Resuscitation 95 (2015) 278–287

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

European Resuscitation Council Guidelines for Resuscitation 2015 Section 9. First aid

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Introduction

In 2005, the American Heart Association (AHA) together with the American Red Cross (ARC) formed the National First Aid Science Advisory Board to evaluate the science associated with the practice of First Aid and published the 2005 AHA and ARC Guidelines for First Aid. This advisory board was subsequently expanded to include representatives from several international first aid organizations to become the International First Aid Science Advisory Board (IFASAB). IFASAB evaluated the scientific literature of first aid and published the treatment recommendations for 2010 in association with the International Liaison Committee on Resuscitation (ILCOR) resuscitation recommendations.[1,2]

It was not until 2012 that ILCOR convened a full international First Aid Task Force with representation from all constituent International Councils together with the ARC. The ERC contributed directly to the Task Force as individual members, question owners and by providing expert evidence reviewers. By the ILCOR Consensus Conference in early 2015 the Task Force had completed comprehensive reviews of twenty-two questions using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology in combination with ILCOR's Scientific Evidence Evaluation and Review system (SEERS). Seventeen of these questions were derived from the 2010 AHA and ARC consensus document, the remaining five questions were new topics selected by the First Aid Task Force and based on current medical requirements. All 22 questions were devised in a Population Intervention Comparison Outcome (PICO) format and librarians assisted in developing the search strategies so that the science could be reassessed at regular intervals throughout the process and into the future using the same search criteria.

In publishing these guidelines based on the 2015 Consensus on Science and Treatment Recommendations the ERC recognises that this is not a comprehensive review of all First Aid topics. The twenty-two questions reviewed in this section provide important evidence-based support for current first aid practice or changes from current practice. It is hoped that the search strategies that have been developed will be used to access newly published research. The Task Force will continue by re-examining the remaining 30 topics reviewed in 2010 and develop new questions based on current and evolving medical practice.

GRADE and First Aid

GRADE is a standardised and transparent process for the evaluation of scientific data. For the 2015 Consensus on Science ILCOR combined GRADE with the development of PICO search strings and its own SEERS system. The process contained over 50 planned steps and involved the selection of a PICO question, the development of an appropriate search string for interrogating the science databases, the analysis of the searched publications to select those relevant to the PICOs, the analysis of the individually selected papers for risk of bias and quality indicators across selected outcomes, analysis of the results of the science, and insertion of

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http://dx.doi.org/10.1016/j.resuscitation.2015.07.031

this information into Summary of Findings tables and then into a GRADE evidence profile. For each PICO question, two evidence reviewers carried out study selection and risk of bias assessment independently. A draft recommendation was formulated, involving a balance between the quality of the evidence identified, benefits and harms. The final results were presented in a standardised format to the ILCOR First Aid Task Force and discussed. The resulting treatment recommendations were presented to ILCOR at the 2015 Consensus on Science conference and the final recommendations formulated.[3]

Certain aspects of First Aid have little or no published data to support their practice and much has been built on expert consensus opinion, tradition and common sense. The GRADE process underlined the lack of true science behind many of the current practices and in some cases the Task Force was unable to make a treatment recommendation founded on evidence-based science. For each treatment recommendation the Task Force added a 'values and preferences' statement as a description of limitations or qualifiers for the treatment recommendations and the 'knowledge gaps' to guide future investigation and research.

In writing these guidelines the Writing Group were conscious that the consensus on science had led to a treatment recommendation that required qualification in terms of safe clinical practice. The Writing Group have added these additional clinical recommendations as expert consensual opinion and labelled them as Good Practice Points to differentiate them from guidelines derived directly from scientific review.

The 2015 definition of First Aid

First Aid is defined as the *helping behaviours* and *initial care* provided for an acute illness or injury. First Aid can be initiated by anyone in any situation. A First Aid Provider is defined as someone trained in First Aid who should:

- recognise, assess and prioritise the need for first aid;
- provide care using appropriate competencies;
- recognise limitations and seek additional care when needed.

The goals of First Aid are to preserve life, alleviate suffering, prevent further illness or injury, and promote recovery.

This 2015 definition for First Aid, as created by the ILCOR First Aid Task Force, addresses the need to recognise injury and illness, the requirement to develop a specific skill base and the need for first aid providers to simultaneously provide immediate care and to activate Emergency Medical Services or other medical care as required. First aid assessments and interventions should be medically sound and based on scientific evidence-based medicine or, in the absence of such evidence, on expert medical consensus. The scope of first aid is not purely scientific, as both training and regulatory requirements will influence it. Because the scope of first aid varies between countries, states and provinces, the guidelines contained herein may need to be refined according to circumstances, need, and regulatory constraints. Dispatcher assisted First Aid was not evaluated in the Guideline process 2015 and has not been included in these guidelines.

