

Part 15: First Aid

Web-based Integrated 2010 & 2015 American Heart Association and American Red Cross Guidelines for First Aid

Key Words: emergency injury illness first aid

1 Highlights & Introduction

1.1 Highlights

The *2015 AHA and American Red Cross Guidelines Update for First Aid* reaffirms the goals of first aid: to reduce morbidity and mortality by alleviating suffering, preventing further illness or injury, and promoting recovery. The scope of first aid has been expanded. First aid can be initiated by anyone, in any situation, and includes self-care.

Summary of Key Issues and Major Changes

- The use of stroke assessment systems can assist first aid providers with identifying signs and symptoms of stroke.
- While glucose tablets are preferred for care of mild hypoglycemia, they may not be readily available. In these cases, other forms of sugar found in common dietary products have been found to be acceptable alternatives to glucose tablets for diabetics with mild symptomatic hypoglycemia who are conscious and are able to swallow and to follow commands.
- It is acceptable for a first aid provider to leave an open chest wound open and uncovered. If a dressing and direct pressure are needed to control bleeding, care should be taken to ensure the dressing does not inadvertently convert to an occlusive dressing.
- There are no single-stage concussion assessment systems to aid first aid providers in the recognition of concussion.
- When reimplantation of an avulsed tooth will be delayed, temporary storage of the tooth in an appropriate solution may help prolong viability of the tooth.
- First aid education delivered through public health campaigns, focused topics, or courses resulting in certification can increase survival rates, can decrease severity of injury and time in the hospital, and can resolve symptoms of injured and ill persons.
- When caring for an unresponsive person who is breathing normally, and in the absence of major trauma such as to the spine or pelvis, placing the person into a lateral, side-lying position may improve airway mechanics. The modified High Arm in Endangered Spine (HAINES) recovery position is no longer recommended.
- There continues to be no indication for the routine administration of supplementary oxygen by first aid providers. For those first aid providers with specialized training in the use of supplementary oxygen, administration of oxygen can be beneficial for persons with decompression injury. Other situations when administration may be considered include suspected carbon monoxide poisoning and for lung cancer patients with dyspnea coupled with hypoxemia.
- The recommendations still state that while awaiting the arrival of EMS providers, the first aid provider may encourage a person with chest pain to chew aspirin if the signs and symptoms suggest that the person is having a heart attack and the person has no allergy or contraindication to aspirin, such as recent bleeding. However, the update of this recommendation notes that if a person has chest pain that does not suggest that the cause is cardiac in origin, or if the first aid provider is uncertain about the cause of the chest pain or uncomfortable with administration of aspirin, a first aid provider should not encourage the person to take the aspirin.
- Epinephrine is recommended for the life-threatening condition of anaphylaxis, and those at risk typically carry epinephrine auto-injectors, often as a 2-dose package. When symptoms of anaphylaxis do not resolve with an initial dose of epinephrine, and EMS arrival will exceed 5 to 10 minutes, a second dose of epinephrine may be considered.
- The primary method to control bleeding is through the application of firm, direct pressure. When direct pressure is not effective for severe or life-threatening bleeding, the use of a hemostatic dressing combined with direct pressure may be considered but requires training in proper application and indications for use.

- Use of cervical collars by first aid providers is not recommended. For injured persons who meet high-risk criteria for spinal injury, the ideal method for a first aid provider to help prevent movement of the spine requires further study but may include verbal prompts or manual stabilization while awaiting arrival of advanced care providers.
- Topics covered in the 2015 Guidelines Update that have no new recommendations since 2010 include the use of bronchodilators for asthma with shortness of breath, toxic eye injury, control of bleeding, use of tourniquets, treatment of suspected long bone fractures, cooling of thermal burns, burn dressings, and spinal motion restriction.

Stroke Recognition

2015 (New): The use of a stroke assessment system by first aid providers is recommended. Compared with stroke assessment systems that do not require glucose measurement, assessment systems that include glucose measurement have similar sensitivity but higher specificity for recognition of stroke. The Face, Arm, Speech, Time (FAST) or Cincinnati Prehospital Stroke Scale (CPSS) stroke assessment systems are the simplest of these tools for use by first aid providers, with high sensitivity for the identification of stroke.

Why: Evidence shows that the early recognition of stroke with the use of a stroke assessment system decreases the interval between the time of stroke onset and arrival at a hospital and definitive treatment. In 1 study, more than 94% of lay providers trained in a stroke assessment system were able to recognize signs and symptoms of a stroke, and this ability persisted at 3 months after training.¹

Hypoglycemia

2015 (New): For diabetics with mild symptomatic hypoglycemia who are able to follow commands and swallow safely, the use of oral glucose in the form of glucose tablets provides more rapid clinical relief compared with other forms of sugar found in common dietary products. Glucose tablets, if available, should be used to resolve hypoglycemia in these individuals. If glucose tablets are not available, other specifically evaluated forms of foods and liquids containing sugars such as sucrose, fructose, and oligosaccharides can be effective alternatives for reversal of mild symptomatic hypoglycemia.

Why: Hypoglycemia is a condition that first aid providers commonly encounter. Early treatment of mild hypoglycemia may prevent progression to severe hypoglycemia. Severe hypoglycemia can result in loss of consciousness or seizures and typically requires management by EMS.

Treatment of Open Chest Wounds

2015 (New): A first aid provider caring for an individual with an open chest wound may leave the wound open. If a dressing and direct pressure are required to stop bleeding, care must be taken to ensure that a blood-saturated dressing does not inadvertently become occlusive.

Why: The improper use of an occlusive dressing or device for open chest wounds may lead to development of an unrecognized life-threatening tension pneumothorax. There are no human studies comparing the application of an occlusive dressing or device to a nonocclusive dressing or device, and only a single animal study showed benefit to use of a nonocclusive device. As a result of the lack of evidence for use of an occlusive device, and considering the risk of unrecognized tension pneumothorax, the application of an occlusive dressing or device by first aid providers for individuals with an open chest wound is not recommended.

Concussion

2015 (New): An HCP should evaluate any person with a head injury that has resulted in a change in level of consciousness, progressive development of signs or symptoms of concussion, or other causes for concern to the first aid provider. The evaluation should occur as soon as possible.

Why: First aid providers often encounter individuals with minor head injury and possible concussion (mild traumatic brain injury). The myriad of signs and symptoms of concussion can make recognition of this injury a challenge. In addition, the long-term consequences of unrecognized concussion can be significant. Although a simple validated single-stage concussion scoring system could possibly help first aid providers with the recognition of concussion, no such assessment system has been identified. Sport concussion assessment tools used by healthcare professionals that require a 2-stage assessment (before competition and after concussion) are not appropriate as a single assessment tool for first aid providers.

Dental Avulsion

2015 (Updated): First aid providers may be unable to reimplant an avulsed tooth due to lack of protective medical gloves, training and skill, or fear of causing pain. When immediate reimplantation is not possible, it may be beneficial to temporarily store an avulsed tooth in a solution shown to prolong viability of dental cells (compared with saliva). Solutions with demonstrated efficacy at prolonging dental cell viability from 30 to 120 minutes include Hank's Balanced Salt Solution (containing calcium, potassium chloride and phosphate, magnesium chloride and sulfate, sodium chloride, sodium bicarbonate, sodium phosphate dibasic, and glucose), propolis, egg white, coconut water, Ricetral, or whole milk.

2010 (Old): Place the tooth in milk—or clean water if milk is not available.

Why: Dental avulsion can result in permanent loss of a tooth. The dental community agrees that immediate reimplantation of the avulsed tooth affords the greatest chance of tooth survival, but it may not be an option. In the event of delayed reimplantation, temporary storage of an avulsed tooth in an appropriate solution may improve chances of tooth survival.

First Aid Education

2015 (New): Education and training in first aid can be useful to improve morbidity and mortality from injury and illness, and we recommend that it be universally available.

Why: Evidence shows that education in first aid can increase survival rates, improve recognition of acute illness, and aid symptom resolution.

Positioning an Ill or Injured Person

2015 (Updated): The recommended recovery position has changed from supine to a lateral side-lying position for patients without suspected spine, hip, or pelvis injury. There is little evidence to suggest that any alternative recovery position is of greater benefit for an individual who is unresponsive and breathing normally.

