The FIFA medical emergency bag and FIFA 11 steps to prevent sudden cardiac death: setting a global standard and promoting consistent football field emergency care

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ABSTRACT
Life-threatening medical emergencies are an infrequent but regular occurrence on the football field. Proper prevention strategies, emergency medical planning and timely access to emergency equipment are required to prevent catastrophic outcomes. In a continuing commitment to player safety during football, this paper presents the FIFA Medical Emergency Bag and FIFA 11 Steps to prevent sudden cardiac death. These recommendations are intended to create a global standard for emergency preparedness and the medical response to serious or catastrophic on-field injuries in football.

INTRODUCTION
Football is the most popular sport in the world.1 Medical emergencies on the football field are not common2 but, if and when they occur, it is imperative that immediate recognition, on-field response and acute medical management are available to the player. Such emergency treatment is most efficiently administered by on-duty medical personnel3 using the appropriate equipment,4 until such time as emergency medical services arrive on scene to assist with additional treatment and/or transfer of the player5 to the nearest, most appropriate medical facility.6

Sudden cardiac arrest (SCA) remains the leading cause of sudden death during football. The infrequent yet regular occurrence of SCA on the football field can to a large extent be prevented, and if necessary, effectively treated by immediate cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) use.7–9

To support and promote a standardized10 and consistent level of advanced life support and emergency medical care on the football field, the FIFA Medical Assessment and Research Center (F-MARC) has developed a FIFA Medical Emergency Bag (FMEB) for distribution to all 209 member association (MA) medical departments. F-MARC also has developed the ‘FIFA 11 Steps to prevent SCD’ which outline fundamental measures to prevent sudden cardiac death (SCD) in football. The 11 steps are aimed at raising the level of awareness and appropriate action for all those involved with football internationally. These efforts follow the decision of the FIFA Congress 2012 (Budapest) to provide each of the 209 MAs with an AED as an indication of the importance of the prevention of sudden cardiac death. F-MARC further endorsed the Congress decision by creating a complete FMEB including educational manual and instructional video (http://www.F-MARC.com).

Setting a standard
The FMEB was developed by a process of expert consultation and consensus encompassing a group of football-experienced and actively involved medical specialists encompassing the fields of neurology, cardiology, orthopaedic surgery, sports and emergency medicine from countries including Switzerland, England, the USA, Brazil and South Africa.

The FMEB is intended for use by all FIFA MAs internationally, for training11 and competition. It is the recommended emergency medical bag for football team physicians, field-of-play medical teams and other medical professionals on duty during football events. Although it is acknowledged and appreciated that certain FIFA MAs may wish to provide a level of football emergency medical care above that provided by the contents of the FMEB, the FMEB takes into consideration the global nature of football. The FMEB provides a benchmark of optimal football emergency care that all MAs should strive for during training and competition, irrespective of the location.

Therefore, although individual or team medical personnel may use their own discretion to add items to the FMEB due to local circumstances, experience and personnel skills, it is recommended that the basic inventory of the FMEB should not be altered and always be available. This will ensure consistency of the core contents across venues and enable healthcare professionals from different teams to be able to work together, on any field-of-play emergency, combining response efforts and FMEBs with the same basic contents.

FMEB content considerations
The decision regarding appropriate contents of a ‘universal’ football emergency medical bag must take into consideration the multitude of locations globally where football is played, at amateur and professional levels.12 Every week millions of registered matches are played worldwide. Additionally, regard should be given to the varied emergency medical knowledge, training, skills and experience and the varied composition of healthcare professional teams who are on-duty at the football
field-of-play during training or competition. In the absence of adequate competency in the recommended life-saving medical skills related to the contents of the FMEB or knowledge of the current standards of care of the expected football field emergency medical conditions, these inadequacies should be improved by implementation of the FIFA football emergency medicine training courses, undertaken locally by the confederations and/or MAs for team physicians, venue medical officers and field-of-play medical team members. Additional qualifications such as prehospital basic and advanced life support qualifications are strongly recommended as the minimum level of skill competency and knowledge.

Contents of the FMEB

In considering the contents of a ‘universal’ emergency medical bag, it was agreed that the level of medical care envisaged should be practically equivalent to an advanced life support level of emergency care. After setting the intended level of emergency care, consideration was centred on (i) which medical emergencies would likely be encountered on the football field (box 1) and (ii) which relevant basic medical equipment, encompassing at least ‘Airway, Breathing and Circulation’ considerations, an on-duty field-of-play healthcare professional could be expected to have competence in using.

