Guidelines for Bystander First Aid 2016

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ABSTRACT Cardiac life support is a form of first aid for cardiac emergencies. However, research and evidence in this field is lacking compared with other forms of first aid. Having identified the common emergencies that are encountered in the hospital, based on the available evidence, we have put together what could be an evidence-based approach to the first aid management of some of these common emergencies, viz. breathlessness, chest pain, allergies, stroke, heat injury, poisoning, unconsciousness, seizures, and trauma situations such as bleeding, wounds, contusions, head injury, burns and fractures. Educating the public is the key to developing a first responder bystander. These guidelines could become the basis for training of the public.

Keywords: breathlessness, chest pain, seizures, stroke, trauma first aid

INTRODUCTION
First aid, as defined by the International Liaison Committee on Resuscitation (ILCOR) First Aid Task Force in 2015, is the helping behaviours and initial care provided for an acute illness or injury. It can be initiated by anyone to preserve life, alleviate suffering, limit further injury and/or promote recovery in any situation. For first aid to be effective and safe, the provider needs to recognise and assess the injury or illness before performing immediate medical intervention while simultaneously activating prehospital emergency services as required. Training is necessary to equip the first aid provider with the knowledge, skill and confidence to attend to an emergency.

SCOPE OF THE PROBLEM
Unintentional injury is the fifth leading cause of death (Table I) and the top cause of hospitalisation (Table II) in Singapore. Along with acute medical emergencies such as myocardial infarction and stroke, this makes up a significant number of casualties who will benefit from timely interventions. First aid measures such as basic life support, including cardiopulmonary resuscitation, recognition of myocardial infarct and stroke, and controlling haemorrhage, can be life-saving. Given the paucity of research in the field of first aid, local data on the frequency and effectiveness of first aid interventions is limited.

In Singapore, a variety of first aid courses (e.g. Basic First Aid, Standard First Aid with or without Automated External Defibrillator [AED], Adult First Aid, Child First Aid) are conducted by training centres for interested participants. The National First Aid Council (NFAC) only accredits the Standard First Aid with AED course (mandated by the National Registry of Coaches or the Singapore Sports Council for sports coaches) and the Child First Aid course (mandated by the Early Childhood Development Agency under the Ministry of Social and Family Development for infant/childcare personnel). Although NFAC provides the accreditation framework for the overall content, and the conduct and assessment of the course, training centres are allowed to use their own training materials and methods. This framework was last updated in 2013 by NFAC council members who were representatives of the National Resuscitation Council, National Trades Union Congress, People’s Association, Singapore Civil Defence Force, Singapore Red Cross Society and St John Ambulance Brigade.

The Occupational First Aid Course is a Ministry of Manpower (MOM)-accredited course for appointed providers at the workplace, in accordance with Workplace Safety and Health (First-Aid) Regulations. In 2015, the Workplace Safety and Health Council, MOM, last updated the reference guidelines for the overall course contents, learning objectives, and the conduct and assessment of the course. The courseware developers that use reference materials to develop the learning objectives, and no specific method of instruction is prescribed. The LSPs are certified to offer the course by an appointed certification body accredited by the Singapore Accreditation Council under the ISO 29990:2010 LSP scheme.

THE EVIDENCE
The International First Aid Science Advisory Board last evaluated the scientific literature on first aid and published the treatment recommendations in 2010. In 2015, the First Aid Task Force from ILCOR released the International Consensus on First Aid Science with Treatment Recommendations (CoSTR) after completing a comprehensive review using the Grading of Recommendations, Assessment, Development and Evaluation (i.e. GRADE) methodology in combination with ILCOR’s Scientific Evidence Evaluation and Review System (SEERS). The final recommendations on guidelines for bystander first aid in this paper were derived after a review of these consensus statements and the relevant literature, giving due consideration to local practice.

Bystander First Aid Guidelines

General principles

Practice of first aid
At any level of training, first aid competencies should include:

- early recognition, assessment and prioritisation of the need...
The first aid provider must always assess the situation to make sure it is safe before proceeding to assist the casualty. There must be an ongoing awareness of potential hazards. If there are dangers that cannot be mitigated, the provider should stay clear and activate additional help without delay.