2010 (Old): If the victim is facedown and is unresponsive, turn the victim faceup. If the victim has difficulty breathing because of copious secretions or vomiting, or if you are alone and have to leave an unresponsive victim to get help, place the victim in a modified HAINES recovery position.

Why: Studies showing some improvement to respiratory indices when the victim is in a lateral position compared with a supine position has led to a change in the recommendation for patients without suspected spine, hip, or pelvis injury. The HAINES position is no longer recommended, due to the paucity and very low quality of evidence to support this position.

Oxygen Use in First Aid

2015 (Updated): There is no evidence supporting the routine administration of supplementary oxygen by first aid providers. Supplementary oxygen may be of benefit in only a few specific situations such as decompression injury and when administered by providers with training in its use.

2010 (Old): There is no evidence for or against the routine use of oxygen as a first aid measure for victims experiencing shortness of breath or chest pain. Oxygen may be beneficial for first aid in divers with a decompression injury.

Why: Evidence shows a benefit from use of oxygen for decompression sickness by first aid providers who have taken a diving first aid oxygen course. Limited evidence also shows supplementary oxygen to be effective for relief of dyspnea in advanced lung cancer patients with dyspnea and associated hypoxemia but not for similar

patients without hypoxemia. Although no evidence was identified to support the use of oxygen, when patients exposed to carbon monoxide are breathing spontaneously, it might be reasonable to provide oxygen while waiting for advanced medical care.

Chest Pain

2015 (Updated): While waiting for EMS to arrive, the first aid provider may encourage a person with chest pain to chew 1 adult or 2 low-dose aspirins if the signs and symptoms suggest that the person is having a myocardial infarction, and if the person has no allergy or other contraindication to aspirin. If a person has chest pain that does not suggest a cardiac source, or if the first aid provider is uncertain of the cause of chest pain or uncomfortable with administration of aspirin, then the first aid provider should not encourage the person to take aspirin and the decision to administer aspirin can be deferred to an EMS provider.

2010 (Old): While waiting for EMS to arrive, the first aid provider may encourage the victim to chew and swallow 1 adult (non–enteric-coated) or 2 low-dose “baby” aspirins if the patient has no allergy to aspirin or other contraindication to aspirin, such as evidence of a stroke or recent bleeding.

Why: The administration of aspirin significantly decreases mortality due to myocardial infarction, but there is no evidence to support the use of aspirin for undifferentiated chest pain. A reduction in mortality is also found when “early” administration of aspirin (ie, in the first few hours after onset of symptoms from myocardial infarction) is compared with “later” (ie, after hospital arrival) administration of aspirin for chest pain due to acute myocardial infarction. It remains unclear, however, whether first aid providers can recognize the signs and symptoms of myocardial infarction, and it is possible that use of aspirin for noncardiac causes of chest pain could cause harm. Although the dose and form of aspirin used for chest pain was not specifically reviewed by the ILCOR First Aid Task Force, the bioavailability of enteric-coated aspirin is similar to non–enteric-coated when chewed and swallowed.¹ Thus, there is no longer the restriction to use non–enteric-coated aspirin, as long as the aspirin is chewed before swallowing.

Anaphylaxis

2015 (Updated): When a person with anaphylaxis does not respond to an initial dose of epinephrine, and arrival of advanced care will exceed 5 to 10 minutes, a repeat dose may be considered.

2010 (Old): In unusual circumstances, when advanced medical assistance is not available, a second dose of epinephrine may be given if symptoms of anaphylaxis persist.

Why: The 2010 Guidelines recommended that first aid providers assist with or administer (the victim's own) epinephrine to persons with symptoms of anaphylaxis. Evidence supports the need for a second dose of epinephrine for acute anaphylaxis in persons not responding to a first dose; the guidelines revision provides clarification as to the time frame for considering a second dose of epinephrine.

Hemostatic Dressings

2015 (Updated): First aid providers may consider use of hemostatic dressings when standard bleeding control measures (with direct pressure with or without gauze or cloth dressing) are not effective for severe or life-threatening bleeding.

2010 (Old): Routine use (of hemostatic agents) in first aid cannot be recommended at this time because of significant variation in effectiveness by different agents and their potential for adverse effects, including tissue destruction with induction of a pro embolic state and potential thermal injury.

Why: The application of firm, direct pressure to a wound is still considered the primary means for control of bleeding. When direct pressure fails to control severe or life-threatening bleeding, first aid providers who have specific training in their indications and use may consider a hemostatic dressing. Newer-generation hemostatic agent-impregnated dressings have been shown to cause fewer complications and adverse effects than older hemostatic agents, and are effective in providing hemostasis in up to 90% of subjects.

Spinal Motion Restriction

2015 (Updated): With a growing body of evidence showing harm and no good evidence showing clear benefit, routine application of cervical collars by first aid providers is not recommended. A first aid provider who suspects a spinal injury should have the injured person remain as still as possible while awaiting arrival of EMS providers.

2010 (Old): First aid providers should not use immobilization devices because their benefit in first aid has not been proven and they may be harmful. Maintain spinal motion restriction by manually stabilizing the head so that motion of the head, neck, and spine is minimized.

Why: In the 2015 ILCOR systematic review of the use of cervical collars as a component of spinal motion restriction for blunt trauma, there was no evidence found to show a decrease in neurologic injury with the use of cervical collars. In fact, studies demonstrated actual or potential adverse effects such as increased intracranial pressure and airway compromise with use of a cervical collar. Proper technique for application of a cervical collar in high-risk individuals requires significant training and practice to be performed correctly. Application of cervical collars is not a first aid skill. The revision of this guideline reflects a change in recommendation class to Class III: Harm due to potential for adverse effects.

1.2 Introduction - Updated

These *Web-based Integrated Guidelines* incorporate the relevant recommendations from 2010 and the new or updated recommendations from 2015.

The International Liaison Committee on Resuscitation (ILCOR) First Aid Task Force was formed in 2013 to review and evaluate the scientific literature on first aid in preparation for development of international first aid guidelines, including the *2015 American Heart Association (AHA) and American Red Cross Guidelines Update for First Aid*. The 14 members of the task force represent 6 of the international member organizations of ILCOR. Before 2015, evidence evaluation for first aid was conducted by the International First Aid Science Advisory Board and the National First Aid Advisory Board. Although the group responsible for evidence evaluation has changed, the goals remain the same: to reduce morbidity and mortality due to emergency events by making recommendations based on an analysis of the scientific evidence.

A critical review of the scientific literature by appointed ILCOR First Aid Task Force members and evidence evaluators resulted in consensus on science statements with treatment recommendations for 22 selected questions addressing first aid interventions. These findings are presented in "[Part 9: First Aid](#)" of the [2015 ILCOR International Consensus on First Aid Science With Treatment Recommendations](#),²⁻³ and they include a list of identified knowledge gaps that may be filled through future research. The ILCOR treatment recommendations are intended for the international first aid community, with the understanding that local, state, or provincial regulatory requirements may limit the ability to implement recommended first aid interventions. The current AHA/American Red Cross First Aid guidelines are derived from this work. New topics found in the 2015 First Aid Guidelines Update include first aid education, recognition of stroke, recognition of concussion, treatment of mild symptomatic hypoglycemia, and management of open chest wounds. Other topics have been updated based on findings from the corresponding ILCOR reviews.