Summary of the 2015 First Aid Guidelines

First Aid for medical emergencies

Positioning of a breathing but unresponsive victim

Position individuals who are unresponsive but breathing normally into a lateral, side-lying recovery position as opposed to leaving them supine (lying on back). In certain situations such as resuscitation related agonal respirations or trauma, it may not be appropriate to move the individual into a recovery position.

Optimal position for a shock victim

Place individuals with shock into the supine (lying on back) position. Where there is no evidence of trauma use passive leg raising to provide a further transient (<7 min) improvement in vital signs; the clinical significance of this transient improvement is uncertain.

Oxygen administration for first aid

There are no direct indications for the use of supplemental oxygen by first aid providers.

Bronchodilator administration

Assist individuals with asthma who are experiencing difficulty in breathing with their bronchodilator administration. First aid providers must be trained in the various methods of administering a bronchodilator.

Stroke recognition

Use a stroke assessment system to decrease the time to recognition and definitive treatment for individuals with suspected acute stroke. First Aid providers must be trained in the use of FAST (Face, Arm, Speech Tool) or CPSS (Cincinnati Pre-hospital Stroke Scale) to assist in the early recognition of stroke.

Aspirin administration for chest pain

In the pre-hospital environment, administer 150–300 mg chewable aspirin early to adults with chest pain due to suspected myocardial infarction (ACS/AMI). There is a relatively low risk of complications particularly anaphylaxis and serious bleeding. Do not administer aspirin to adults with chest pain of unclear aetiology.

Second dose of adrenaline for anaphylaxis

Administer a second intramuscular dose of adrenaline to individuals in the pre-hospital environment with anaphylaxis that has not been relieved within 5 to 15 min by an initial intramuscular auto-injector dose of adrenaline. A second intramuscular dose of adrenaline may also be required if symptoms re-occur.

Hypoglycaemia treatment

Treat conscious patients with symptomatic hypoglycaemia with glucose tablets equating to glucose 15–20 g. If glucose tablets are not available, use other dietary forms of sugar.

Exertion-related dehydration and rehydration therapy

Use 3–8% oral carbohydrate–electrolyte (CE) beverages for rehydration of individuals with simple exercise-induced dehydration. Alternative acceptable beverages for rehydration include water, 12% CE solution, coconut water, 2% milk, or tea with or without carbohydrate electrolyte solution added.

Eye injury from chemical exposure

For an eye injury due to exposure to a chemical substance, take immediate action by irrigating the eye using continuous, large volumes of clean water. Refer the individual for emergency healthcare professional review.

First Aid for trauma emergencies

Control of bleeding

Apply direct pressure, with or without a dressing, to control external bleeding where possible. Do not try to control major external bleeding by the use of proximal pressure points or elevation of an extremity. However it may be beneficial to apply localised cold therapy, with or without pressure, for minor or closed extremity bleeding.

Haemostatic dressings

Use a haemostatic dressing when direct pressure cannot control severe external bleeding or the wound is in a position where direct pressure is not possible. Training is required to ensure the safe and effective application of these dressings.

Use of a tourniquet

Use a tourniquet when direct wound pressure cannot control severe external bleeding in a limb. Training is required to ensure the safe and effective application of a tourniquet.

Straightening an angulated fracture

Do not straighten an angulated long bone fracture.

Protect the injured limb by splinting the fracture. Realignment of fractures should only be undertaken by those specifically trained to perform this procedure.

First aid treatment for an open chest wound

Leave an open chest wound exposed to freely communicate with the external environment without applying a dressing, or cover the wound with a non-occlusive dressing if necessary. Control localised bleeding with direct pressure.

Spinal motion restriction

The routine application of a cervical collar by a first aid provider is not recommended. In suspected cervical spine injury, manually support the head in position limiting angular movement until experienced healthcare provision is available.

Recognition of concussion

Although a concussion scoring system would greatly assist first aid providers in the recognition of concussion, there is no simple validated scoring system in use in current practice. An individual with a suspected concussion should be evaluated by a healthcare professional.

Cooling of burns

Actively cool thermal burns as soon as possible for a minimum of 10 min duration using water.

Burn dressings

Subsequent to cooling, burns should be dressed with a loose sterile dressing.

