of Fire Chiefs
 International Association of Fire Fighters
 Medic First Aid International
 Military Training Network
 National Association of EMS Educators
 National Association of EMS Physicians
 National Association of EMTs
 National Safety Council
 Occupational Safety and Health Administration
 Save a Life Foundation

emergency response plan (ERP), and how to contact the Poison Control Center (see below).

Positioning the Victim

As a general rule, a victim should not be moved, but there are times when you should do so:

- If the area is unsafe for you or the victim, move the victim to a safe location.
- If the victim is face down and needs CPR, turn the victim face up.
- If the victim is unresponsive, has an open airway, and is breathing spontaneously, turn the victim onto his or her side (recovery position) with the victim's hand in front (Class IIB; LOE 7^{8,9}). Be aware of the potential for nerve and vessel injury if the victim lies on one arm for a prolonged period; it may be necessary to roll the victim to the other side (Class Indeterminate; LOE 7^{8,9}).
- If you suspect that the victim might have a spinal injury, it is best not to move the victim. If the injured victim is unresponsive and has difficulty breathing because of copious secretions or vomiting, or if you are alone and have to leave the victim to get help, place the victim in a modified HAINES recovery position by extending one of the victim's arms above the head and rolling the body to the side so that the victim's head rests on the extended arm. Bend both legs to stabilize the victim (Class IIB; LOE 7^{8,9}).

Oxygen

There is insufficient evidence to recommend for or against the use of oxygen by a first aid provider (Class Indeterminate), and concern exists that oxygen administration may delay other interventions.

Medical Emergencies

Breathing Difficulties

The incidence of acute asthma is increasing, especially in urban populations.¹⁰ Many victims with asthma have and can self-administer bronchodilator medication.^{11–14} Inhaled bronchodilator medications are safe with few untoward effects. First aid providers may assist the victim in using prescribed bronchodilator medication (Class IIB; LOE 4 studies^{11–14} extrapolated to first aid = LOE 7). They are not expected to make a diagnosis, but they can assist the victim under the following conditions:

- The victim states that he or she is having an asthma attack and has medications or an inhaler.
- The victim identifies the medication and is unable to administer it without assistance.¹²

Anaphylaxis

Allergies are relatively common, but only a small proportion of people with allergies develop anaphylactic reactions. An anaphylactic reaction is characterized by swelling, especially of the face, breathing difficulty, shock, and even death. Many people with a history of anaphylaxis carry a lifesaving epinephrine auto-injector. With proper training, parents can be taught to correctly use the auto-injector to administer epinephrine to their child.¹⁵ Unfortunately all too often neither the victim nor family members know how to use an auto-injector correctly.^{16–18} First aid providers should be familiar with the epinephrine auto-injector so that they can help someone having an anaphylactic reaction self-administer the epinephrine. First aid providers should be able to administer the auto-injector if the victim is unable to do so, provided that the medication has been prescribed by a physician and state law permits (Class IIB; LOE 7¹⁵).

Seizures

The general principles of first aid management of seizures are to (1) prevent injury, (2) ensure an open airway, and (3) ensure that the airway remains open after the seizure has ended.

The victim of a seizure must be protected from injury. Protect the head with a pillow or other soft material. Do not restrain the victim during a seizure or place any object in the victim's mouth. Restraining the victim may cause musculo-skeletal or soft-tissue injury. Placing an object in the victim's mouth is futile because most tongue biting occurs at the onset of seizure activity and attempts to insert an object may cause dental damage or aspiration or may injure the rescuer's fingers.

To prevent aspiration of secretions and maintain an open airway, place the victim in a recovery position after the seizure stops. It is not unusual for the victim to be unresponsive or confused for a short time after a seizure.

Injury Emergencies

Bleeding

Control of bleeding is one of the few actions by which you can critically influence outcome. Control external bleeding by applying pressure over the bleeding area until bleeding stops or EMS rescuers arrive (Class IIb; LOE 4¹⁹; 5²⁰; 6²¹; 7 [extrapolated from LOE 1 and 2 in the cardiac catheterization laboratory]²²⁻²⁵). The important factors in successful control of bleeding are to apply pressure firmly and for a long time. Methods of applying pressure include

- Manual pressure on gauze or other cloth placed over the bleeding source.²²⁻²⁵ If bleeding continues, do not remove the gauze; add more gauze on top and apply more pressure.
- An elastic bandage firmly wrapped over gauze²⁰ to hold it in place with pressure.

The effectiveness, feasibility, and safety of tourniquets to control bleeding by first aid providers are unknown, but the use of tourniquets is potentially dangerous (Class Indeterminate). Tourniquets are routinely used in the operating room under controlled conditions and have been effective in controlling bleeding from an extremity,²⁶ but potential undesired effects include temporary²⁷ or permanent²⁸ injury to the underlying nerves and muscles,²⁹ as well as systemic complications resulting from limb ischemia,³⁰ including acidemia, hyperkalemia, arrhythmias, shock, limb loss, and death. Complications are related to tourniquet pressure³¹ and occlusion time.³² Pressure has been found to be superior to tourniquets in controlling bleeding,¹⁹ although tourniquets may be useful under some unique conditions (eg, the battlefield, when rapid evacuation is required and ischemic time is carefully monitored). The method of application and the best design of tourniquets are under investigation.³³

There is insufficient evidence to recommend for or against the first aid use of pressure points or extremity elevation to control hemorrhage (Class Indeterminate). The efficacy, feasibility, and safety of pressure points to control bleeding have never been subjected to study, and there have been no published studies to determine if elevation of a bleeding extremity helps in bleeding control or causes harm. Using these unproven procedures has the potential to compromise the proven intervention of direct pressure.