2 Background - Updated

The roots of first aid have been recorded throughout history, particularly as related to warfare or battlefield care. Images on classical Greek pottery from circa 500 bc depict bandaging of battle wounds.⁴ A system of first aid existed in the Roman army, with *capsarii* responsible for first aid, including bandaging, and resembling modern day combat medics.⁵ In the 1870s, Johannes Friedrich August von Esmarch, a Prussian military surgeon, was the first to use the term *Erste Hilfe* ("first aid") and taught soldiers to use a standard set of bandaging and splinting skills to care for their wounded comrades on the battlefield.⁴ During that same decade, the English Priory of the Order of St John was changed from a religious and fraternal body to a charitable organization with the goal of alleviating human suffering. They later established Britain's first ambulance service and the wheeled transport litter (the St John Ambulance) followed by the St John Ambulance Association "to train men and women for the benefit of the sick and wounded."⁶ In the United States, organized training in first aid started in 1903, when Clara Barton, president of the Red Cross, formed a committee to establish instruction in first aid among industrial workers, who were frequently subject to dangerous conditions, accidents, and deaths.⁷

2.1 The Evidence Evaluation Process - Updated

The recommendations in the 2015 Guidelines Update are based on an extensive evidence review process that

was begun by ILCOR after the publication of the *2010 American Heart Association and American Red Cross International Consensus on First Aid Science With Treatment Recommendations*⁸ and was completed in February 2015.²⁻³

In this in-depth evidence review process, ILCOR examined topics and then generated a prioritized list of questions for systematic review. Questions were first formulated in PICO (population, intervention, comparator, outcome) format,⁹ search strategies and inclusion and exclusion criteria were defined, and then a search for relevant articles was performed. The evidence was evaluated by the ILCOR task forces by using the standardized methodological approach proposed by the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group.¹⁰

The quality of the evidence was categorized based on the study methodologies and the 5 core GRADE domains of risk of bias, inconsistency, indirectness, imprecision, and other considerations (including publication bias). Where possible, consensus-based treatment recommendations were created.

To create the 2015 First Aid Guidelines Update, the AHA and the American Red Cross formed a joint writing group, with careful attention to avoiding conflicts of interest, to assessing the ILCOR treatment recommendations, and to writing AHA and American Red Cross treatment recommendations by using the AHA Class of Recommendation and Level of Evidence (LOE) system. The recommendations made in the 2015 Guidelines Update are informed by the ILCOR recommendations and GRADE classification, in the context of the delivery of medical care in North America. Throughout the online version of this document, live links are provided so the reader can connect directly to the systematic review on the ILCOR website, the Scientific Evidence Evaluation and Review System (SEERS) site. These links are indicated by a superscript combination of letters and numbers (eg, FA 517). For further information, please see "[Part 2: Evidence Evaluation and Management of Conflicts of Interest](#)."

A paucity of research in the field of first aid is present, although certain topics have received recent attention (eg, tourniquets for traumatic amputations, hemostatic dressings, identification of stroke symptoms). Without research into first aid interventions, all recommendations must be derived indirectly from hospital-based, animal, or, at best, emergency medical services (EMS) studies.

2.2 Definition of First Aid - Updated

We define first aid as helping behaviors and initial care provided for an acute illness or injury. The goals of a first aid provider include preserving life, alleviating suffering, preventing further illness or injury, and promoting recovery. First aid can be initiated by anyone in any situation and includes self-care. First aid assessments and interventions should be medically sound and based on scientific evidence or, in the absence of such evidence, on expert consensus. First aid competencies include, at any level of training,

- Recognizing, assessing, and prioritizing the need for first aid
- Providing care by using appropriate knowledge, skills, and behaviors
- Recognizing limitations and seeking additional care when needed

The scope of first aid is not purely scientific; it is influenced by both training and regulatory constraints. The definition of scope is therefore variable and should be defined according to circumstances, need, and regulatory requirements.

2.3 First Aid Education - New [FA 773](#)

First aid education can be accomplished through a variety of means, including online courses, classes, and public health campaigns. First aid education can increase survival rates, reduce injury severity, and resolve symptoms over a spectrum of approaches, including public health campaigns,¹¹⁻¹² focused health topics, or courses that result in certification.¹³

Education and training in first aid can be useful to improve morbidity and mortality from injury and illness. (Class IIa, LOE C-LD)

We recommend that first aid education be universally available. (Class I, LOE C-EO)

3 Calling for Help - Updated

The goal of first aid intervention is to recognize when help is needed and how to get it. This goal includes learning how and when to access the EMS system (9-1-1), how to activate the on-site emergency response plan, and how to contact the Poison Control Center (1-800-222-1222).

Providing care for someone who is ill or injured should not usually delay calling for more advanced care if needed. However, if the first aid provider is alone with an injured or ill person and there are imminent threats to life involving the ABCs (airway, breathing, circulation), then basic care—such as opening an airway or applying pressure to the site of severe bleeding—should be provided before leaving the victim to activate the emergency response system or phone for help (EMS or 9-1-1).

4 Positioning the Ill or Injured - Updated FA 517

Generally, an ill or injured person should not need to be moved. This is especially important if you suspect, from the person's position or the nature of the injury, that the person may have a pelvic or spine injury. There are times, however, when the person should be moved:

If the area is unsafe for the first aid provider or the person, move to a safe location if possible. (Class I, LOE C-EO)

If a person is unresponsive and breathing normally, it may be reasonable to place him or her in a lateral side-lying recovery position. (Class IIb, LOE C-LD)

There is evidence that this position will help increase total airway volume¹⁴ and decrease stridor severity.¹⁵ Extend one of the person's arms above the head and roll the body to the side so that the person's head rests on the extended arm. Once the person is on his or her side, bend both legs to stabilize the body. There is little evidence to suggest an alternative optimal recovery position.² If a person is unresponsive and not breathing normally, proceed with basic life support guidelines (see "[Part 5: Adult Basic Life Support and Cardiopulmonary Resuscitation Quality](#)").

If a person has been injured and the nature of the injury suggests a neck, back, hip, or pelvic injury, the person should not be rolled onto his or her side and instead should be left in the position in which they were found, to avoid potential further injury. (Class I, LOE C-EO)

If leaving the person in the position found is causing the person's airway to be blocked, or if the area is unsafe, move the person only as needed to open the airway and to reach a safe location. (Class I, LOE C-EO)

5 Position for Shock - Updated FA 520

The [ILCOR 2015 International Consensus on CPR and ECC Science With Treatment Recommendations](#) (C2015) reviewed the published evidence in support of various body positions that might be used by a first aid provider for a person in shock. Studies included normotensive volunteers; healthy individuals who underwent phlebotomy; and patients with septic, cardiogenic, or hypovolemic shock. Study results were sometimes conflicting.¹⁶⁻²¹ One observational study found a lower cardiac index and higher heart rate for individuals following phlebotomy when placed in a standing position compared with the supine position.²¹ Other studies found that the addition of passive leg raising alone compared to the supine position in hypotensive patients resulted in an improvement in various vital signs and indicators of cardiac output, but this effect was temporary, lasting no more than 7 minutes.^{17,18,21} There were no reported adverse effects due to raising the feet.

If a person shows evidence of shock and is responsive and breathing normally, it is reasonable to place or maintain the person in a supine position. (Class IIa, LOE C-LD)

If there is no evidence of trauma or injury (eg, simple fainting, shock from nontraumatic bleeding, sepsis, dehydration), raising the feet about 6 to 12 inches (about 30° to 60°) from the supine position is an option that may be considered while awaiting arrival of EMS. (Class IIb, LOE C-LD)

Do not raise the feet of a person in shock if the movement or the position causes pain. (Class III:Harm, LOE C-EO)

6 Oxygen Use in First Aid - Updated FA 519

Despite the common use of supplementary oxygen in various medical conditions, there is little evidence to support its use in the first aid setting. Administration of oxygen is not considered a standard first aid skill. However, oxygen may be available in some first aid environments and requires specific training in its use.