Dental avulsion

If a tooth cannot be immediately re-implanted, store it in Hank's Balanced Salt Solution. If this is not available use propolis, egg white, coconut water, ricetral, whole milk, saline or Phosphate Buffered Saline (in order of preference) and refer the individual to a dentist as soon as possible.

Education

First aid education programmes, public health campaigns and formal first aid training are recommended in order to improve prevention, recognition and management of injury and illness.

First Aid for medical emergencies

Positioning of the breathing but unresponsive victim

The priority management of a breathing but unresponsive victim, including one whose circulation has been successfully restored following cardiac arrest, is the maintenance of an open airway. Victims with agonal breathing should not be placed in the recovery position. The ERC 2015 Guidelines for Basic Life Support include the use of a recovery position aimed at achieving this.[4]

Although the available evidence is weak, the use a recovery position places a high value on the importance of decreasing the risk of aspiration or the need for more advanced airway management. Given the absence of high quality evidence, the recovery position is recommended due to the lack of demonstrated associated risk.

A number of different side-lying recovery positions have been compared (left lateral versus right lateral versus prone positions,[5] ERC versus Resuscitation Council (UK) positions,[6] and AHA versus ERC versus Rautek versus Morrison, Mirakhur and Craig (MMC) positions.[7] The quality of evidence is low, but overall no significant differences between the positions have been identified.

In certain situations such as trauma, it may not be appropriate to move the individual into a recovery position. The HAINES position has been reported to reduce the likelihood of causing cervical spinal injury compared with the side-lying positions.[8] The evidence for this is of very low quality with little if any difference between the positions being demonstrated.[9]

2015 First Aid Guideline

Position individuals who are unresponsive but breathing normally into a lateral, side-lying recovery position as opposed to leaving them supine (lying on back). In certain situations such as resuscitation related agonal respirations or trauma, it may not be appropriate to move the individual into a recovery position.

Overall, there is little evidence to suggest an optimal recovery position, but the ERC recommends the following sequence of actions:

- kneel beside the victim and make sure that both legs are straight,
- place the arm nearest to you out at right angles to the body, elbow bent with the hand palm uppermost;
- bring the far arm across the chest, and hold the back of the hand against the victim's cheek nearest to you;
- with your other hand, grasp the far leg just above the knee and pull it up, keeping the foot on the ground;
- keeping the hand pressed against the cheek, pull on the far leg to roll the victim towards you onto his or her side;
- adjust the upper leg so that both hip and knee are bent at right angles;
- tilt the head back to make sure the airway remains open;
- adjust the hand under the cheek if necessary, to keep the head tilted and facing downwards to allow liquid material to drain from the mouth;
- check breathing regularly.

If the victim has to be kept in the recovery position for more than 30 min turn him or her to the opposite side to relieve the pressure on the lower arm.

Optimal position for shock victim

Shock is a condition in which there is failure of the peripheral circulation. It may be caused by sudden loss of body fluids (such as in bleeding), serious injury, myocardial infarction (heart attack), pulmonary embolism, and other similar conditions. While the primary treatment is usually directed at the cause of shock, support of the circulation is important. Although the evidence is weak, there is potential clinical benefit of improved vital signs and cardiac function by placing individuals with shock into the supine (lying on back) position, rather than by moving a victim with shock into an alternative position.

The use of passive leg raising (PLR) may provide a transient (<7 min) improvement in heart rate, mean arterial pressure, cardiac index, or stroke volume;[10–12] for those with no evidence of trauma. The clinical significance of this transient improvement is uncertain. The optimal degree of elevation has not been determined, with studies of PLR ranging between 30 and 60 degrees elevation. No study however, has reported adverse effects due to PLR.

These recommendations place an increased value on the potential, but uncertain, clinical benefit of improved vital signs and cardiac function, by positioning a victim with shock in the supine position (with or without PLR), over the risk of moving the victim.

The Trendelenburg position (legs raised–head down) was excluded from evaluation in this review and is not recommended due to the inability or impracticality of first aid providers placing a victim into this position in an out-of-hospital setting.

2015 First Aid Guideline

Place individuals with shock into the supine (lying on back) position. Where there is no evidence of trauma use passive leg raising to provide a further transient (<7 min) improvement in vital signs but the clinical significance of this transient improvement is uncertain.