It was also agreed that the contents of the FMEB (table 1) would primarily be designed to medically manage a player for approximately 60 min who was older than 14 years of age, with a weight of 50 kg or greater. The inclusion of a rigid, durable immobilisation-carrying device was considered mandatory. Although the item recommended was a toughened plastic-type long spinal board or equivalent to provide universal availability, it is further recommended that the acquisition of a Stokes-type basket stretcher or scoop stretcher would be preferable for field-of-play extrication.

The multitude of stadiums internationally make the provision of oxygen cylinders an optional rather than a mandatory item, due to the logistical difficulties of having stored oxygen routinely available on scene during training or competition matches. This necessitates including FMEB items that were not compressed gas driven or dependent. Hence the inclusion of a pressurised metered dose inhaler and volumetric spacer rather than a nebuliser system for acute asthma.

### Box 1 Emergency medical conditions on the football field

- Acute anaphylaxis
- Acute asthma
- Acute chest pain
- Dehydration
- Dental injuries
- Dislocations
- Fractures
- Grand mal seizures
- Head injury
- Heat-related emergencies
- Hypoglycaemia
- Spinal injury
- Sudden cardiac arrest

### Table 1 Contents of the FIFA emergency medical bag

<table>
<thead>
<tr>
<th>Task</th>
<th>Item</th>
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| Personal protection | Pair of latex/nitrile gloves Small/medium/large—as appropriate 2
| | Plastic goggles One size 1
| | Antiseptic hand disinfectant 100 mL 1
| | Rescue scissors shears Stainless steel 1
| Airway management | Magill’s forceps Size—adult 1
| | Suction hand held Manual 1
| | Suction catheter Yankuer 2
| | Suction catheter Flexible 2
| | Spencer Wells artery forceps Straight/stainless steel 2
| | Scalpel handle and blade Size 15, disposable 2
| Breathing | Bag valve manual resuscitator (self-inflating) Without adult—pop off valve 1
| | Bag valve face mask Sizes 3, 4 and 5 1 each
| | Volumetric spacer device Size—adult 1
| | Pulse oximeter With batteries 1
| Circulation | Automated external defibrillator AED 1
| | AED pads Adult 1
| | Shaving type razor Disposable 2
| | Towelling Polyethercotton 1
| | Stethoscope Dual head 1
| | Sphygmomanometer Aneroid clip on 1
| | Venous tourniquet—quick release Size—adult 1
| | Hazard sharps 500 mL container 1
| | Antiseptic type appropriate swab, for example, chlorhexidine Sachets 25
| | IV cannula 14, 16, 18 and 20G 3 each
| | Sterile IV retaining dressing 7.5×8.5 cm packet 4
| | IV fluid administration set 15 drop/mL 2
| | Sterile disposable syringe Size 2 mL, 5 mL, 10 mL, 20 mL 4 each
| | Hypodermic needle Size 21g×40 mm 6
| | Hypodermic needle Size 18g×40 mm 6
| | Lactated Ringer’s solution 500 mLs 2
| | Sterile saline 20 mL 5
| | Arterial tourniquet Size—adult 1
| | Clinical waste bag 20×25 cm with seal 3
| Dressings | Gauze swabs 10 cm×10 cm packet of 5 10
| | Crepe bandage 100, 75 and 50 mm 2 each
| | Trauma wound dressing 100, 75 and 50 mm 4 each
| | Transpose hypaollergenic tape 25 cm 2
| | Sterile burn dressing 100 mm×100 mm 5
| | Plasters Assortment of sizes 1 box
| | Non-suture skin closures Singles 5
| | Adhesive bandage 25 mm 2
| | Celox gauze dressing 1
| | Protective eye shield 1
| Evacuation | Long trauma board Plasticised 1
| | Board immobilisation straps 6×straps/spider type or equivalent 1×set
| | Calico triangular bandage Single wrapped 6

Continued
The contents of the FMEB (figures 1 and 2) have been selected mainly in a generic format such that all of the items can be replaced if used in an emergency or expire using the equivalent locally available stocked items. Additionally the outer compartment of the FMEB has transparent plastic and houses the AED, making the AED presence immediately visible from a distance and easily checked for functionality on a regular basis without having to open the compartment (figures 1 and 2).