The 2015 ILCOR evidence review of oxygen in the first aid setting sought to determine the impact of oxygen supplementation, as compared with no oxygen supplementation, on outcomes of patients with shortness of breath, difficulty breathing, or hypoxia. The review attempted to identify specific medical conditions, other than chest pain, that may benefit from supplementary oxygen administration by first aid providers. Supplementary oxygen for adults with chest pain, during CPR and after return of spontaneous circulation, is addressed in “[Part 5: Adult Basic Life Support and Cardiopulmonary Resuscitation Quality](#),” “[Part 7: Advanced Cardiovascular Life Support](#),” “[Part 8: Post-Cardiac Arrest Care](#),” and “[Part 9, Acute Coronary Syndromes](#).” No evidence was found in the C2015 review for or against the routine administration of supplementary oxygen by first aid providers.²

Evidence was identified showing a beneficial effect with the use of supplementary oxygen for the relief of decompression sickness.²²

The use of supplementary oxygen by first aid providers with specific training is reasonable for cases of decompression sickness (Class IIa, LOE C-LD)

Patients with advanced cancer may use oxygen at home. One meta-analysis²³ found that the use of oxygen for patients with advanced cancer who had normoxia and dyspnea was not of benefit in relieving dyspnea. Two small, randomized controlled trials demonstrated relief of dyspnea in patients with advanced cancer who had hypoxemia and dyspnea.^{24,25}

For first aid providers with specific training in the use of oxygen, the administration of supplementary oxygen to persons with known advanced cancer with dyspnea and hypoxemia may be reasonable (Class IIb, LOE B-R)

Although no evidence was identified to support the use of oxygen, it might be reasonable to provide oxygen to spontaneously breathing persons who are exposed to carbon monoxide while waiting for advanced medical care (Class IIb, LOE C-EO)

Oxygen delivery mechanisms and amounts will vary with the individual’s underlying health problems. Specialized courses are available for persons who may potentially need to use oxygen in the settings described above.

There is insufficient evidence to recommend routine use of supplementary oxygen by a first aid provider for victims complaining of chest discomfort^{26,27} or shortness of breath.²⁸ (Class IIb, LOE C)

7 Medical Emergencies - Updated

7.1 Bronchodilators for Asthma With Shortness of Breath - Updated [FA 534](#)

There are many causes of shortness of breath. Some people carry inhaled medications to relieve certain causes of shortness of breath and wheezing, such as bronchitis, asthma, reactive airway disease or chronic obstructive pulmonary disease. The incidence of severe asthma and deaths from asthma are increasing.²⁹ First aid providers will likely encounter persons with a previous diagnosis of asthma and prescribed inhaled medication who have acute difficulty breathing and/ or wheezing.

Inhaled bronchodilators have been shown to be effective in patients with asthma and acute shortness of breath.³⁰⁻⁴⁰ Evidence from included studies was extrapolated from the prehospital and emergency department settings.

The incidence of adverse events related to the use of inhaled bronchodilators is low: multiple studies show that treatment with albuterol/salbutamol causes no significant change in heart rate,^{30,35-37} blood pressure,³⁷ serum potassium, tremor, headache, nervousness, weakness, palpitation, or dry mouth.³⁰ However, a single study showed a statistically significant difference in heart rate with different treatment regimens of salbutamol/albuterol.³⁰

It is reasonable for first aid providers to be familiar with the available inhaled bronchodilator devices and to assist as needed with the administration of prescribed bronchodilators when a person with asthma is having difficulty breathing. (Class IIa, LOE B-R)

7.2 Stroke Recognition - New [FA 801](#)

Worldwide, 15 million individuals are estimated to have a stroke each year. Some areas have achieved great success in decreasing the incidence and long-term effects of stroke through prevention, recognition, treatment, and rehabilitation programs. Early stroke recognition through the use of stroke assessment systems decreases the interval between the time of stroke onset and arrival at the hospital and definitive treatment.⁴¹⁻⁴⁶ This is associated with better outcomes, such as improved neurologic function. From a first aid education perspective, it has been shown that 94.4% of lay providers trained in a stroke assessment system are able to recognize signs and symptoms of a stroke, compared with 76.4% of those without training. The ability to recognize stroke with a stroke assessment system persists at 3 months after training.⁴⁷

The Face, Arm, Speech, Time (FAST) and Cincinnati Prehospital Stroke Scale (CPSS) stroke assessment systems are the simplest of these tools, with high sensitivity for the identification of stroke.² If glucose measurement is available to the first aid provider, stroke assessment systems such as the Los Angeles Prehospital Stroke Screen (LAPSS), Ontario Prehospital Stroke Scale (OPSS), Recognition of Stroke in the Emergency Room (ROSIER), and Kurashiki Prehospital Stroke Scale (KPSS) show increased specificity.^{2, 41-46, 48-64}

The use of a stroke assessment system by first aid providers is recommended. (Class I, LOE B-NR)

7.3 Chest Pain - Updated [FA 871](#) [FA 586](#)

Chest pain is a common health problem with a myriad of causes, ranging from minor chest wall strains to pneumonia, angina, or myocardial infarction. It can be very difficult to differentiate chest pain of cardiac origin, such as a heart attack or myocardial infarction, from other origins. Common signs and symptoms associated with chest pain or discomfort of cardiac origin include shortness of breath, nausea, sweating, or pain in the arm(s) or back.

Aspirin has been found to significantly decrease mortality due to myocardial infarction in several large studies^{65, 66, 67} and is therefore recommended for persons with chest pain due to suspected myocardial infarction.

(Class I, LOE B-R)

There was no evidence of allergic reactions in 1 small study,⁶⁸ but there was an increased risk of bleeding

among recipients of aspirin in 1 large study.⁶⁵

The 2015 ILCOR systematic review for the use of aspirin in chest pain did not find any evidence to support the use of aspirin for undifferentiated chest pain.¹ When early aspirin administration (ie, in the first few hours after onset of symptoms) is compared with late aspirin administration (eg, after hospital arrival) for chest pain due to myocardial infarction, a reduction of mortality is found.^{65,69,70}

Call EMS immediately for anyone with chest pain or other signs of heart attack, rather than trying to transport the person to a healthcare facility yourself. (Class I, LOE C-EO)

While waiting for EMS to arrive, the first aid provider may encourage a person with chest pain to take aspirin if the signs and symptoms suggest that the person is having a heart attack and the person has no allergy or contraindication to aspirin, such as recent bleeding. (Class IIa, LOE B-NR) The suggested dose of aspirin is 1 adult 325-mg tablet, or 2 to 4 low-dose “baby” aspirins (81 mg each), chewed and swallowed.

If a person has chest pain that does not suggest that the cause is cardiac in origin, or if the first aid provider is uncertain or uncomfortable with administration of aspirin, then the first aid provider should not encourage the person to take aspirin. (Class III: Harm, LOE C-EO)

The decision to administer aspirin in these cases may be deferred to an EMS provider with physician oversight.

7.4 Anaphylaxis - Updated FA 500

Allergic reactions do not require epinephrine, but a small portion of reactions can progress to anaphylaxis. Epinephrine is recommended for anaphylaxis, and persons at risk are typically prescribed and carry an epinephrine autoinjector. An anaphylactic reaction involves 2 or more body systems and can be life-threatening. Symptoms may include respiratory difficulty (such as wheezing), cutaneous manifestations (such as hives or swelling of the lips and eyes), cardiovascular effects (such as hypotension, cardiovascular collapse, or shock), or gastrointestinal cramping and diarrhea.

This update does not change the 2010 Guidelines recommendation that first aid providers assist with or administer to persons with symptoms of anaphylaxis their own epinephrine when they are having a reaction.⁷

From 2010: Older patients who suffer from anaphylactic reactions know their signs and symptoms and many carry a lifesaving epinephrine auto-injector. With proper training, parents can be taught to correctly use an auto-injector to administer epinephrine to their allergic children.⁷¹ All too often, however, neither the victim nor family members know how to correctly use an auto-injector.⁷²⁻⁷⁴ First aid providers should be familiar with the epinephrine auto-injector so that they can help a victim with an anaphylactic reaction to self-administer it.

First aid providers should also know how 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 it. (Class IIb, LOE B)

The recommended dose of epinephrine is 0.3 mg intramuscularly for adults and children greater than 30 kg, 0.15 mg intramuscularly for children 15 to 30 kg, or as prescribed by the person’s physician. First aid providers should call 9-1-1 immediately when caring for a person with suspected anaphylaxis or a severe allergic reaction (Class I, LOE C-EO). (Class I, LOE C-EO)

A second dose of epinephrine has been found to be beneficial for persons not responding to a first dose.⁷⁵⁻⁸³

When a person with anaphylaxis does not respond to the initial dose, and arrival of advanced care will

exceed 5 to 10 minutes, a repeat dose may be considered. (Class IIb, LOE C-LD)

7.5 Seizures

The general principles of first aid management of seizures are to:

- Ensure an open airway.
- Prevent injury.