**Safety – scene and personal**

The first aid provider must always assess the situation to make sure it is safe before proceeding to assist the casualty. There must be an ongoing awareness of potential hazards. If there are dangers that cannot be mitigated, the provider should stay clear and activate additional help without delay.

Proper personal protective equipment (PPE) should be used, and universal precautions exercised to minimise unnecessary exposure and harm to the provider. While PPE might not be available to bystanders, the following should be practised whenever possible: (a) wash hands before and after attending to the casualty; (b) wear gloves, face mask, eye protection and/or full gown if coming in contact with blood or other body fluids or tissues; and (c) proper disposal of all contaminated PPE after use.

### First aid kit

A first aid kit contains a collection of supplies and equipment that may be used when providing first aid. As the kit may be tailored according to individual or organisational needs, the contents may vary widely. We recommend that every home should have a first aid kit containing, at the minimum, the following: resuscitation mask (pocket mask or face shield); sterile water or saline in 100 mL disposable container; adhesive dressings (band-aids, sticking plasters); absorbent gauze; eye pad; crepe bandage (5 cm, 10 cm, 15 cm); triangular bandages; hypoallergenic tape; safety pins; tweezers; scissors; torchlight; antiseptic wipes; and disposable gloves. Supplementary supplies such as medications, structural aluminium malleable splint, eye shield, pulse oximeter and glucose meter may be included depending on the purpose of use for specialised first aid kits. All first aid kits should be checked regularly and expired contents replaced.

### Specific conditions

The first aid topics from CoSTR were reviewed and conditions relevant to Singapore’s context have been selected for inclusion in this section. The following guidelines were made based on the ‘minimal or no equipment’ approach, as is the case in most instances of bystander first aid. The conduct of first aid courses would be dependent on the specific needs of the target populations and the first aid programmes.

#### Medical

- **Breathing difficulties**: Many medical problems can result in breathing difficulties. These include asthma, chronic bronchitis and heart failure. For asthma and chronic bronchitis, proper use of inhaled bronchodilators can relieve shortness of breath and wheeze. They have been shown to be effective, with a low incidence of adverse events. Therefore, first aid providers should be familiar with the available inhaled bronchodilator and assist when a casualty with asthma or chronic bronchitis is experiencing an acute exacerbation of the condition. For patients with heart failure, the upright position is associated with less breathing distress than the supine position. In addition, restricting blood flow to the heart helps to reduce myocardial workload in such patients. This can be achieved by flexing both knees of the patient and maintaining them in that position with a pillow. Patients with bronchial asthma or chronic bronchitis are also better managed in the upright rather than the supine position. Therefore, have the patient seated upright with his knees flexed. There is no evidence for or against routine administration of supplementary oxygen by
first aid providers. However, as oxygen is not always available and specific training in its use is required, we do not consider it a standard first aid skill.

(b) Anaphylaxis: A small proportion of allergic reactions can progress to anaphylaxis, necessitating the use of adrenaline. Persons at risk are prescribed and carry their own adrenaline auto-injector. The first aid provider may assist persons with anaphylaxis to administer their own adrenaline or administer it for them, and thereafter proceed to activate the emergency ambulance. While a second dose of adrenaline is beneficial for persons without an initial response to the first dose, we recommend the repeat dose be left to the emergency ambulance provider or physician.

(c) Chest pain: There are many causes of chest pain – from minor costochondritis to severe myocardial infarction – which can be difficult to differentiate. When transferring anyone with chest pain to a healthcare facility, one should immediately activate the emergency ambulance services instead of arranging for private transportation. While early aspirin use can decrease mortality due to myocardial infarction, we recommend the decision to administer aspirin to be left to the emergency ambulance provider or physician, since there is a need to ask about aspirin allergy before drug administration.

(d) Shock: Passive leg raise of the feet to about 30°–60° from the supine position can lead to temporary improvement in vital signs and cardiac output with no reported adverse effect. This option can be considered while awaiting the arrival of the emergency ambulance, unless the movement causes pain.