Oxygen administration for first aid

Oxygen is probably one of the most commonly used drugs in medicine. Administration of oxygen in the pre-hospital environment has traditionally been considered crucial in the care of patients with an acute illness or injury, aiming at treating or preventing hypoxaemia. However, there is no evidence for or against the routine administration of supplemental oxygen by first aid providers.[13–16] Further, supplemental oxygen might have potential adverse effects that complicate the disease course or even worsen clinical outcomes and therefore its usefulness is not universally proved. If used, supplemental oxygen should only be administered by first aid providers who have been properly trained in its use and if they can monitor its effects.

2015 First Aid Guideline

There are no direct indications for the use of supplemental oxygen by first aid providers:

Bronchodilator administration

Asthma is a common chronic disease affecting millions of people worldwide, while its incidence continues to increase, especially in urban and industrialised areas. Bronchodilators are integral to asthma management and work by relaxing the bronchial smooth muscles, thereby improving respiratory function and reducing respiratory distress. The administration of a bronchodilator decreased the time to resolution of symptoms in children and reduced the time for the subjective improvement of dyspnoea in young adult asthma sufferers.[17,18] Bronchodilator administration can be achieved via different methods ranging from assisting the individual with their bronchodilator to administering a bronchodilator as part of an organised response team with medical oversight.

Individuals with asthma who experience breathing difficulties may be severely incapacitated and not be able to administer a bronchodilator themselves due to the severity of the attack or due to poor inhalation technique. Although first aid providers cannot routinely be expected to make a diagnosis of asthma, they may be able to aid an individual experiencing difficulty in breathing due to asthma by helping them to sit upright, and then assisting the patient with the administration of a prescribed bronchodilator.

Administration of bronchodilators or use of inhalers requires competency in bronchoconstriction recognition and nebuliser use and first aid providers should be trained in these methods.[19–21] National organisations must assure the quality of training in their local setting. If the patient has no bronchodilator or the bronchodilator is having no effect, activate EMS and continue to observe and assist the patient until help arrives.

2015 First Aid Guideline

Assist individuals with asthma who are experiencing difficulty in breathing with their bronchodilator administration. First aid providers must be trained in the various methods of administering a bronchodilator.

Stroke recognition

Stroke is a non-traumatic, focal vascular-induced injury of the central nervous system and typically results in permanent damage in the form of cerebral infarction, intracerebral haemorrhage and/or subarachnoid haemorrhage.[22] Every year, 15 million people worldwide suffer a stroke, nearly six million die and another five million are left permanently disabled. Stroke is the second leading cause of death above the age of 60 years and the second leading cause of disability (loss of vision, speech or partial or complete paralysis).[23]

Early admission to a stroke centre and early treatment greatly improves stroke outcome and highlights the need for first aid providers to quickly recognize stroke symptoms.[24,25] The stroke management goal is to administer definitive treatment early in the course of the stroke and to benefit from the best therapies, e.g. receiving clot-busting treatment within the first hours of the onset of stroke symptoms or in the case of intra-cerebral haemorrhage, a surgical intervention.[26] There is good evidence that the use of a stroke-screening tool improves the time to definitive treatment.[27–30]

First aid providers should be trained to utilize a simple stroke assessment tool such as the Face, Arm, Speech, Test scale (FAST)[31–35] or the Cincinnati Prehospital Stroke Scale (CPSS)[31,36,37] to identify individuals with suspected acute stroke. The specificity of stroke recognition can be improved by using a stroke assessment tool that includes the measurement of blood glucose such as the Los Angeles Prehospital Stroke Scale (LAPSS),[28,31,36,38–40] the Ontario Prehospital Stroke Scale (OPSS),[41] Recognition of Stroke in the Emergency Room (ROSIER)[32,34,35,42,43] or the Kurashiki Prehospital Stroke Scale (KPSS)[44] but it is recognised that blood glucose measurement may not be routinely available to first aid providers.

2015 First Aid Guideline

Use a stroke assessment system to decrease the time to recognition and definitive treatment for individuals with suspected acute stroke. First aid providers must be trained in the use of FAST (Face, Arm, Speech Tool) or CPSS (Cincinnati Prehospital Stroke Scale) to assist in the early recognition of stroke.

Aspirin administration for chest pain

The pathogenesis of acute coronary syndromes (ACS) including acute myocardial infarction (AMI) is most frequently a ruptured plaque in a coronary artery. As the plaque contents leak into the artery, platelets clump around them and coronary thrombosis occurs completely or partially occluding the lumen of the artery, leading to myocardial ischemia and possible infarction.