Do not restrain the victim during a seizure. Do not try to open the victim's mouth or try to place any object between the victim's teeth or in the mouth. Restraining the victim may cause musculoskeletal or soft-tissue injury.

Placing an object in the victim's mouth may cause dental damage or aspiration. (Class IIa, LOE C)

It is not unusual for the victim to be unresponsive or confused for a short time after a seizure.

7.6 Hypoglycemia - New [FA 795](#)

Hypoglycemia can manifest as a variety of symptoms, including confusion, altered behavior, diaphoresis, or tremulousness. Diabetics who display these symptoms should be assumed by the first aid provider to have hypoglycemia.

If the person is unconscious, exhibits seizures, or is unable to follow simple commands or swallow safely, the first aid provider should call for EMS immediately. (Class I, LOE C-EO)

Evidence from the 2015 ILCOR systematic review demonstrates more rapid clinical relief of symptomatic hypoglycemia with glucose tablets compared with various evaluated dietary sugars, such as sucrose- or fructose-containing candies or foods, orange juice, or milk (Table 1).⁸⁴⁻⁸⁶

Table 1: 2015 - Types of Food Representing 20 g of Carbohydrates and Number of People With Improvement in Hypoglycemia Within 15 Minutes (Based on Included Evidence)

Open table in a [new window](#)

Types of Food Representing 20 g of Carbohydrates and Number of People With Improvement in Hypoglycemia Within 15 Minutes (Based on Included Evidence)[reference id="2299" range="" /]

| Type of Food or Fluid | Carbohydrates/Serving | Measure Representing 20 g Carbohydrates* | Clinical Relief 15 min or Less After Ingestion |
|---|-----------------------|--|--|
| Glucose tablets | Varies | Varies | 194/223 (87.0%) |
| Glucose 71%/oligosaccharides 29% candy (Mentos) | 2.8 g/mint | 5–10 mints | 44/48 (91.7%) |
| Sucrose candy (Skittles) | 0.9 g/candy | 20–25 candies | 150/177 (84.7%) |
| Jelly beans | 1.1 g/jelly bean | 15–20 jelly beans | 33/45 (73.3%) |
| Orange juice (unsweetened, from concentrate) | 1 g/10 mL | 200 mL | 35/50 (70.0%) |

| Type of Food or Fluid | Carbohydrates/Serving | Measure Representing 20 g Carbohydrates* | Clinical Relief 15 min or Less After Ingestion |
|--|-----------------------|--|--|
| Fructose (fruit leather, such as Stretch Island) | 10 g/strip | 2 strips | 111/165 (67.3%) |
| Whole milk | 21.75 g/mL | 435 mL | Not reported |

*These measurements may differ from those in the evaluated studies, as the amount was not standardized across studies.

If a person with diabetes reports low blood sugar or exhibits signs or symptoms of mild hypoglycemia and is able to follow simple commands and swallow, oral glucose should be given to attempt to resolve the hypoglycemia. Glucose tablets, if available, should be used to reverse hypoglycemia in a person who is able to take these orally. (Class I, LOE B-R)

If glucose tablets are not available, other forms of dietary sugars, as depicted in Table 1, have been found to be effective as a substitute for glucose tablets to reverse hypoglycemia.⁸⁴⁻⁸⁷

It is reasonable to use these dietary sugars as an alternative to glucose tablets (when not available) for reversal of mild symptomatic hypoglycemia. (Class IIa, LOE B-R)

For diabetics with symptoms of hypoglycemia, symptoms may not resolve until 10 to 15 minutes after ingesting glucose tablets or dietary sugars (Table 1).⁸⁴⁻⁸⁷

First aid providers should therefore wait at least 10 to 15 minutes before calling EMS and re-treating a diabetic with mild symptomatic hypoglycemia with additional oral sugars. (Class I, LOE B-R)

If the person's status deteriorates during that time or does not improve, the first aid provider should call EMS. (Class I, LOE C-EO)

7.7 Exertional Dehydration - Updated FA 584

First aid providers are often called upon to assist at "hydration stations" at sporting events. Vigorous exercise, particularly in hot and humid environments, can lead to significant dehydration with loss of water and electrolytes through sweat.

Evidence from the 2015 ILCOR systematic review shows that ingestion of 5% to 8% carbohydrate-electrolyte (CE) solutions facilitates rehydration after exercise-induced dehydration and is generally well tolerated.^{88,89} Studies in this review looked at the specific percentage CE solutions described and did not evaluate oral rehydration therapy or salts that are sometimes used for diarrheal illness.

In the absence of shock, confusion, or inability to swallow, it is reasonable for first aid providers to assist or encourage individuals with exertional dehydration to orally rehydrate with CE drinks. (Class IIa, LOE B-R)

For individuals with severe dehydration with shock, confusion or symptoms of heat stroke, or symptoms of heat exhaustion or cramps, refer to the 2010 First Aid Guidelines.⁷ Lemon tea-based CE drinks and Chinese tea with caffeine have been found to be similar to water for rehydration.⁹⁰ Other beverages, such as coconut water and 2% milk, have also been found to promote rehydration after exercise-associated dehydration, but they may not be as readily available.^{88,90,91}

If these alternative beverages are not available, potable water may be used. (Class IIb, LOE B-R)

7.8 Toxic Eye Injury - Updated FA 540

Chemical injury to the eye occurs most commonly from chemicals in powder and liquid form. Evidence limited to a single study of eye exposure to an alkali showed improvement in ocular pH following irrigation with tap water compared with normal saline. In this study, irrigation with 1.5 L of solution occurred over 15 minutes.⁹²

It can be beneficial to rinse eyes exposed to toxic chemicals immediately and with a copious amount of tap water for at least 15 minutes or until advanced medical care arrives. (Class IIa, LOE C-LD)

If tap water is not available, normal saline or another commercially available eye irrigation solution may be reasonable. (Class IIb, LOE C-LD)

First aid providers caring for individuals with chemical eye injury should contact their local poison control center or, if a poison control center is not available, seek help from a medical provider or 9-1-1. (Class I, LOE C-EO)

8 Trauma Emergencies - Updated

8.1 Bleeding - Updated FA 530

Control of bleeding is an important first aid skill. Standard first aid bleeding control includes applying direct pressure with or without gauze. The 2015 ILCOR systematic review evaluated the use of pressure points, elevation, local application of ice, tourniquets, and hemostatic dressings for the control of bleeding compared with direct pressure.

8.1.1 Direct Pressure, Pressure Points and Elevation - Updated

There continues to be no evidence to support the use of pressure points or elevation of an injury to control external bleeding.

The use of pressure points or elevation of an extremity to control external bleeding is not indicated. (Class III: No Benefit, LOE C-EO)

The standard method for first aid providers to control open bleeding is to apply direct pressure to the bleeding site until it stops. Control open bleeding by applying direct pressure to the bleeding site. (Class I, LOE B-NR)

8.1.2 Localized Cold Therapy - Updated

There are limited data from the hospital setting demonstrating a benefit from application of localized cold therapy compared to direct pressure alone to closed bleeding, such as a bruise or hematoma.^{93,94}

Local cold therapy, such as an instant cold pack, can be useful for these types of injuries to the extremity or scalp. (Class IIa, LOE C-LD)

Cold therapy should be used with caution in children because of the risk of hypothermia in this population. (Class I, LOE C-EO)

8.1.3 Tourniquets - Updated FA 768

Tourniquets can be effective for severe external limb bleeding. The use of tourniquets in the prehospital setting for severe external limb bleeding has been studied in the military setting⁹⁵⁻¹⁰² and civilian EMS setting.^{103,104} The effectiveness and complications of different types of tourniquets, such as military tourniquets compared with commercial or improvised tourniquets, was not reviewed for 2015. However, tourniquets have been found to control bleeding effectively in most cases.^{95,97,101,103} Potential complications include compartment syndrome,⁹⁶ nerve damage,^{96,98,101,103} damage to blood vessels,¹⁰³ and amputation or limb shortening.^{95,96,98,101} Complications may be related to tourniquet pressure and duration of occlusion, but there is insufficient evidence to determine a minimal critical time beyond which irreversible complications may occur.