Wounds and Abrasions

Irrigate wounds and abrasions with clean running tap water (Class IIa; LOE 1³⁴; 2^{35,36}; 7³⁷⁻³⁹) for ≥ 5 minutes or until there appears to be no foreign matter in the wound. If running water is unavailable, use any source of clean water. Wounds heal better and with less infection if an antibiotic ointment or cream is used (Class IIa; LOE 1^{40,41}; and evidence extrapolated from LOE 2 studies to first aid = LOE 7⁴²⁻⁴⁵); triple antibiotic ointment appears to be superior to single antibiotic ointment or cream (Class IIb; LOE 1⁴¹). Apply antibiotic ointment or cream only if the victim's wound is an abrasion or is superficial.

Burns

Thermal Burns

Cool thermal burns with cold water as soon as possible^{46,47} (Class IIa; LOE 3⁴⁸; 4⁴⁹; 5⁵⁰⁻⁵²; 6⁴⁶) and continue at least until

pain is relieved.⁵³ Cooling reduces the injury and relieves pain.⁴⁸⁻⁵² There is some evidence that brief cooling of small burns with ice water may be effective (LOE 5),^{53,54} but direct application of ice to a burn may produce tissue ischemia,^{55,56} and prolonged cold exposure even of small burns can lead to further injury.^{52,55,57} Avoid cooling of burns with ice or ice water for longer than 10 minutes, especially if the burn is large ($>20\%$ of body surface area) (Class III; LOE 6⁵⁸).

Burn Blisters

Loosely cover burn blisters with a sterile dressing but leave them intact (Class IIb; LOE 5⁵⁹; 6⁶⁰⁻⁶²).

Electrocution and Electrical Burns

The severity of electrical injuries can vary widely, from an unpleasant tingling sensation caused by low-intensity current to thermal burns, cardiopulmonary arrest, and death. Thermal burns may result from burning clothing that is in contact with the skin or from electric current traversing a portion of the body. When current transverses the body, thermal burns may be present at the points where the current entered and exited the body and internally along its pathway. Cardiopulmonary arrest is the primary cause of immediate death from electrocution.⁶³ Cardiac arrhythmias, including ventricular fibrillation, ventricular asystole, and ventricular tachycardia that progresses to ventricular fibrillation, may result from exposure to low- or high-voltage current.⁶⁴ Respiratory arrest may result from electrical injury to the respiratory center in the brain or from tetanic contractions or paralysis of respiratory muscles.

Do not place yourself in danger by touching an electrocuted victim while the power is on. Turn off the power at its source; at home the switch is usually near the fuse box. In case of high-voltage electrocution, such as that caused by fallen power lines, immediately notify the appropriate authorities (ie, 911, fire department, etc). All materials will conduct electricity if the voltage is high enough, so do not enter the area around the victim or try to remove wires or other materials with any object, including wooden ones, until the power has been turned off by knowledgeable personnel.

Once the power is off, assess the victim, who may need CPR, defibrillation, and treatment for shock and thermal burns. All victims of electric shock require medical assessment because the extent of injury may not be apparent.

Spine Stabilization

There is an approximately 2% risk of injury to the cervical spine after blunt trauma that is serious enough to require spinal imaging in an emergency department,^{65,66} and this risk is tripled in patients with craniofacial injury⁶⁷ or a Glasgow Coma Scale score of <8 .⁶⁸ Most victims with spinal injuries are males between the ages of 10 and 30 years. Motor vehicles cause approximately half of the injuries; the remainder are caused by falls (especially from a height or diving), sports, and assaults.⁶⁹ A victim with a spinal injury has an increased risk of permanent neurologic damage, including quadriplegia from a secondary spinal cord injury.^{70,71} First aid rescuers may not be able to conclusively identify a victim with a spinal injury, but they should suspect spinal injury if an injured victim.^{66,72-75}

- Is involved in a motor vehicle, motorized cycle, or bicycle crash as an occupant, rider, or pedestrian
- Is injured as a result of a fall from greater than a standing height
- Complains of neck or back pain, tingling in the extremities, or weakness
- Is not fully alert
- Appears to be intoxicated
- Appears frail or >65 years of age
- Has a head or neck injury

In these situations or any situation in which you suspect a possible spinal injury, manually stabilize the head so that the head, neck, and spine do not move and are kept in line (Class IIa; LOE 3⁶⁵; 7 [extrapolated from healthcare provider literature]^{66,73}). Do not use any immobilization devices because their benefit in first aid has not been proven⁷⁶ and may be harmful (Class III; LOE 4⁷⁷; 6⁷¹; 7⁷⁸). Immobilization devices may be needed in special circumstances when immediate extrication (ie, rescue of drowning victim) is required. First aid providers should be trained in the proper use of these devices before using them.

Musculoskeletal Trauma: Sprains, Strains, Contusions, and Fractures

Soft-tissue injuries include joint sprains and muscle contusions. Apply cold to soft-tissue injuries (Class IIa; LOE 2⁷⁹; 6⁸⁰; 7⁸¹). Cold application decreases hemorrhage, edema, pain, and disability.^{79,81–83} Cooling is best accomplished with a plastic bag or damp cloth filled with a cooling modality that undergoes a phase change (eg, ice).⁸⁴ Refreezable gel packs are not as good as ice.^{80,85} To prevent cold injury, limit each application of cold to periods ≤20 minutes and place a barrier, such as a thin towel, between the cold container and the skin.^{86,87}

There is insufficient evidence to recommend for or against the use of a compression bandage to reduce edema following a closed soft-tissue injury such as a joint sprain (Class Indeterminate).

Assume that any injury to an extremity includes a bone fracture. Cover open wounds with a dressing if one is available. Do not move or straighten an injured extremity. If you are far from definitive health care, you may stabilize the extremity in the position found. If an injured extremity is blue or extremely pale, activate EMS immediately because this could be a medical emergency.