Prevention and management of sudden cardiac arrest

As the leading cause of death in sport, SCA warrants specific considerations in the implementation of a comprehensive programme to respond to life-threatening medical emergencies on the field-of-play. F-MARC has therefore outlined the FIFA 11 Steps for the prevention of sudden cardiac death in football (box 2).

Prevention (steps 1–3)

Preparticipation screening is universally supported to identify athletes with pre-existing conditions that place them at risk of catastrophic injury or sudden death. The Precompetition Medical Assessment (PCMA) as recommended by FIFA17–19 involves at least a focused player medical history (PMH), family medical history (FMH) and cardiac specific physical medical examination. A resting 12-lead ECG should be undertaken as part of the PCMA on all players at the beginning of their playing career and then once every year.20 21 Echocardiography should be undertaken by an experienced cardiologist when abnormal results are found on the above history, examination and/or ECG, and should be considered at least once in a player’s early career22 to better detect structural disorders not routinely identified by ECG. An exercise test should be considered in athletes older than 35 years of age and when otherwise indicated.

Planning + protocol (step 4)

Appropriate, annual CPR and AED training should be undertaken for all team staff and referees to ensure these life-saving skills are up to date.23 The FMEB or equivalent should be acquired by, or available to, each team for use, if and when medical emergencies occur, as part of an approved emergency medical plan (EMP).24 All on-duty medical personnel must be familiar and have checked the contents of the FMEB before the game. An approved football team and football stadium EMP should be established that defines what steps are taken, by which football staff, using which equipment, during a medical emergency. The EMP should be part of initial training and revised/practiced at least annually. Prior to each game, roles and responsibilities for each aspect of the EMP should be allotted to medical team members.25 The field-of-play medical team is encouraged to review and/or practice retrieval of the AED and other emergency equipment before each match with on-duty personnel present and equipment positioned and accessible.

The official on-duty field-of-play medical team should be comprised of members who are adequately trained, experienced and have appropriate qualifications in football emergency medicine that is practiced on the field and within the stadium. An on-site attending ambulance must be available on location within the football stadium at a designated time and location, staffed with appropriately trained crew and operational with comprehensive medical equipment. Preferably, the ambulance should be located in a position which enables it to enter the field, if and when required, as part of the EMP.
Consensus statement

Performance of the emergency medical plan (steps 8–11)
Immediate recognition of any collapsed player is the initial primary responsibility of the field-of-play medical team. Any football player who collapses and is unresponsive, particularly if it occurs without contact with another player, is to be regarded as a SCA until proved otherwise.26 Any football player who collapses and displays seizure-like activity and/or agonal respirations should be regarded as a SCA.23 For any suspected SCA, the EMP must be activated immediately followed by prompt CPR and retrieval, application and use of an AED as soon as possible. Chest compressions should be started immediately and continued until the AED has been brought to the collapsed player and can be applied to analyse the cardiac rhythm.26 After adequate chest compressions and AED use has been undertaken, the player must be transitioned to advanced life support by transferring the player to the ambulance inside the stadium, preferably by summoning the ambulance onto the field to the player’s side. If this cannot be done, the player must be safely and quickly transferred to the ambulance with continuous chest compressions and repeat use of an AED if necessary. Effective chest compressions and AED use must also be maintained during ambulance transportation as indicated.27, 28

If the game is resumed following an on-field rescue, medical personnel are reminded to return to the field-of-play to continue their duties. The EMP should include provisions for a ‘return to normal’ situation similar to a pregame timeout including the anticipation of back-up ambulance transport and restoration of used medical equipment.

CONCLUSION
The FMEB and FIFA 11 Steps to prevent SCD are part of a comprehensive preventative programme to appropriately manage SCA14, 15 and other acute life threatening or serious field-of-play medical emergencies. Both the FMEB and FIFA 11 Steps to prevent SCD are part of a broader preventive philosophy promoting player safety and football as a health enhancing leisure activity. Education of the medical and paramedical staff, coaches, physiotherapists, referees and fitness trainers is an essential adjunct to this process. The FMEB is the proposed medical equipment standard to be provided at every football field and to be used when medical emergencies arise. The complete FMEB was presented to the FIFA Congress 2013 and delivered to all FIFA MAs in June 2013.

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