Because the rate of complications is low and the rate of hemostasis is high, first aid providers may consider the use of a tourniquet when standard first aid hemorrhage control does not control severe external limb bleeding. (Class IIb, LOE C-LD)

A tourniquet may be considered for initial care when a first aid provider is unable to use standard first aid hemorrhage control, such as during a mass casualty incident, with a person who has multisystem trauma, in an unsafe environment, or with a wound that cannot be accessed. (Class IIb, LOE C-EO)

Although maximum time for tourniquet use was not reviewed by a 2015 ILCOR systematic review, it has been recommended that the first aid provider note the time that a tourniquet is first applied and communicate this information with EMS providers.⁷

It is reasonable for first aid providers to be trained in the proper application of tourniquets, both manufactured and improvised. (Class IIa, LOE C-EO)

Specifically designed tourniquets appear to be better than ones that are improvised,^{105, 106-109} but tourniquets should only be used with proper training. (Class IIa, LOE B)

8.1.4 Hemostatic Dressings - Updated FA 769

Hemostatic dressings are becoming more commonly used to control bleeding, especially in the military setting.¹¹⁰⁻¹¹² Early-generation powder or granular hemostatic agents were poured directly into the wound and were associated with exothermic reactions that could worsen tissue injury. Because of their potential for adverse effects and the variability of effectiveness of early hemostatic agents and dressings, routine use has not previously been advised. Newer-generation hemostatic agent-impregnated dressings are safer and effective in providing hemostasis in up to 90% of participants in case series.¹¹⁰⁻¹¹³ Both complications and adverse effects are now uncommon but may include wound infection and exothermic burns.¹¹⁰ Use of newer-generation hemostatic dressings is increasing in the civilian setting.¹¹³

Hemostatic dressings may be considered by first aid providers when standard bleeding control (direct pressure with or without gauze or cloth dressing) is not effective for severe or life-threatening bleeding. (Class IIb, LOE C-LD)

Hemostatic dressings are likely of greatest use for severe external bleeding in locations where standard hemorrhage control is not effective, when a tourniquet cannot be applied (trunk or junctional areas such as the abdomen or axilla/groin), when a tourniquet is not available, or when a tourniquet is not effective to stop bleeding.

Proper application of hemostatic dressings requires training. (Class I, LOE C-EO)

8.2 Superficial Non-thermal Wounds and Abrasions

Superficial wounds and abrasions should be thoroughly irrigated with a large volume of warm or room temperature potable water with or without soap¹¹⁴⁻¹¹⁹ until there is no foreign matter in the wound.

(Class I, LOE A)

Cold water appears to be as effective as warm water, but it is not as comfortable. If running water is unavailable, use any source of clean water.

Wounds heal better with less infection if they are covered with an antibiotic ointment or cream and a clean occlusive dressing.¹²⁰⁻¹²² ***(Class IIa, LOE A)***

Apply antibiotic ointment or cream only if the wound is an abrasion or a superficial injury and only if the victim has no known allergies to the antibiotic.

8.3 Open Chest Wounds - New FA 525

Management of an open chest wound in out-of-hospital settings is challenging and requires immediate activation of EMS. The greatest concern is the improper use of a dressing or device that could lead to fatal tension pneumothorax. There are no human studies comparing the application of an occlusive device versus a nonocclusive device.²

We recommend against the application of an occlusive dressing or device by first aid providers for individuals with an open chest wound. (Class III-Harm, LOE C-EO)

In the first aid situation, it is reasonable to leave an open chest wound exposed to ambient air without a dressing or seal. (Class IIa, LOE C-EO)

If a nonocclusive dressing, such as a dry gauze dressing, is applied for active bleeding, care must be taken to ensure that saturation of the dressing does not lead to partial or complete occlusion.

8.4 Concussion - New FA 799

The signs and symptoms of concussion (mild traumatic brain injury) are complex. The classic signs of concussion after head trauma include feeling stunned or dazed, or experiencing headache, nausea, dizziness and unsteadiness (difficulty in balance), visual disturbance, confusion, or loss of memory (from either before or after the injury).¹²³ The various grades and combinations of these symptoms make the recognition of concussion difficult.¹²⁴ Furthermore, changes may be subtle and yet progressive.

First aid providers are often faced with the decision as to what advice to give to a person after minor head trauma, and it is now widely recognized that an incorrect decision can have long-term serious or even fatal consequences.¹²⁵

There are no clinical studies to support the use of a simple concussion scoring system by first aid providers.

Any person with a head injury that has resulted in a change in level of consciousness, has progressive development of signs or symptoms as described above, or is otherwise a cause for concern should be evaluated by a healthcare provider or EMS personnel as soon as possible. (Class I, LOE C-EO)

Using any mechanical machinery, driving, cycling, or continuing to participate in sports after a head injury should be deferred by these individuals until they are assessed by a healthcare provider and cleared to participate in those activities. (Class I, LOE C-EO)

8.5 Spinal Motion Restriction - Updated FA 772

The terms *spinal immobilization* and *spinal motion restriction* have been used synonymously in the past. Because true spinal immobilization is not possible, the term *spinal motion restriction* is now being used to describe the practice of attempting to maintain the spine in anatomical alignment and minimize gross movement, with or without the use of specific adjuncts such as collars.

In the 2010 review, no published studies were identified to support or refute the benefit of spinal immobilization and/or the method by which to apply spinal motion restriction (SMR) by first aid providers.⁸ For the 2015 ILCOR systematic review, cervical SMR in injured persons without penetrating trauma, as a component of total SMR, was the specific focus for evidence review. Thus, the evidence evaluation was limited to the use of cervical collars. Potential adverse effects from the use of a cervical collar include increased intracranial pressure¹²⁶⁻¹³¹ and potential airway compromise.¹³² Once again, no studies were found that demonstrated a decrease in neurologic injury with the use of a cervical collar.¹³³

While complete SMR may be indicated for individuals who have blunt mechanism of injury and who meet high-risk criteria as recommended in the 2010 Guidelines,⁷ the proper technique for SMR requires extensive training and practice to be performed properly and is thus not considered a skill for first aid providers.

With a growing body of evidence showing more actual harm and no good evidence showing clear benefit, we recommend against routine application of cervical collars by first aid providers.

(Class III-Harm, LOE C-LD)

If a first aid provider suspects a spinal injury, he or she should have the person remain as still as possible and await the arrival of EMS providers. (Class I, LOE C-EO)

8.6 Musculoskeletal Trauma - Updated

8.6.1 Sprains and Strains

Soft-tissue injuries include joint sprains and muscle contusions. Cold application decreases hemorrhage, edema, pain, and disability,¹³⁴⁻¹³⁹ and it is reasonable to apply cold to a soft-tissue injury. Cooling is best accomplished with a plastic bag or damp cloth filled with a mixture of ice and water; the mixture is better than ice alone.¹⁴⁰⁻¹⁴² Refreezable gel packs do not cool as effectively as an ice-water mixture.^{143,144} To prevent cold injury, limit each application of cold to periods of 20 minutes.¹⁴⁵⁻¹⁴⁷ If that length of time is uncomfortable, limit application to 10 minutes.¹⁴⁸

Place a barrier, such as a thin towel, between the cold container and the skin.^{145,147} ***(Class IIb, LOE C)***

It is not clear whether a compression bandage is helpful for a joint injury. Heat application to a contusion or injured joint is not as good a first aid measure as cold application.¹³⁴

8.6.2 Suspected Long Bone Fractures - Updated [FA 503](#)

Long bone fractures may at times be severely angulated. The 2015 ILCOR systematic review attempted to compare straightening of angulated long bone fractures before splinting with splinting in the position found. No studies were identified that evaluate straightening of angulated long bone fractures before splinting. Thus, there is no evidence in the first aid setting for or against the straightening or gentle realignment of a suspected angulated long bone fracture before splinting, including in the presence of neurovascular compromise, for outcomes of incidence of neurologic or vascular injury, ability to splint, pain experienced, or time to medical transportation.²

In general, first aid providers should not move or try to straighten an injured extremity.

(Class III-Harm, LOE C-EO)

Based on training and circumstance (such as remote distance from EMS or wilderness settings, presence of vascular compromise), some first aid providers may need to move an injured limb or person.