A victim with an injured lower extremity should not bear weight until advised by definitive health care.

Dental Injuries

Traumatic dental injuries are common. The first aid for dental injuries:

- Handle the tooth by the crown, not the root (do not handle the part that was embedded in the gum).
- Clean bleeding wounds with saline solution or tap water.
- Stop bleeding by applying pressure with a piece of cotton for 5 minutes.

- If there is an avulsed tooth, rinse it in water (do not scrub it), place it in milk, and bring it with you and consult a dentist as quickly as possible (Class IIa).^{88–91}
- If there are other dental injuries, consult a dentist.

Environmental Emergencies

Snakebite

Do not apply suction as first aid for snakebite (Class III; LOE 5⁹²; 6^{93,94}). Suction does remove some venom,^{92,94} but the amount is very small,⁹⁵ suction has no clinical benefit, and it may aggravate the injury.⁹⁶

In case of an elapid (eg, coral) snakebite, wrap a bandage snugly (comfortably tight but loose enough to slip or fit a finger under it) around the entire length of the bitten extremity, immobilize the extremity, and get definitive medical help as rapidly as possible (Class IIa; LOE 3⁹⁷; 6^{98–100}). Wrapping the extremity slows dissemination of venom by slowing lymph flow.^{97–101} There is a paucity of studies evaluating whether pressure and immobilization bandage are effective in bites by nonelapid snakes.

Cold Emergencies

Hypothermia

Hypothermia is caused by exposure to cold. The urgency of treatment depends on the length of exposure and the victim's body temperature. Immediately begin rewarming a victim of hypothermia (Class IIa; LOE 2^{102,103}; 5^{104–108}; 8^{109,110}). Move the victim to a warm environment, remove wet clothing, and wrap all exposed body surfaces with anything at hand, including blankets, clothing, newspapers, etc. If you are far from definitive health care, you may begin active rewarming for a victim of hypothermia (Class IIb; LOE 2^{102,103}; 8^{109,110}). For example, active rewarming may be achieved by placing the victim near a heat source and placing containers of warm, but not hot, water in contact with the skin. Active rewarming should not delay definitive care.

Frostbite

Frostbite usually affects an exposed extremity. In case of frostbite, remove wet clothing and make sure the victim does not develop hypothermia. Get the victim to a medical facility as rapidly as possible. Do not try to rewarm the frostbite if there is any chance that it might refreeze or if you are close to a medical facility. If you are in a remote area far from a medical facility, you may slowly rewarm the frostbite using warm water (100°F to 105°F) (Class Indeterminate).

Drowning

Drowning is a major cause of unintentional death. It can be prevented with isolation fencing around swimming pools (gates should be self-closing and self-latching),¹¹¹ wearing personal flotation devices (life jackets) while in, around, or on water, and never swimming alone.

Outcome following drowning depends on the duration of the submersion, the water temperature, and how promptly CPR is started.^{112,113} Case reports have documented intact neurologic survival in small children following prolonged submersion in icy waters.^{114,115} Remove the victim rapidly and safely from the water, but do not place yourself in danger.

If you have special training, you can start rescue breathing while the victim is still in the water¹¹⁶ if it does not delay removing the victim from the water. There is no evidence that water acts as an obstructive foreign body, so don't waste time trying to remove it. Start CPR with 2 effective ventilations and continue with 5 cycles (about 2 minutes) of chest compressions and ventilations before activating EMS. If 2 rescuers are present, send the second rescuer to activate EMS immediately.

Poison Emergencies

Poison Control Centers

There are a large number of poisonous substances in the home and worksite. It is important to understand the toxic nature of the chemical substances in your environment and the proper protective equipment and emergency procedures in case of toxic exposure. The Poison Control Center (800-222-1222) is an excellent resource for treating ingestion of, or exposure to, a potential poison. Inform the Poison Control Center of the nature of the exposure, the time of exposure, and the name of the product or toxic substance.

Chemical Burns

Brush powdered chemicals off the skin with a gloved hand or piece of cloth. Remove all contaminated clothing and make sure not to contaminate yourself in the process. In case of an acid or alkali exposure to the skin^{117–123} or eye,^{124–129} immediately irrigate the affected area with copious amounts of water (Class I; LOE 4¹¹⁷; 6^{124–127}).

Ingested Poisons

Milk or Water

Do not administer anything by mouth unless advised to do so by a poison control center (Class IIb).

Animal studies^{130,131} suggest that dilution or neutralization of a caustic agent by water or milk reduces tissue injury, but no human studies have shown a clinical benefit, and the possibility of emesis with aspiration must be considered (Class Indeterminate).

Activated Charcoal

There is insufficient evidence to recommend for or against the use of activated charcoal as first aid for ingestions (Class Indeterminate). Until more definitive evidence becomes available, do not administer activated charcoal unless you have been advised to do so by a poison control center.¹³² Activated charcoal is effective for adsorbing toxins, but there is no evidence that charcoal administered by a first aid provider improves outcome.¹³³ Many children will not take the recommended dose (LOE 3¹³⁴) and there are reports of harm.^{135–137}

Ipecac

Do not administer syrup of ipecac for ingestions (Class III; LOE 2^{138–141}; 4¹⁴²; 7^{132,143}). There are several problems with ipecac. These include questions about the amount of poison removed,^{144–147} longer lengths of stay in the emergency department,¹³⁸ and lack of evidence that it improves outcome.^{139,140,142} Side effects include lethargy^{138,148} and the

potential hazard of aspiration during emesis.¹⁴¹ Syrup of ipecac is contraindicated in hydrocarbon or corrosive substance ingestion.