The use of aspirin as an antithrombotic agent to potentially reduce mortality and morbidity in ACS/AMI is considered beneficial even when compared with the low risk of complications, particularly anaphylaxis and serious bleeding (requiring transfusion).[45–49] The early administration of aspirin in the pre-hospital environment, within the first few hours of the onset of symptoms, also reduces cardiovascular mortality,[50,51] supporting the recommendation that first aid providers should administer aspirin to those individuals with chest pain from suspected myocardial infarction.

All patients with chest pain due to suspected myocardial infarction should seek immediate healthcare professional advice and be transferred to hospital for definitive medical care. First aid providers should call for help and administer a single oral dose of 150–300 mg chewable or soluble aspirin whilst waiting for healthcare professional assistance to arrive.[52] This early administration of aspirin should never delay the transfer of the patient to a hospital for definitive care.

Aspirin should not be administered to patients who have a known allergy or contraindications to aspirin.

It is recognised that a first aid provider might have difficulty in identifying chest pain of cardiac origin and the pre-hospital administration of aspirin by first aid providers to adults with chest pain of unclear aetiology is not recommended. If there is any doubt call for the advice and assistance of a healthcare professional.

2015 First Aid Guidelines

In the pre-hospital environment, administer 150–300 mg chewable aspirin early to adults with chest pain due to suspected myocardial infarction (ACS/AMI). There is a relatively low risk of complications particularly anaphylaxis and serious bleeding. Do not administer aspirin to adults with chest pain of unclear aetiology.

Second dose of adrenaline for anaphylaxis

Anaphylaxis is a potentially fatal, allergic reaction that requires immediate recognition and intervention. It is a rapid multi-organ system reaction, affecting the cutaneous, respiratory, cardiovascular, and gastrointestinal systems, usually characterised by swelling, breathing difficulty, shock and even death. Adrenaline reverses the pathophysiological manifestations of anaphylaxis and remains the most important drug, especially if it is given within the first few minutes of a severe allergic reaction.[53–55] Although adrenaline should be administered as soon as the diagnosis is suspected, the majority of patients die due to lack of adrenaline or delays in its administration.[54,56]

In the pre-hospital setting, adrenaline is administered via prefilled auto-injectors, which contain one dose of 300 mcg of adrenaline for intra-muscular self-administration or assisted by a trained first aid provider. If symptoms are not relieved within 5–15 min of the initial dose or reoccur, a second dose of intramuscular adrenaline is recommended.[57–66]

No absolute contraindications to the use of adrenaline for anaphylaxis have been identified.[54,67,68] Adverse effects have previously been reported in the literature when adrenaline is administered at an incorrect dose or via inappropriate routes such as the intravenous route. Use of auto-injectors by first aid providers should minimize the opportunity for mis-dosing or administration of adrenaline by the intravenous route.

2015 First Aid Guideline

Administer a second intramuscular dose of adrenaline to individuals in the pre-hospital environment with anaphylaxis that has not been relieved within 5 to 15 min by an initial intramuscular auto-injector dose of adrenaline. A second intramuscular dose of adrenaline may also be required if symptoms re-occur.

Hypoglycaemia treatment

Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin, a hormone that regulates blood sugar, or when the body cannot effectively use the insulin it produces.

Diabetes is frequently complicated by serious events such as heart attack and stroke but significant or extreme alterations of blood sugar level (hyper- and hypoglycaemia) can present as a medical emergency. Hypoglycaemia is usually a sudden and life-threatening event with the typical symptoms of hunger, headache, agitation, tremor, sweating, psychotic behaviour (frequently resembling drunkenness) and loss of consciousness. It is most important that these symptoms are recognised as hypoglycaemia as the victim requires rapid first aid treatment.

Glucose tablets equating to glucose 15–20 g should be used by first aid providers, before dietary forms of sugar for treating symptomatic hypoglycaemia, in conscious patients who are able to follow commands and swallow. Glucose tablets, however, may not always be immediately available and various alternative forms of dietary sugars such as Skittles™, Mentos™, sugar cubes, jellybeans and orange juice can be used to treat symptomatic hypoglycaemia.[69–71] Glucose gels and paste are not directly equivalent to oral glucose tablets in terms of dosing and absorption.

If the patient is unconscious or unable to swallow then oral treatment should be withheld due to the risk of aspiration, and the emergency medical services should be called.

2015 First Aid Guideline

Treat conscious patients with symptomatic hypoglycaemia with glucose tablets equating to glucose 15–20 g. If glucose tablets are not available, use other dietary forms of sugar.

Exertion-related dehydration and rehydration therapy

First aid providers are often called upon to assist at “hydration stations” for sporting events such as bicycle races or foot races. Failure to hydrate adequately before, during and following exercise contributes to exercise-associated dehydration. When vigorous exercise takes place during periods of high ambient temperatures, dehydration may be associated with heat cramps, heat exhaustion or heat stroke.