In such situations, providers should protect the injured person, including splinting in a way that limits pain, reduces the chance for further injury, and facilitates safe and prompt transport. (Class I, LOE C-EO)

If an injured extremity is blue or extremely pale, activate EMS immediately. (Class I, LOE C-EO)

8.7 Burns - Updated

8.7.1 Thermal Burns: Cooling - Updated FA 770

Burns can come from a variety of sources such as hot water (scalds) and fire. It is known that applying ice directly to a burn can cause tissue ischemia.^{7,8}

Don't apply ice directly to a burn; it can produce tissue ischemia. (Class III, LOE B)

The 2015 ILCOR systematic review of the evidence for cooling of burns evaluated agents that were cool or cold, but not frozen. Cooling was found to reduce risk of injury and depth of injury.^{12,149,150}

Cool thermal burns with cool or cold potable water as soon as possible and for at least 10 minutes. (Class I, LOE B-NR)

If cool or cold water is not available, a clean cool or cold, but not freezing, compress can be useful as a substitute for cooling thermal burns. (Class IIa, LOE B-NR)

Care should be taken to monitor for hypothermia when cooling large burns. (Class I, LOE C-EO)

This is particularly important in children, who have a larger body surface area for their weight than adults have.

8.7.2 Burn Dressings - Updated FA 771

It is common for first aid providers to cover a burn with a dressing after it has been cooled; however, based on limited data, there is no evidence that a wet dressing compared with a dry dressing is beneficial for care of a burn.² One study showed no benefit for a topical penetrating antibacterial versus petrolatum gauze or for a topical nonpenetrating antibacterial versus dry dressing.¹⁵¹

After cooling of a burn, it may be reasonable to loosely cover the burn with a sterile, dry dressing. (Class IIb, LOE C-LD)

In 2010 it was also noted to leave blisters intact because this improves healing and reduces pain.

Honey, when used as a dressing, has been shown in 2 randomized controlled trials to decrease the risk of infection and mean duration of time to healing when compared with an antibiotic-impregnated gauze dressings.^{152,153} Both of these studies were downgraded for risk of bias, imprecision, and indirectness.

In general, it may be reasonable to avoid natural remedies, such as honey or potato peel dressings. (Class IIb, LOE C-LD)

However, in remote or wilderness settings where commercially made topical antibiotics are not available, it may be reasonable to consider applying honey topically as an antimicrobial agent.

(Class IIb, LOE C-LD)

8.7.3 Burns: When Advanced Care is Needed - Updated

Burns associated with or involving (1) blistering or broken skin; (2) difficulty breathing; (3) the face, neck, hands, or genitals; (4) a larger surface area, such as trunk or extremities; or (5) other cause for concern should be evaluated by a healthcare provider (Class I, LOE C-EO)

8.8 Electric Injuries

The severity of electric 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 traverses the body, thermal burns may be present at the entry and exit points and along its internal pathway. Cardiopulmonary arrest is the primary cause of immediate death from electrocution.¹⁵⁴ 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.¹⁵⁵ Respiratory arrest may result from electric 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.

(Class III, LOE C)

Turn off the power at its source; at home the switch is usually near the fuse box. In case of high-voltage electrocutions caused by fallen power lines, immediately notify the appropriate authorities (eg, 911 or fire department). All materials 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 a wooden one, 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.

8.9 Human and Animal Bites

Irrigate human and animal bites with copious amounts of water. (Class I, LOE B)

This irrigation has been shown to prevent rabies from animal bites^{156,157} and bacterial infection.¹⁵⁸

8.9.1 Snakebites

Do not apply suction as first aid for snakebites. (Class III, LOE C)

Suction does remove some venom, but the amount is very small.¹⁵⁹ Suction has no clinical benefit¹⁶⁰ and it may aggravate the injury.¹⁶¹⁻¹⁶³

Applying a pressure immobilization bandage with a pressure between 40 and 70 mm Hg in the upper extremity and between 55 and 70 mm Hg in the lower extremity around the entire length of the bitten extremity is a reasonable way to slow the dissemination of venom by slowing lymph flow.

(Class IIa, LOE C)

For practical purposes pressure is sufficient if the bandage is comfortably tight and snug but allows a finger to be slipped under it. Initially it was theorized that slowing lymphatic flow by external pressure would only benefit

victims bitten by snakes producing neurotoxic venom,¹⁶⁴ but the effectiveness of pressure immobilization has also been demonstrated for bites by non-neurotoxic American snakes in an animal model.¹⁶⁵ The challenge is to find a way to teach the application of the correct snugness of the bandage because inadequate pressure is ineffective and too much pressure may cause local tissue damage. It has also been demonstrated that, once learned, retention of the skill of proper pressure and immobilization application is poor.^{166,167}

8.9.2 Jellyfish Stings

This section is new to the First Aid Guidelines. First aid for jellyfish stings consists of two important actions: preventing further nematocyst discharge and pain relief.

To inactivate venom load and prevent further envenomation, jellyfish stings should be liberally washed with vinegar (4% to 6% acetic acid solution) as soon as possible for at least 30 seconds (Class IIa, LOE B)

The inactivation of venom has been demonstrated for *Olindias sambaquiensis*¹⁶⁸ and for *Physalia physalis* (Portuguese man-of-war).¹⁶⁹ If vinegar is not available, a baking soda slurry may be used instead.¹⁶⁹

For the treatment of pain, after the nematocysts are removed or deactivated, jellyfish stings should be treated with hot-water immersion when possible. (Class IIa, LOE B)

The victim should be instructed to take a hot shower or immerse the affected part in hot water (temperature as hot as tolerated, or 45°C if there is the capability to regulate temperature), as soon as possible, for at least 20 minutes or for as long as pain persists.¹⁷⁰⁻¹⁷³

If hot water is not available, dry hot packs or, as a second choice, dry cold packs may be helpful in decreasing pain but these are not as effective as hot water. ^{170, 174, 175} (Class IIb, LOE B)

Topical application of aluminum sulfate or meat tenderizer, commercially available aerosol products, fresh water wash, and papain, an enzyme derived from papaya used as a local medicine, are even less effective in relieving pain. ^{171, 176} (Class IIb, LOE B)

Pressure immobilization bandages are not recommended for the treatment of jellyfish stings because animal studies ^{177, 178} show that pressure with an immobilization bandage causes further release of venom, even from already fired nematocysts. (Class III, LOE C)

8.10 Dental Avulsion - Updated FA 794

Dental avulsion injury can damage both the tooth and the supporting soft tissue and bone, resulting in permanent loss of the tooth. Immediate reimplantation of an avulsed tooth is believed by the dental community to result in the greatest chance of tooth survival.¹⁷⁹

In situations that do not allow for immediate reimplantation, it can be beneficial to temporarily store an avulsed tooth in a variety of solutions shown to prolong viability of dental cells. (Class IIa, LOE C-LD)

The following solutions have demonstrated efficacy at prolonging dental cell viability from 30 to 120 minutes, and they may be available to first aid providers (listed in order of preference based on the C2015 evidence review):

- Hank's Balanced Salt Solution (containing calcium, potassium chloride and phosphate, magnesium chloride and sulfate, sodium chloride, sodium bicarbonate, sodium phosphate dibasic and glucose),
- propolis,
- egg white,
- coconut water,

- Ricetral, or
- whole milk.¹⁸⁰⁻¹⁹⁰

If none of these solutions are available, it may be reasonable to store an avulsed tooth in the injured persons saliva (not in the mouth) pending reimplantation. (Class IIb, LOE C-LD)

Viability of an avulsed tooth stored in any of the above solutions is limited. Reimplantation of the tooth within an hour after avulsion affords the greatest chance for tooth survival.

Following dental avulsion, it is essential to seek rapid assistance with reimplantation. (Class I, LOE C-EO)

9 Environmental Emergencies

9.1 Cold Emergencies

9.1.1 Hypothermia

Hypothermia is caused by exposure to cold. The urgency of treatment depends on the length of exposure and the victim's body temperature.