References

1. International Liaison Committee on Resuscitation. 2005 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. *Circulation*. 2005;112:III-1–III-136.
2. Lewis TH. *The Medicine Men: Oglala Sioux Ceremony and Healing*. Lincoln, NE: University of Nebraska Press; 1992.
3. Pearn J. The earliest days of first aid. *BMJ*. 1994;309:1718–1720.
4. American Heart Association in collaboration with International Liaison Committee on Resuscitation. Guidelines 2000 for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care: International Consensus on Science, Part 5: New Guidelines for First Aid. *Circulation*. 2000;102(suppl I):I-77–I-85.
5. Neely KW, Drake ME, Moorhead JC, Schmidt TA, Skeen DT, Wilson EA. Multiple options and unique pathways: a new direction for EMS? *Ann Emerg Med*. 1997;30:797–799.
6. Callahan M. Quantifying the scanty science of prehospital emergency care. *Ann Emerg Med*. 1997;30:785–790.
7. Spaite DW, Criss EA, Valenzuela TD, Meislin HW. Developing a foundation for the evaluation of expanded-scope EMS: a window of opportunity that cannot be ignored. *Ann Emerg Med*. 1997;30:791–796.
8. Blake WE, Stillman BC, Eizenberg N, Briggs C, McMeeken JM. The position of the spine in the recovery position—an experimental comparison between the lateral recovery position and the modified HAINES position. *Resuscitation*. 2002;53:289–297.
9. Gunn BD, Eizenberg N, Silberstein M, McMeeken JM, Tully EA, Stillman BC, Brown DJ, Gutteridge GA. How should an unconscious person with a suspected neck injury be positioned? *Prehospital Disaster Med*. 1995;10:239–244.
10. Mannino DM, Homa DM, Pertowski CA, Ashizawa A, Nixon LL, Johnson CA, Ball LB, Jack E, Kang DS. Surveillance for asthma—United States, 1960–1995. *MMWR CDC Surveill Summ*. 1998;47:1–27.
11. Connellan SJ, Wilson RS. The use of domiciliary nebulised salbutamol in the treatment of severe emphysema. *Br J Clin Pract*. 1979;33:135–136.
12. Hamid S, Kumaradevan J, Cochrane GM. Single centre open study to compare patient recording of PRN salbutamol use on a daily diary card with actual use as recorded by the MDI compliance monitor. *Respir Med*. 1998;92:1188–1190.
13. O'Driscoll BR, Kay EA, Taylor RJ, Weatherby H, Chetty MC, Bernstein A. A long-term prospective assessment of home nebulizer treatment. *Respir Med*. 1992;86:317–325.
14. Simon HK. Caregiver knowledge and delivery of a commonly prescribed medication (albuterol) for children. *Arch Pediatr Adolesc Med*. 1999;153:615–618.
15. Dobbie A, Robertson CM. Provision of self-injectable adrenaline for children at risk of anaphylaxis: Its source, frequency and appropriateness of use, and effect. *Ambulatory Child Health*. 1998;4:283–288.
16. Clegg SK, Ritchie JM. 'EpiPen' training: A survey of the provision for parents and teachers in West Lothian. *Ambulatory Child Health*. 2001;7:169–175.
17. Gold MS, Sainsbury R. First aid anaphylaxis management in children who were prescribed an epinephrine autoinjector device (EpiPen). *J Allergy Clin Immunol*. 2000;106:171–176.
18. Sicherer SH, Forman JA, Noone SA. Use assessment of self-administered epinephrine among food-allergic children and pediatricians. *Pediatrics*. 2000;105:359–362.
19. Pihlgram-Larsen J, Mellesmo S. [Not a tourniquet, but compressive dressing. Experience from 68 traumatic amputations after injuries from mines]. *Tidsskr Nor Laegeforen*. 1992;112:2188–2190.
20. Naimer SA, Chemla F. Elastic adhesive dressing treatment of bleeding wounds in trauma victims. *Am J Emerg Med*. 2000;18:816–819.
21. Sava J, Velmahos GC, Karaiskakis M, Kirkman P, Toutouzas K, Sarkisyan G, Chan L, Demetriades D. Abdominal insufflation for prevention of exsanguination. *J Trauma*. 2003;54:590–594.
22. Lehmann KG, Heath-Lange SJ, Ferris ST. Randomized comparison of hemostasis techniques after invasive cardiovascular procedures. *Am Heart J*. 1999;138:1118–1125.
23. Walker SB, Cleary S, Higgins M. Comparison of the FemoStop device and manual pressure in reducing groin puncture site complications