Water is commonly used for rehydration following exercise, but newer commercial “sports drinks” are often promoted for this purpose. Furthermore, alternative beverages (tea or coconut water) have recently been promoted as acceptable for oral rehydration and some athletes may have a cultural preference for these beverages. Solutions made from oral rehydration salt packets and homemade solutions are more commonly used for rehydration following gastrointestinal losses and are not as practical for use following exercise-associated dehydration.

3–8% oral carbohydrate–electrolyte (CE) beverages were found to be superior to water and are therefore recommended for rehydration of individuals with simple exercise-induced dehydration.[72–80] It is recognised that water may be the simplest and most readily available rehydrating solution and that palatability and gastro-intestinal tolerance may be a factor that limits rehydration with fluids other than water. Other alternative acceptable beverages for rehydration include 12% CE solution,[72] coconut water,[73,79,80] 2% milk,[77] or tea with or without carbohydrate electrolyte solution added.[74,81]

It is known that thirst is not an accurate guide for rehydration, and the volume of oral fluids ingested typically must at least equal the volume fluid lost. The exact amount of liquid required for adequate rehydration may not be determinable in the first aid setting.

Oral hydration may not be appropriate for individuals with severe dehydration associated with hypotension, hyperpyrexia or mental status changes. Such individuals should receive care by an advanced medical provider capable of administering intravenous fluids (Good Practice Point).

2015 First Aid Guideline

Use 3–8% oral carbohydrate–electrolyte (CE) beverages for rehydration of individuals with simple exercise-induced dehydration. Alternative acceptable beverages for rehydration include water, 12% CE solution, coconut water, 2% milk, or tea with or without carbohydrate electrolyte solution added.

Eye injury from chemical exposure

Accidental exposure of the eye to chemical substances is a common problem in both the household and industrial setting and it is often difficult to identify precisely what chemical has entered the eye. Alkali injury to the cornea has been shown to cause severe corneal injury and risk of blindness. Irrigation with large volumes of water was more effective at improving corneal pH as compared to using low volumes or saline irrigation.[82]

Trying to identify the chemical substance may delay treatment and it is recommended that the first aid provider should flush the eye with continuous large volumes of clean water immediately after the injury has been sustained and to refer the patient for emergency healthcare review.

Where there is a known high risk of eye contamination by particular chemicals, specific antidotes should be readily available.

2015 First Aid Guideline

In case of eye injury due to exposure to a chemical substance, take immediate action. Put on disposable gloves. Irrigate the eye using continuous, large volumes of clean water. Take care that the rinsing water does not come into contact with the other eye (Good Practice Point). Call 112 and the Poison Control Centre. Wash your hands after giving first aid. Refer the individual for emergency healthcare professional review (Good Practice Point).

First aid for trauma emergencies

Control of bleeding

There is a paucity of literature comparing different bleeding control strategies commonly employed by first aiders. The best control of bleeding is to apply direct pressure to the wound where possible. Localised cold therapy, with or without pressure, may be beneficial in haemostasis for minor or closed bleeding in extremities although this is based on in-hospital evidence.[83,84] There is no published evidence for the effective use of proximal pressure points to control bleeding.

Where bleeding cannot be controlled by direct pressure it may be possible to control bleeding by the use of a haemostatic dressing or a tourniquet (see below).

2015 First Aid Guideline

Apply direct pressure, with or without a dressing, to control external bleeding where possible. Do not try to control major external bleeding by the use of proximal pressure points or elevation of an extremity. However it may be beneficial to apply localised cold therapy, with or without pressure, for minor or closed extremity bleeding.

Haemostatic dressings

Haemostatic dressings are commonly used to control bleeding in the surgical and military settings especially when the wound is in a non-compressible area such as the neck, abdomen, or groin. Early generation haemostatic agents were powder or granules that were poured directly into the wound. Some of these were associated with exothermic reactions that could exacerbate tissue injury. Major improvements have been made in the composition, texture, and active constituent materials of haemostatic dressings.[85–89] In human studies there was a reported improvement in haemostasis associated with a low complication rate of 3% from the use of haemostatic dressings and a decrease in mortality.[90–93]

2015 First Aid Guideline

Use a haemostatic dressing when direct pressure cannot control severe external bleeding or the wound is in a position where direct pressure is not possible. Training is required to ensure the safe and effective application of these dressings.