(e) Unresponsiveness: If a casualty is unresponsive and not breathing normally, the provider should proceed according to the basic life support guidelines immediately. This is addressed in Lim et al.’s Basic Cardiac Life Support: 2016 Singapore Guidelines. An unresponsive casualty who is breathing normally should be positioned in a lateral, side-lying recovery position as opposed to the supine position. This position involves extending one of the arms of the person above the head and rolling the body to the side so that the person’s head rests on the extended arm. Once on the side, bend both legs to stabilise the body. This will increase total airway volume and decrease stridor severity. However, if a neck, back, hip or pelvic injury is suspected, the casualty should be left in the position he was found in to avoid further potential injury, unless there is a need to open the airway or to reach a safe location.

(f) Stroke: Early recognition of stroke using stroke assessment systems can decrease the time interval between onset and arrival at hospital for definitive treatment, leading to improved functional outcomes. First aid providers should be trained in the use of stroke assessment systems to recognise the signs and symptoms of stroke. We recommend the use of the FAST (Face, Arm, Speech, Time) stroke assessment system, which is the simplest tool for bystanders, with high sensitivity for the identification of stroke. ‘Face’ refers to facial asymmetry, ‘arm’ to weakness of one arm or leg, and ‘speech’ to slurring of speech.

(g) Seizure: During a seizure, the first aid provider’s goal is to ensure airway patency and to prevent injury. The casualty should be kept in a left lateral position. Avoid placing any object in the casualty’s mouth, as it can cause dental damage or aspiration. Unnecessary restraining during a seizure may result in musculoskeletal injury. Activate the emergency ambulance and continue to monitor the casualty, who may be unresponsive or confused for a period after the seizure.

(h) Hypoglycaemia: Diabetics who display symptoms of hypoglycaemia, such as tremors, diaphoresis and confusion, should be assumed to have hypoglycaemia. The emergency ambulance should be activated immediately if the casualty is unconscious, having a seizure, or is unable to follow simple commands or swallow safely. If the casualty is able to follow simple commands and to swallow safely, oral glucose or other dietary sugars can be used to effectively resolve hypoglycaemia. The first aid provider should monitor for resolution within the next 10–15 minutes. The emergency ambulance service should be activated if there is deterioration or persistence of symptoms.

(i) Exertional dehydration: Heat cramps, heat exhaustion and heat stroke are often precipitated by vigorous exercise in a hot and humid environment. Heat cramps are involuntary muscle spasms affecting the calves, arms, abdominal muscles and back. First aid measures include rest, cooling of the body with water or drinking a carbohydrate-electrolyte solution (such as juice, milk or a commercial drink) and icing or stretching of the affected muscles. Potable water may be used if carbohydrate-electrolyte solutions are not readily available. Casualties with heat exhaustion may present with nausea, dizziness, muscle cramps, headache, fatigue and heavy sweating. Cooling measures should be initiated by moving the casualty to a cool place, removing his clothes, cooling with cool water spray and encouraging oral fluids. Heat stroke occurs when there is central nervous system involvement, presenting as syncope, confusion or seizures. The most important action for a victim of heat stroke is to begin immediate cooling and to activate the emergency ambulance to take the casualty to the hospital for advanced care. As casualties with heat stroke may not be able to swallow safely, one should not force them to drink.

(j) Ingested poisons: Limit further access to the poison by the casualty. Activate the emergency ambulance immediately and do not administer anything by mouth to a person who has ingested poison because it may be harmful. There is no evidence for the effectiveness of dilution with water or activated charcoal as a first aid measure.

Trauma

(a) Bleeding: Control of bleeding is an important skill in first aid. Direct pressure is the best method. Firm pressure maintained for a prolonged duration is necessary for
successful control of bleeding. If it is not possible to provide continuous manual pressure, wrap an elastic bandage over a gauze to hold it in place with pressure.\textsuperscript{[65–68]} The use of pressure points and elevation of an extremity to control bleeding are not indicated.\textsuperscript{[9]} While tourniquets\textsuperscript{[69–72]} and haemostatic dressings\textsuperscript{[73–76]} may be effective in controlling bleeding, we do not recommend their use for bystander first aid, as proper application requires sustained training.