- following coronary angioplasty and coronary stent placement. *Int J Nurs Pract.* 2001;7:366–375.
24. Simon A, Bumgarner B, Clark K, Israel S. Manual versus mechanical compression for femoral artery hemostasis after cardiac catheterization. *Am J Crit Care.* 1998;7:308–313.
 25. Koreny M, Riedmuller E, Nikfardjam M, Siostrzonek P, Mullner M. Arterial puncture closing devices compared with standard manual compression after cardiac catheterization: systematic review and meta-analysis. *JAMA.* 2004;291:350–357.
 26. Lakstein D, Blumenfeld A, Sokolov T, Lin G, Bssorai R, Lynn M, Ben-Abraham R. Tourniquets for hemorrhage control on the battlefield: a 4-year accumulated experience. *J Trauma.* 2003;54:S221–S225.
 27. Savvidis E, Parsch K. [Prolonged transitory paralysis after pneumatic tourniquet use on the upper arm]. *Unfallchirurg.* 1999;102:141–144.
 28. Kornbluth ID, Freedman MK, Sher L, Frederick RW. Femoral, saphenous nerve palsy after tourniquet use: a case report. *Arch Phys Med Rehabil.* 2003;84:909–911.
 29. Landi A, Saracino A, Pinelli M, Caserta G, Facchini MC. Tourniquet paralysis in microsurgery. *Ann Acad Med Singapore.* 1995;24(suppl): 89–93.
 30. Wakai A, Wang JH, Winter DC, Street JT, O'Sullivan RG, Redmond HP. Tourniquet-induced systemic inflammatory response in extremity surgery. *J Trauma.* 2001;51:922–926.
 31. Mohler LR, Pedowitz RA, Lopez MA, Gershuni DH. Effects of tourniquet compression on neuromuscular function. *Clin Orthop.* 1999; 213–220.
 32. Kokki H, Vaatainen U, Penttila I. Metabolic effects of a low-pressure tourniquet system compared with a high-pressure tourniquet system in arthroscopic anterior crucial ligament reconstruction. *Acta Anaesthesiol Scand.* 1998;42:418–424.
 33. Calkins D, Snow C, Costello M, Bentley TB. Evaluation of possible battlefield tourniquet systems for the far-forward setting. *Mil Med.* 2000;165:379–384.
 34. Fernandez R, Griffiths R, Ussia C. Water for wound cleansing. (Cochrane Review). *The Cochrane Library.* 2004.
 35. Griffiths RD, Fernandez RS, Ussia CA. Is tap water a safe alternative to normal saline for wound irrigation in the community setting? *J Wound Care.* 2001;10:407–411.
 36. Valente JH, Forti RJ, Freundlich LF, Zandieh SO, Crain EF. Wound irrigation in children: saline solution or tap water? *Ann Emerg Med.* 2003;41:609–616.
 37. Dire DJ, Welsh AP. A comparison of wound irrigation solutions used in the emergency department. *Ann Emerg Med.* 1990;19:704–708.
 38. Moscati R, Mayrose J, Fincher L, Jehle D. Comparison of normal saline with tap water for wound irrigation. *Am J Emerg Med.* 1998;16: 379–381.
 39. Moscati RM, Reardon RF, Lerner EB, Mayrose J. Wound irrigation with tap water. *Acad Emerg Med.* 1998;5:1076–1080.
 40. Leyden JJ, Bartelt NM. Comparison of topical antibiotic ointments, a wound protectant, and antiseptics for the treatment of human blister wounds contaminated with *Staphylococcus aureus*. *J Fam Pract.* 1987; 24:601–604.
 41. Maddox JS, Ware JC, Dillon HC, Jr. The natural history of streptococcal skin infection: prevention with topical antibiotics. *J Am Acad Dermatol.* 1985;13:207–212.
 42. Berger RS, Pappert AS, Van Zile PS, Cetnarowski WE. A newly formulated topical triple-antibiotic ointment minimizes scarring. *Cutis.* 2000;65:401–404.
 43. Atiyeh BS, Ioannovich J, Al-Amm CA, El-Musa KA, Dham R. Improving scar quality: a prospective clinical study. *Aesthetic Plast Surg.* 2002;26:470–476.
 44. Hendley JO, Ashe KM. Effect of topical antimicrobial treatment on aerobic bacteria in the stratum corneum of human skin. *Antimicrob Agents Chemother.* 1991;35:627–631.
 45. Hendley JO, Ashe KM. Eradication of resident bacteria of normal human skin by antimicrobial ointment. *Antimicrob Agents Chemother.* 2003;47:1988–1990.
 46. King TC, Zimmerman JM. First-Aid Cooling of the Fresh Burn. *Surg Gynecol Obstet.* 1965;120:1271–1273.
 47. Jandera V, Hudson DA, de Wet PM, Innes PM, Rode H. Cooling the burn wound: evaluation of different modalities. *Burns.* 2000;26:265–270.
 48. Raghupati N. First-aid treatment of burns: efficacy of water cooling. *Br J Plast Surg.* 1968;21:68–72.
 49. Berberian GM. Temporary regional surface cooling and long-term hep- arinization in the therapy of burns. *Surgery.* 1960;48:391–393.
 50. Nguyen NL, Gun RT, Sparnon AL, Ryan P. The importance of immediate cooling—a case series of childhood burns in Vietnam. *Burns.* 2002;28:173–176.
 51. Li C, Yu D, Li MS. [Clinical and experiment study of cooling therapy on burned wound]. *Zhonghua Yi Xue Za Zhi.* 1997;77:586–588.
 52. Matthews RN, Radakrishnan T. First-aid for burns. *Lancet.* 1987; 1:1371.
 53. Shulman AG. Ice water as primary treatment of burns: simple method of emergency treatment of burns to alleviate pain, reduce sequelae, and hasten healing. *JAMA.* 1960;173:1916–1919.
 54. Grounds M. Immediate surface cooling in treatment of burns. *Med J Aust.* 1967;2:846–847.
 55. Purdue GF, Layton TR, Copeland CE. Cold injury complicating burn therapy. *J Trauma.* 1985;25:167–168.
 56. *Advanced Burn Life Support Providers Manual.* Chicago, IL: American Burn Association; 2002.
 57. Sawada Y, Urushidate S, Yotsuyanagi T, Ishita K. Is prolonged and excessive cooling of a scalded wound effective? *Burns.* 1997;23:55–58.
 58. Ofeigsson OJ. Observations and experiments on the immediate cold water treatment for burns and scalds. *Br J Plast Surg.* 1959;12:104–119.
 59. Forage AV. The effects of removing the epidermis from burnt skin. *Lancet.* 1962;2:690–693.
 60. Gimbel NS, Kapetansky DI, Weissman F, Pinkus HK. A study of epithelization in blistered burns. *AMA Arch Surg.* 1957;74:800–803.
 61. Singer AJ, Thode HCJ, McClain SA. The effects of epidermal debridement of partial-thickness burns on infection and reepithelialization in swine. *Acad Emerg Med.* 2000;7:114–119.
 62. Wheeler ES, Miller TA. The blister and the second degree burn in guinea pigs: the effect of exposure. *Plast Reconstr Surg.* 1976;57: 74–83.
 63. Homma S, Gillam LD, Weyman AE. Echocardiographic observations in survivors of acute electrical injury. *Chest.* 1990;97:103–105.
 64. Jensen PJ, Thomsen PE, Bagger JP, Norgaard A, Baandrup U. Electrical injury causing ventricular arrhythmias. *Br Heart J.* 1987;57:279–283.
 65. Lowery DW, Wald MM, Browne BJ, Tigges S, Hoffman JR, Mower WR. Epidemiology of cervical spine injury victims. *Ann Emerg Med.* 2001;38:12–16.
 66. Stiell IG, Wells GA, Vandemheen KL, Clement CM, Lesiuk H, De Maio VJ, Laupacis A, Schull M, McKnight RD, Verbeek R, Brison R, Cass D, Dreyer J, Eisenhauer MA, Greenberg GH, MacPhail I, Morrison L, Reardon M, Worthington J. The Canadian C-spine rule for radiography in alert and stable trauma patients. *JAMA.* 2001;286:1841–1848.
 67. Hackl W, Hausberger K, Sailer R, Ulmer H, Gassner R. Prevalence of cervical spine injuries in patients with facial trauma. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2001;92:370–376.
 68. Demetriades D, Charalambides K, Chahwan S, Hanpeter D, Alo K, Velmahos G, Murray J, Asensio J. Nonskeletal cervical spine injuries: epidemiology and diagnostic pitfalls. *J Trauma.* 2000;48:724–727.
 69. Kennedy E. Spinal Cord Injury: The facts and Figures. *Birmingham, Alabama University of Alabama.* 1986.
 70. Reid DC, Henderson R, Saboe L, Miller JD. Etiology and clinical course of missed spine fractures. *J Trauma.* 1987;27:980–986.
 71. Davis JW, Phreaner DL, Hoyt DB, Mackersie RC. The etiology of missed cervical spine injuries. *J Trauma.* 1993;34:342–346.
 72. Hoffman JR, Mower WR, Wolfson AB, Todd KH, Zucker MI. Validity of a set of clinical criteria to rule out injury to the cervical spine in patients with blunt trauma. National Emergency X-Radiography Utilization Study Group. *N Engl J Med.* 2000;343:94–99.
 73. Panacek EA, Mower WR, Holmes JF, Hoffman JR. Test performance of the individual NEXUS low-risk clinical screening criteria for cervical spine injury. *Ann Emerg Med.* 2001;38:22–25.
 74. Viccellio P, Simon H, Pressman BD, Shah MN, Mower WR, Hoffman JR. A prospective multicenter study of cervical spine injury in children. *Pediatrics.* 2001;108:E20.
 75. Touger M, Gennis P, Nathanson N, Lowery DW, Pollack CV, Jr., Hoffman JR, Mower WR. Validity of a decision rule to reduce cervical spine radiography in elderly patients with blunt trauma. *Ann Emerg Med.* 2002;40:287–293.
 76. Hauswald M, Ong G, Tandberg D, Omar Z. Out-of-hospital spinal immobilization: its effect on neurologic injury. *Acad Emerg Med.* 1998; 5:214–219.
 77. Barkana Y, Stein M, Scope A, Maor R, Abramovich Y, Friedman Z, Knoller N. Prehospital stabilization of the cervical spine for penetrating injuries of the neck—is it necessary? *Injury.* 2000;31:305–309.