Use of a tourniquet

Haemorrhage from vascular injured extremities may result in life-threatening exsanguination and is one of the leading causes of preventable death on the battlefield and in the civilian setting.[94,95] Initial management of severe external limb bleeding is direct pressure but this may not be possible and even a tight compression bandage directly over the wound may not completely control major arterial bleeding.

Tourniquets have been used in military settings for severe external limb bleeding for many years.[96,97] The application of a tourniquet has resulted in a decrease in mortality,[96,98–106] haemostasis being achieved with an associated incidence of complications of 6% and 4.3%.[96,97,99,100,103,105–109]

2015 First Aid Guideline

Use a tourniquet when direct wound pressure cannot control severe external bleeding in a limb. Training is required to ensure the safe and effective application of a tourniquet.

Straightening an angulated fracture

Fractures, dislocations, sprains and strains are extremity injuries commonly cared for by first aid providers. Long bone fractures, particularly of the leg or forearm, may be angulated on presentation. Severe angulation may limit the ability to properly splint the extremity or move the injured individual.

First aid for fractures begins with manual stabilisation of the fracture, followed by splinting in the position found. Splinting, to include the joint above and the joint below the break, protects the injury from further movement and thus prevents or reduces pain and the potential for converting a closed fracture to an open fracture.

Although there are no published studies that show a benefit to stabilising or splinting a fractured extremity, common sense and expert opinion support the use of a splint to immobilize the injured extremity for the purpose of preventing further harm and reducing pain. Splinting of an extremity injury by first aid providers should be "in the position found", with as little movement as possible to apply the splint. In some cases, an extremity fracture will present with severe angulation, making application of a splint and transportation extremely difficult or impossible. In these cases, the first aid provider may defer to a provider with specific training to perform minimal realignment to facilitate splinting and transportation to a hospital.

2015 First Aid Guideline

Do not straighten an angulated long bone fracture (Good Practice Point).

Protect the injured limb by splinting the fracture to reduce movement, limit pain, reduce the chance for further injury and to facilitate safe and prompt transport. Realignment of fractures should only be undertaken by those specifically trained to perform this procedure.

First aid treatment for an open chest wound

The correct management of an open chest wound is critical, as the inadvertent sealing of these wounds by the incorrect use of occlusive dressings or device or the application of a dressing that becomes occlusive may result in the potential life-threatening complication of a tension pneumothorax.[110] A decrease in the incidence of respiratory arrest and improvements in oxygen saturation, tidal volume, respiratory rate and mean arterial pressure has been shown using a non-occlusive device in an animal model.[111] It is important that an open chest wound, especially with associated underlying lung damage, is not occluded and that the inside of the chest is in open communication with the external environment.

2015 First Aid Guideline

Leave an open chest wound exposed to freely communicate with the external environment without applying a dressing, or cover the wound with a non-occlusive dressing if necessary. The use of occlusive devices or dressings can be associated with the potentially life-threatening complication of a tension pneumothorax. Control localised bleeding with direct pressure.

Cervical spinal motion restriction

Definitions

- Spinal immobilisation is defined as the process of immobilising the spine using a combination of devices (e.g. backboard and cervical collar) intended to restrict spinal motion.
- Cervical spinal motion restriction is defined as the reduction or limitation of cervical spine movement using mechanical cervical devices including cervical collars and sandbags with tape.
- Spinal stabilisation is defined as physical maintenance of the spine in a neutral position prior to applying spinal motion restriction devices.

In suspected cervical spine injury it has been routine to apply cervical collars to the neck, in order to avoid further injury from spinal movement. However, this intervention has been based on consensus and opinion rather than on scientific evidence.[112,113] Furthermore, clinically significant adverse effects, such as raised intracranial pressure, have been shown to occur following the application of a cervical collar.[114–118]

2015 First Aid Guideline

The routine application of a cervical collar by a first aid provider is not recommended.

In suspected cervical spine injury, manually support the head in a position limiting angular movement until experienced healthcare providers are available (Good Practice Point).

Recognition of concussion

Minor head injuries without loss of consciousness are common in adults and children. The first aid providers may find it difficult to recognise concussion (minor traumatic brain injury (TBI)) due to the complexity of the symptoms and signs, and this can lead to a delay in providing proper concussion management and post-concussion advice and treatment.

In sport, the use of a sport concussion assessment tool (SCAT3) is widely advocated and used.[119] This tool is advocated for use by healthcare professionals and requires a two-stage assessment, before competition and post concussion. It is therefore not appropriate as a single assessment tool for first aid providers. If an athlete with a suspected concussion has had an initial SCAT3 assessment then they should be referred to a healthcare professional for further assessment and advice.