(b) Wounds and abrasions: Irrigate the wound thoroughly with potable water to ensure that there is no foreign matter left within. Covering the wound subsequently with an antibiotic ointment and a clean occlusive dressing\textsuperscript{[77–79]} will allow wounds to heal better with less infection.

(c) Thermal burns: Cooling burns with cool or tepid potable water as soon as possible for at least ten minutes can reduce the risk and depth of injury.\textsuperscript{[80,81]} Avoid applying ice directly to a burn, as it can cause tissue ischaemia. Remove any constricting objects on the person such as watches, rings, bracelets and belts. After cooling of a burn, the area may be loosely covered with a sterile, dry dressing. The prehospital emergency ambulance service should be activated to take the casualty to advanced care when burns are associated with the following:\textsuperscript{[82]} difficulty breathing; blistering or broken skin; involvement of the face, neck, hands or genitals; large surface area affected; and any other cause for concern.

(d) Electrical injury: After an electrical injury, a casualty can suffer from a range of conditions, from thermal burns to cardiac arrhythmias and respiratory arrest. Before first aid is provided, the power should be turned off at its source by the appropriate authorities, if it cannot be safely done by the provider. Assess the casualty and activate the emergency ambulance to take the casualty to the hospital, as the extent of injury may not be apparent.\textsuperscript{[7]}

(e) Head injury: The signs and symptoms of head injury are varied and subtle. Significant head injury must be recognised by the first aid provider. Not doing so can have long-term adverse or even fatal consequences.\textsuperscript{[83,84]} Significant head injury can also be associated with spinal injury. Measures to ensure basic spinal protection should be in place. In addition, any bleeding from a head injury needs to be addressed by pressure dressings. The casualty would also need to be reviewed soon in a hospital setting to rule out any intracranial injury. Therefore, we recommend any person with a head injury that has resulted in a change of level of consciousness, with progressive development of headache, nausea, dizziness, unsteadiness, visual disturbance, confusion and amnesia (before or after the injury), be evacuated to a hospital for evaluation by a healthcare provider as soon as possible.\textsuperscript{[9]}

(f) Spinal motion restriction: Spinal injury should be suspected in the following:\textsuperscript{[25]} age $\geq$ 65 years old; driver, passenger or pedestrian in a motor vehicle, motorcycle or bicycle crash; fall from greater than standing height; tingling in the extremities; pain or tenderness in the neck or back; sensory deficit or muscle weakness involving the torso or upper extremities; intoxicated or not fully alert; other painful distracting injuries, especially of the head and neck; and children $\geq$ 7 years old with evidence of head or neck trauma. In such situations, we recommend that a first aid provider keeps the casualty as still as possible till the arrival of the prehospital emergency medical services. Manual immobilisation by the first aider may be used rather than a cervical collar. The application of cervical collars by first aid providers is discouraged, as the current literature shows more potential harm than benefit.\textsuperscript{[83–89]} Furthermore, it requires extensive training for proper application.

(g) Fractures and dislocations: When a fracture or dislocation is suspected, the first aid provider should not move or try to straighten the injured extremity.\textsuperscript{[28]} Open wounds should be covered with a dressing to minimise the likelihood of infection. Splinting of fractures with commonly available objects can be attempted to limit pain and further injury while allowing for prompt evacuation. The emergency ambulance must be activated immediately if the extremity is blue or pale.

(h) Sprains and strains: Joint sprains and muscle contusions can benefit from cold application with a plastic bag or damp cloth filled with a mixture of ice and water (better than ice alone). This can reduce haemorrhage, oedema, pain and disability.\textsuperscript{[90–93]} Application time < 20 minutes and a barrier is ineffective and too much pressure can cause damage to local tissues. General immobilisation with a splint and triangular bandages may be an alternative. When a person has been stung by a jellyfish, the first aid provider keeps the casualty as still as possible till the arrival of the prehospital emergency medical services. Manual immobilisation by the first aider may be used rather than a cervical collar. The application of cervical collars by first aid providers is discouraged, as the current literature shows more potential harm than benefit.\textsuperscript{[97,98]} Therefore, we do not recommend routine application of the pressure immobilisation bandage, as inadequate pressure is ineffective and too much pressure can cause damage to local tissues. General immobilisation with a splint and triangular bandages may be an alternative. When a person has been stung by a jellyfish, the first aid provider needs to prevent further nematocyst discharge and provide pain relief to the casualty. Liberal washing with vinegar (4%–6% acetic acid solution) for at least 30 seconds can inactivate the venom and prevent further envenomation from nematocyst discharge.\textsuperscript{[99,100]} For pain relief, jellyfish sting should be treated with hot water immersion (45°C or as hot as tolerable) for at least 20 minutes or for as long as the pain persists.\textsuperscript{[101–104]}