78. Vickery D. The use of the spinal board after the pre-hospital phase of trauma management. *Emerg Med J.* 2001;18:51–54.
79. Cote DJ, Prentice WE, Jr., Hooker DN, Shields EW. Comparison of three treatment procedures for minimizing ankle sprain swelling. *Phys Ther.* 1988;68:1072–1076.
80. McMaster WC, Liddle S, Waugh TR. Laboratory evaluation of various cold therapy modalities. *Am J Sports Med.* 1978;6:291–294.
81. Meeusen R, Lievens P. The use of cryotherapy in sports injuries. *Sports Med.* 1986;3:398–414.
82. Hocutt JE, Jr., Jaffe R, Rylander CR, Beebe JK. Cryotherapy in ankle sprains. *Am J Sports Med.* 1982;10:316–319.
83. Airaksinen OV, Kyrklund N, Latvala K, Kouri JP, Gronblad M, Kolari P. Efficacy of cold gel for soft tissue injuries: a prospective randomized double-blinded trial. *Am J Sports Med.* 2003;31:680–684.
84. Merrick MA, Jutte LS, Smith ME. Cold modalities with different thermodynamic properties produce different surface and intramuscular temperatures. *J Athl Train.* 2003;38:28–33.
85. Chesterton LS, Foster NE, Ross L. Skin temperature response to cryotherapy. *Arch Phys Med Rehabil.* 2002;83:543–549.
86. Bassett FH, 3rd, Kirkpatrick JS, Engelhardt DL, Malone TR. Cryotherapy-induced nerve injury. *Am J Sports Med.* 1992;20:516–518.
87. Graham CA, Stevenson J. Frozen chips: an unusual cause of severe frostbite injury. *Br J Sports Med.* 2000;34:382–383.
88. Flores MT. Traumatic injuries in the primary dentition. *Dent Traumatol.* 2002;18:287–298.
89. Hiltz J, Trope M. Vitality of human lip fibroblasts in milk, Hanks balanced salt solution and Viaspan storage media. *Endod Dent Traumatol.* 1991;7:69–72.
90. Chan AW, Wong TK, Cheung GS. Lay knowledge of physical education teachers about the emergency management of dental trauma in Hong Kong. *Dent Traumatol.* 2001;17:77–85.
91. Sae-Lim V, Lim LP. Dental trauma management awareness of Singapore pre-school teachers. *Dent Traumatol.* 2001;17:71–76.
92. Bronstein A, Russell F, Sullivan J. Negative pressure suction in the field treatment of rattlesnake bite victims. *Vet Hum Toxicol.* 1986;28:485.
93. Leopold RS, Huber GS. Ineffectiveness of suction in removing snake venom from open wounds. *US Armed Forces Med J.* 1960;11:682–685.
94. Bronstein A, Russell F, Sullivan J, Egen N, Rumack B. Negative pressure suction in field treatment of rattlesnake bite. *Vet Hum Toxicol.* 1985;28:297.
95. Alberts MB, Shalit M, LoGalbo F. Suction for venomous snakebite: a study of “mock venom” extraction in a human model. *Ann Emerg Med.* 2004;43:181–186.
96. Bush SP, Hegewald KG, Green SM, Cardwell MD, Hayes WK. Effects of a negative pressure venom extraction device (Extractor) on local tissue injury after artificial rattlesnake envenomation in a porcine model. *Wilderness Environ Med.* 2000;11:180–188.
97. Howarth DM, Southee AE, Whyte IM. Lymphatic flow rates and first-aid in simulated peripheral snake or spider envenomation. *Med J Aust.* 1994;161:695–700.
98. German B, Brewer K, Hack JB, Meggs WJ. Pressure-immobilization bandages delay toxicity in a porcine model of eastern coral snake (*Micrurus fulvius fulvius*) envenomation. *Ann Emerg Med.* 2005;45:603–608.
99. Sutherland SK, Coulter AR, Harris RD. Rationalisation of first-aid measures for elapid snakebite. *Lancet.* 1979;1:183–185.
100. Sutherland SK, Coulter AR. Early management of bites by the eastern diamondback rattlesnake (*Crotalus adamanteus*): studies in monkeys (*Macaca fascicularis*). *Am J Trop Med Hyg.* 1981;30:497–500.
101. Anker RL, Straffon WG, Loiselle DS, Anker KM. Retarding the uptake of “mock venom” in humans: comparison of three first-aid treatments. *Med J Aust.* 1982;1:212–214.
102. Greif R, Rajek A, Lacity S, Bastanmehr H, Sessler DI. Resistive heating is more effective than metallic-foil insulation in an experimental model of accidental hypothermia: a randomized controlled trial. *Ann Emerg Med.* 2000;35:337–345.
103. Steele MT, Nelson MJ, Sessler DI, Fraker L, Bunney B, Watson WA, Robinson WA. Forced air speeds rewarming in accidental hypothermia. *Ann Emerg Med.* 1996;27:479–484.
104. Althaus U, Aeberhard P, Schupbach P, Nachbur BH, Muhlemann W. Management of profound accidental hypothermia with cardiorespiratory arrest. *Ann Surg.* 1982;195:492–495.
105. Kornberger E, Schwarz B, Lindner KH, Mair P. Forced air surface rewarming in patients with severe accidental hypothermia. *Resuscitation.* 1999;41:105–111.