Begin rewarming a victim of hypothermia immediately by moving the victim to a warm environment, removing wet clothing, and wrapping all exposed body surfaces with anything at hand, such as blankets, clothing, and newspapers. If the hypothermia victim is far from definitive health care, begin active rewarming^{191,192} (Class IIa, LOE B) although the effectiveness of active rewarming has not been evaluated.

Active rewarming should not delay definitive care. Potential methods of active rewarming include placing the victim near a heat source and placing containers of warm, but not hot, water in contact with the skin.

9.1.2 Frostbite

Frostbite usually affects an exposed part of the body such as the extremities and nose. In case of frostbite, remove wet clothing and dry and cover the victim to prevent hypothermia. Transport the victim to an advanced medical facility as rapidly as possible.

Do not try to rewarm the frostbite if there is any chance that it might refreeze^{193,194} or if you are close to a medical facility. (Class III, LOE C)

Minor or superficial frostbite (frostnip) can be treated with simple, rapid rewarming using skin-to-skin contact such as a warm hand.

Severe or deep frostbite should be rewarmed within 24 hours of injury and this is best accomplished by immersing the frostbitten part in warm (37° to 40°C or approximately body temperature) water for 20 to 30 minutes.¹⁹³⁻²⁰² (Class IIb, LOE C)

Chemical warmers should not be placed directly on frostbitten tissue because they can reach temperatures that can cause burns.²⁰³ (Class III, LOE C)

Following rewarming, efforts should be made to protect frostbitten parts from refreezing and to quickly evacuate the patient for further care. The effectiveness of ibuprofen or other nonsteroidal antiinflammatory drugs (NSAIDs) in frostbite has not been well established in human studies.^{202,204-207}

9.2 Heat Emergencies

Heat-induced symptoms, often precipitated by vigorous exercise, may include heat cramps, heat exhaustion, and heat stroke.

Heat cramps are painful involuntary muscle spasms that most often affect the calves, arms, abdominal muscles, and back. First aid includes rest, cooling off, and drinking an electrolyte-carbohydrate mixture, such as juice, milk, or a commercial electrolyte-carbohydrate drink.²⁰⁸⁻²¹⁷ Stretching, icing, and massaging the painful muscles may be helpful. Exercise should not be resumed until all symptoms have resolved.

Heat exhaustion is caused by a combination of exercise-induced heat and fluid and electrolyte loss as sweat. Signs and symptoms may start suddenly and include: nausea, dizziness, muscle cramps, feeling faint, headache, fatigue, and heavy sweating. Heat exhaustion is a serious condition because it can rapidly advance to the next stage, heat stroke, which can be fatal. Heat exhaustion must be vigorously treated by having the victim lie down in a cool place, taking off as many clothes as possible, cooling the victim with a cool water spray, and encouraging the victim to drink cool fluids, preferably containing carbohydrates and electrolytes.

Heat stroke includes all the symptoms of heat exhaustion plus signs of central nervous system involvement, including dizziness, syncope, confusion, or seizures. The most important action by a first aid provider for a victim of heat stroke is to begin immediate cooling, preferably by immersing the victim up to the chin in cold water.²¹⁸⁻²²¹ It is also important to activate the EMS system. Heat stroke requires emergency treatment with intravenous fluids. Do not try to force the victim to drink liquids.

9.3 Drowning

Drowning is a major cause of unintentional death. Methods of preventing drowning include isolation fencing around swimming pools (gates should be self-closing and self-latching),²²² wearing personal flotation devices (life jackets) while in, around, or on water, never swimming alone, and avoiding swimming or operating motorized watercraft while intoxicated. Outcome following drowning depends on the duration of the submersion, the water temperature, and how promptly CPR is started.^{223,224} Occasional case reports have documented intact neurological survival in children following prolonged submersion in icy waters.^{225,226}

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 water²²⁷ providing that it does not delay removing the victim from the water. There is no evidence that water acts as an obstructive foreign body, so do not waste time trying to remove it with abdominal or chest thrusts. Start CPR and, if you are alone, continue with about 5 cycles (about 2 minutes) of chest compressions and ventilations before activating EMS. If 2 rescuers are present, send 1 rescuer to activate EMS immediately.

10 Poison Emergencies

If the patient exhibits any signs or symptoms of a life-threatening condition, (eg, sleepiness, seizures, difficulty breathing, vomiting) after exposure to a poison, activate the EMS immediately.

10.1 Poison Control Centers

There are many poisonous substances in the home and worksite. It is important to understand the toxic nature of the chemical substances in the environment and the proper protective equipment and emergency procedures in case of toxic exposure. The Poison Help hotline of the American Association of Poison Control Centers (800-222-1222) is an excellent resource in the United States for information about treating ingestion of, or exposure to, a potential poison. Further information is available at www.aapcc.org. Similar resources may be available internationally, and their contact information (eg, 112 in Europe) should be standard in international first aid training. When phoning a poison control center or other emergency medical services, know the nature and time of exposure and the name of the product or toxic substance.

10.2 Chemical Burns

Brush powdered chemicals off the skin with a gloved hand or piece of cloth.

Remove all contaminated clothing from the victim, making sure you do not contaminate yourself in the process. In case of exposure to an acid or alkali on the skin²²⁸⁻²³⁴ or eye,²³⁵⁻²⁴⁰ immediately irrigate

| Writing Group Member | Employment | Research Grant | Other Research Support | Speakers' Bureau/ Honoraria | Ownership Interest | Consultant/ Advisory Board | Other |
|----------------------|--|----------------|------------------------|-----------------------------|--------------------|----------------------------|--|
| Jeffrey D. Ferguson | Brody School of Medicine, East Carolina University—Ass Professor | None | None | None | None | None | *Serving as an expert witness in two ongoing lawsuits involving EMS related cases. Billing for this service has not yet occurred and will likely represent less than \$10,000 per 12 months. This payment is expected to come directly to me |
| Leon Chameides | Emeritus Director Pediatric Cardiology, Connecticut Children's Medical Center, Clinical Professor, University of Connecticut | None | None | None | None | None | None |

| Writing Group Member | Employment | Research Grant | Other Research Support | Speakers' Bureau/ Honoraria | Ownership Interest | Consultant/ Advisory Board | Other |
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| Pascal Cassan | French Red Cross, National Medical Advisor and Coordinator of the European Reference Centre for first aid education Coordinator of the Scientific Commission of First Aid for the French Interior Ministry (unpaid) | None | None | None | None | | None |
| Kin-Lai Chung | Hong Kong Hospital Authority Hospital Chief Executive | None | None | None | None | None | None |

| Writing Group Member | Employment | Research Grant | Other Research Support | Speakers' Bureau/ Honoraria | Ownership Interest | Consultant/ Advisory Board | Other |
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| Jonathan Epstein | NorthEast Emergency Medical Services, Inc.— Regional EMS Council: Provide EMS System Oversight. Also provide education (First aid and CPR/AED) as an AHA Training Center. Executive Director; Isis Maternity: Pre-Natal and Post Partum edu.- Provide CPR and First Aid Training via AHA Curriculum. For-Profit Company—Ins | None | None | None | None | Volunteer: American Red Cross Advisory Council on First Aid, Aquatics, Safety and Preparedness (ACFASP) Vice-Chair | None |

| Writing Group Member | Employment | Research Grant | Other Research Support | Speakers' Bureau/ Honoraria | Ownership Interest | Consultant/ Advisory Board | Other |
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| Adam Singer | Stony Brook University-Physician | None | None | None | None | None | None |

- This table represents the relationships of writing group members that may be perceived as actual or reasonably perceived conflicts of interest as reported on the Disclosure Questionnaire, which all members of the writing group are required to complete and submit. A relationship is considered to be “significant” if (a) the person receives \$10 000 or more during any 12-month period, or 5% or more of the person's gross income; or (b) the person owns 5% or more of the voting stock or share of the entity, or owns \$10 000 or more of the fair market value of the entity. A relationship is considered to be “modest” if it is less than “significant” under the preceding definition.
- [?*](#) Modest.
- [?†](#) Significant.

12 Footnotes

The American Heart Association and the American Red Cross request that this document be cited as follows:

American Heart Association and American Red Cross. Web-based Integrated Guidelines for First Aid. firstaidguidelines.heart.org.

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