(i) Bites: Bites (human and animal) can be irrigated with copious amount of water to prevent bacterial infection.\textsuperscript{[96]} Snakebites may benefit from the application of a pressure immobilisation bandage around the entire length of the bitten extremity to decrease venom dissemination by slowing lymph flow.\textsuperscript{[7]} However, skin retention for proper application is poor among first aid providers.\textsuperscript{[97,98]} Therefore, we do not recommend routine application of the pressure immobilisation bandage, as inadequate pressure is ineffective and too much pressure can cause damage to local tissues. General immobilisation with a splint and triangular bandages may be an alternative. When a person has been stung by a jellyfish, the first aid provider needs to prevent further nematocyst discharge and provide pain relief to the casualty. Liberal washing with vinegar (4%–6% acetic acid solution) for at least 30 seconds can inactivate the venom and prevent further envenomation from nematocyst discharge.\textsuperscript{[99,100]} For pain relief, jellyfish sting should be treated with hot water immersion (45°C or as hot as tolerable) for at least 20 minutes or for as long as the pain persists.\textsuperscript{[101–104]}

(j) Dental injuries: Seek rapid medical consultation following tooth avulsion. Immediate re-implantation of an avulsed tooth within an hour provides the greatest chance of tooth survival.\textsuperscript{[105]} While awaiting re-implantation, the avulsed tooth may be stored in egg white, coconut water, whole milk or the injured person’s saliva (not mouth).\textsuperscript{[9]}

(k) Drowning: The casualty should be removed from the water rapidly and safely. Assess the casualty immediately,
If the casualty is unresponsive and not breathing normally and only one first aid provider is present, commence cardiopulmonary resuscitation immediately and continue with about five cycles of chest compressions and ventilations before activating the emergency ambulance. If two providers are present, one provider should activate the emergency ambulance immediately.

**Occupational**

(a) Chemical burns: All contaminated clothing should be immediately removed with care to prevent cross contamination to the first aid provider. Powdered chemicals should be brushed off with a gloved hand or a piece of cloth. Acid or alkali exposure should be irrigated with copious amounts of water.(106-112)

(b) Toxic eye injury: Eyes exposed to toxic chemicals must be immediately rinsed with copious amounts of tap water.(113-118) Normal saline or another commercially available eye irrigation solution.(9) This should be continued for at least 15 minutes or until the arrival of the emergency ambulance.

**Education**

First aid education should be made universally available. Morbidity and mortality from injury and illness have improved as a result of educational approaches such as online courses, classes with certification and public health campaigns. (119-123) These programmes should focus on prevention, recognition and management of injury and illness. Training guidelines should be developed in the context of first aid settings (e.g. workplace, sports facility). Simpler training courses may be developed for individuals in the home environment. The validity period of the initial training should be determined and providers should undergo a refresher course to maintain competency.

**CONCLUSION**

First aid assessments and interventions should be medically sound and grounded on evidence-based medicine. However, as there is a lack of research in the field of first aid, recommendations from ILCOR are extrapolated indirectly from animal, prehospital or hospital-based studies. Therefore, more consolidated research needs to be done in this area. Finally, as the scope of first aid is influenced by training and regulatory requirements, the guidelines contained herein, while specific to the local context, may be refined depending on circumstances and need. The provider must always remember the goals of first aid – to preserve life, alleviate suffering, prevent further illness or injury and promote recovery.

**REFERENCES**