106. Ledingham IM, Mone JG. Treatment of accidental hypothermia: a prospective clinical study. *Br Med J.* 1980;280:1102–1105.
107. Walpoth BH, Walpoth-Aslan BN, Mattle HP, Radanov BP, Schroth G, Schaeffler L, Fischer AP, von Segesser L, Althaus U. Outcome of survivors of accidental deep hypothermia and circulatory arrest treated with extracorporeal blood warming. *N Engl J Med.* 1997;337:1500–1505.
108. Koller R, Schnider TW, Neidhart P. Deep accidental hypothermia and cardiac arrest–rewarming with forced air. *Acta Anaesthesiol Scand.* 1997;41:1359–1364.
109. Danzl DF. Accidental hypothermia. In: Auerbach PS, ed. *Wilderness Medicine.* 4th ed. St Louis, Mo: Mosby; 2001:135–177.
110. Danzl D. Hypothermia. *Seminars in Respiratory and Critical Care Medicine.* 2002;23:57–68.
111. Prevention of drowning in infants, children, and adolescents. *Pediatrics.* 2003;112:437–439.
112. Suominen P, Baillie C, Korpela R, Rautanen S, Ranta S, Olkkola KT. Impact of age, submersion time and water temperature on outcome in near-drowning. *Resuscitation.* 2002;52:247–254.
113. Graf WD, Cummings P, Quan L, Brutocao D. Predicting outcome in pediatric submersion victims. *Ann Emerg Med.* 1995;26:312–319.
114. Modell JH, Idris AH, Pineda JA, Silverstein JH. Survival after prolonged submersion in freshwater in Florida. *Chest.* 2004;125:1948–1951.
115. Mehta SR, Srinivasan KV, Bindra MS, Kumar MR, Lahiri AK. Near drowning in cold water. *J Assoc Physicians India.* 2000;48:674–676.
116. Szpilman D, Soares M. In-water resuscitation—is it worthwhile? *Resuscitation.* 2004;63:25–31.
117. Latenser BA, Lucktong TA. Anhydrous ammonia burns: case presentation and literature review. *J Burn Care Rehabil.* 2000;21:40–42.
118. Wibbenmeyer LA, Morgan LJ, Robinson BK, Smith SK, Lewis RW, 2nd, Kealey GP. Our chemical burn experience: exposing the dangers of anhydrous ammonia. *J Burn Care Rehabil.* 1999;20:226–231.
119. Yano K, Hosokawa K, Kakibuchi M, Hikasa H, Hata Y. Effects of washing acid injuries to the skin with water: an experimental study using rats. *Burns.* 1995;21:500–502.
120. Kono K, Yoshida Y, Watanabe M, Tanioka Y, Dote T, Orita Y, Bessho Y, Yoshida J, Sumi Y, Umabayashi K. An experimental study on the treatment of hydrofluoric acid burns. *Arch Environ Contam Toxicol.* 1992;22:414–418.
121. Muraio M. Studies on the treatment of hydrofluoric acid burn. *Bull Osaka Med Coll.* 1989;35:39–48.
122. Lorette JJ, Jr., Wilkinson JA. Alkaline chemical burn to the face requiring full-thickness skin grafting. *Ann Emerg Med.* 1988;17:739–741.
123. Leonard LG, Scheulen JJ, Munster AM. Chemical burns: effect of prompt first aid. *J Trauma.* 1982;22:420–423.
124. Kompa S, Schareck B, Tympner J, Wustemeyer H, Schrage NF. Comparison of emergency eye-wash products in burned porcine eyes. *Graefes Arch Clin Exp Ophthalmol.* 2002;240:308–313.
125. McCulley JP. Ocular hydrofluoric acid burns: animal model, mechanism of injury and therapy. *Trans Am Ophthalmol Soc.* 1990;88:649–684.
126. Hojer J, Personne M, Hulten P, Ludwigs U. Topical treatments for hydrofluoric acid burns: a blind controlled experimental study. *J Toxicol Clin Toxicol.* 2002;40:861–866.
127. Herr RD, White GL, Jr., Bernhisel K, Mamalis N, Swanson E. Clinical comparison of ocular irrigation fluids following chemical injury. *Am J Emerg Med.* 1991;9:228–231.
128. Ingram TA. Response of the human eye to accidental exposure to sodium hypochlorite. *J Endod.* 1990;16:235–238.
129. Burns FR, Paterson CA. Prompt irrigation of chemical eye injuries may avert severe damage. *Occup Health Saf.* 1989;58:33–36.
130. Homan CS, Maitra SR, Lane BP, Thode HC Jr, Davidson L. Histopathologic evaluation of the therapeutic efficacy of water and milk dilution for esophageal acid injury. *Acad Emerg Med.* 1995;2:587–591.
131. Homan CS, Maitra SR, Lane BP, Thode HC Jr, Finkelshteyn J, Davidson L. Effective treatment for acute alkali injury to the esophagus using weak-acid neutralization therapy: an ex-vivo study. *Acad Emerg Med.* 1995;2:952–958.
132. Poison treatment in the home. American Academy of Pediatrics Committee on Injury, Violence, and Poison Prevention. *Pediatrics.* 2003;112:1182–1185.
133. Merigian KS, Blaho KE. Single-dose oral activated charcoal in the treatment of the self-poisoned patient: a prospective, randomized, controlled trial. *Am J Ther.* 2002;9:301–308.