2015 First Aid Guideline

Although a concussion scoring system would greatly assist first aid providers in the recognition of concussion, there is no simple validated scoring system in use in current practice. An individual with a suspected concussion should be evaluated by a healthcare professional.

Cooling of burns

Immediate active cooling of thermal burns, defined as any method undertaken to decrease local tissue temperature, is a common first aid recommendation for many years. Cooling thermal burns will minimise the resulting depth of the burn[120,121] and possibly decrease the number of patients that will eventually require hospital admission for treatment.[122] The other perceived benefits of cooling are pain relief and reduction of oedema, reduced infection rates and a faster wound healing process.

There are no scientifically supported recommendations for the specific cooling temperature, the method of cooling (e.g. gel pads, cold packs or water) or the duration of cooling. Clean water is readily available in many areas of the world and can therefore be used immediately for cooling of burns. Cooling of burns for 10 min is the currently perceived recommended practice.

Care must be taken when cooling large thermal burns or burns in infants and small children so as not to induce hypothermia.

2015 First Aid Guideline

Actively cool thermal burns as soon as possible for a minimum of 10 min duration using water.

Wet or dry burn dressings

A broad range of burn wound dressings are available, ranging from hydrocolloid dressings, polyurethane film dressings, hydrogel dressings, silicon-coated nylon dressings, biosynthetic skin substitute dressings, antimicrobial dressings, fibre dressings and simple wound dressing pads with or without medication.[123] Current burn wound dressings also include plastic wrap (cling film or medical commercial forms) and has the advantage that it is inexpensive, widely available, non-toxic, non-adherent, impermeable, and transparent allowing for wound monitoring without having to remove the dressing.

No scientific evidence was found to determine which type of dressings, wet or dry, is most effective. The decision about which type of burn dressing first aid providers should use, should therefore be determined by national and local burn management policies.

2015 First Aid Guideline

Subsequent to cooling, burns should be dressed according to current practice with a loose sterile dressing (Good Practice Point).

Dental avulsion

Following a fall or accident involving the face, a tooth can be injured or avulsed. Appropriate first aid in the case of an avulsed permanent tooth increases the chance of recovery after replacement of the tooth. Immediate re-implantation is the intervention of choice by the dental community, however it is often not possible for first aid providers to re-implant the tooth due to a lack of training or skills in that procedure.

If the tooth is not immediately re-implanted, the priority is to get the patient and the avulsed tooth to a dentist, who is capable of re-implanting the tooth as soon as possible. In the meanwhile store the tooth in a temporary storage solution. Hanks Balanced Salt solution is the recommended medium,[124–127] but other recommended solutions are Propolis,[126,128] egg white,[125,126] coconut water,[127] ricetral[124] when compared with survival following storage in whole milk. Saline[129,130] and Phosphate Buffered saline[131] were less effective as storage solutions than whole milk. The choice of a storage solution depends on the availability and accessibility of the solution.

2015 First Aid Guideline

If a tooth cannot be immediately re-implanted store it in Hank's Balanced Salt Solution. If this is not available use Propolis, egg white, coconut water, ricetral, whole milk, saline or Phosphate Buffered Saline (in order of preference) and refer the individual to a dentist as soon as possible.

Education

First Aid education and training

Education and training in First Aid has been shown to increase survival from trauma among those patients cared for by trained first aid providers[132] and to improve the resolution of symptoms.[133] Education in the form of a public health campaign has also improved the ability to recognise life-threatening illness, such as stroke[134] and from a prevention perspective it has been shown to reduce the incidence of burn injury.[122]

2015 First Aid Guideline

First aid education programmes, public health campaigns and formal first aid training are recommended in order to improve prevention, recognition and management of injury and illness.

Conflicts of interest

David Zideman	No conflict of interest reported
Anthony J. Handley	Medical advisor BA, Virgin, Places for people, Life saving Societies, Trading Company Secretary RCUK
Christina Hafner	No conflict of interest reported
Daniel Meyran	French Red Cross: Medical advisor
Emmy De Buck	Belgian Red Cross-Flanders: employee
Eunice Singletary	American Red Cross Advisory Council member
Pascal Cassan	French Red Cross Head Global First Aid Defence Center
Philippe Vandekerckhove	Red Cross Belgium: employee
Susanne Schunder-Tatzber	OMV Austrian Oil&Gas company: Health Manager
Thanos Chalkias	No conflict of interest reported
Tom Evans	No conflict of interest reported

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