134. Scharman EJ, Cloonan HA, Durback-Morris LF. Home administration of charcoal: can mothers administer a therapeutic dose? *J Emerg Med.* 2001;21:357–361.
135. Donoso A, Linares M, Leon J, Rojas G, Valverde C, Ramirez M, Oberpaur B. Activated charcoal laryngitis in an intubated patient. *Pediatr Emerg Care.* 2003;19:420–421.
136. Dorrington CL, Johnson DW, Brant R. The frequency of complications associated with the use of multiple-dose activated charcoal. *Ann Emerg Med.* 2003;41:370–377.
137. Givens T, Holloway M, Wason S. Pulmonary aspiration of activated charcoal: a complication of its misuse in overdose management. *Pediatr Emerg Care.* 1992;8:137–140.
138. Kornberg AE, Dolgin J. Pediatric ingestions: charcoal alone versus ipecac and charcoal. *Ann Emerg Med.* 1991;20:648–651.
139. Pond SM, Lewis-Driver DJ, Williams GM, Green AC, Stevenson NW. Gastric emptying in acute overdose: a prospective randomised controlled trial. *Med J Aust.* 1995;163:345–349.
140. Kulig K, Bar-Or D, Cantrill SV, Rosen P, Rumack BH. Management of acutely poisoned patients without gastric emptying. *Ann Emerg Med.* 1985;14:562–567.
141. Albertson TE, Derlet RW, Foulke GE, Minguillon MC, Tharratt SR. Superiority of activated charcoal alone compared with ipecac and activated charcoal in the treatment of acute toxic ingestions. *Ann Emerg Med.* 1989;18:56–59.
142. Bond G. Home Syrup of ipecac use does not reduce emergency department use or improve outcome. *Pediatrics.* 2003;112:1061–1064.
143. Position paper: Ipecac syrup. *J Toxicol Clin Toxicol.* 2004;42:133–143.
144. Corby DG, Decker WJ, Moran MJ, Payne CE. Clinical comparison of pharmacologic emetics in children. *Pediatrics.* 1968;42:361–364.
145. Vasquez TE, Evans DG, Ashburn WL. Efficacy of syrup of ipecac-induced emesis for emptying gastric contents. *Clin Nucl Med.* 1988;13:638–639.
146. Saetta JP, Quinton DN. Residual gastric content after gastric lavage and ipecacuanha-induced emesis in self-poisoned patients: an endoscopic study. *J R Soc Med.* 1991;84:35–38.
147. Saetta JP, March S, Gaunt ME, Quinton DN. Gastric emptying procedures in the self-poisoned patient: are we forcing gastric content beyond the pylorus? *J R Soc Med.* 1991;84:274–276.
148. Czajka PA, Russell SL. Nonemetic effects of ipecac syrup. *Pediatrics.* 1985;75:1101–1104.