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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

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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.¹³ Additional qualifications such as prehospital basic¹⁴ 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.¹⁵ 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 stretcher¹⁶ 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 necessitated 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

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		
Guedel oropharyngeal tube	Sizes 3 and 4	1 each
Nasopharyngeal airway	6 and 7 mm	2 each
Laryngeal mask airway (LMA)	Sizes 3 and 4	1 each
Water-based lubricating Jelly	50 mL tube	1
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	Polyester/cotton	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
Transpore hypoallergenic 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

Table 1 Continued

Lower limb metal traction splint	Kendrick traction splint or equivalent	1
Rescue type blankets to prevent or treat hypothermia postinjury	Aluminium or equivalent	4
Fractures		
SAM splint orange/blue	91.5 cm×11.5 cm	2
Ambu head wedge cervical	Single	2
General		
Sealable plastic bag	Small, medium and large	2 each
Glucometer	With batteries	1
Glucometer test strips	Singles	Pack of 10
Lancets	Singles	Pack of 10
Black marker + black ink pen		1
Thermometer	Non-mercury	1
Penlight		1
Prescription pad/referral letter		1
Team/venue emergency protocol and contacts		1
Inventory and checklist		1
Medications		
Epinephrine 1 in 1000 injection	1 mg per mL	10
Aspirin tablets	300 mg dissolvable	10
Atropine	0.5 mg in 1 mL	5
Chlopheniramine injection	10 mg in 1 mL	5
Cyclisine injection	50 mg in 1 mL	5
Glucose gel	25 g sachet	3
Glyceryl trinitrate tablets/spray	300 µg sublingual	1 unit
Midazolam	15 mg in 3 mL	3
Salbutamol pMDI (pressurized Metered Dose Inhaler)	200 µg/dose	1
Tramadol injection (or equivalent analgesic)	50 mg in 2 mL	4
Oral rehydration solution sachets		10

AED, automated external defibrillator.

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 FIFA^{17–19} 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



Figure 1 FIFA medical emergency bag.

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.



Figure 2 Contents of the FIFA medical emergency bag.

Play the game + pregame timeout (steps 5–7)

Before starting of all training sessions and all games, a FMEB with AED must be in position at the field-side. In addition, before starting of all games, an on-duty medical team and an adequately staffed and equipped ambulance must be positioned at the field-side.

Box 2 The FIFA 11 Steps to prevent sudden cardiac death in football

Prevention

1. PCMA—player medical history (PMH), family history and physical examination
2. ECG—12-lead, resting, supine; initially + every year
3. Echocardiography—where necessary and at least once in the early career, exercise test where necessary and in athletes >35 years old

Planning + protocol

4. Training and equipment
 - A. CPR + AED training yearly for team staff and referees undertaken
 - B. FIFA medical emergency bag available and checked
 - C. Emergency medical plan—roles and responsibilities allotted; on field response practiced and rehearsed at least once annually
 - D. Field-of-play medical team qualifications + logistics confirmed
 - E. Ambulance location and logistics confirmed

Play the game + pre-game timeout

5. FIFA medical emergency bag with AED in position and checked
6. Field-of-play medical team in position (games)
7. Ambulance, fully functional, in position (games)

Performance of the emergency medical plan

8. Immediate recognition of collapsed player
 - A. Assume SCA if collapsed and unresponsive
 - B. Seizure activity and/or agonal respirations—SCA
9. Activation of emergency medical plan
10. Early CPR and AED application
 - A. Start chest compressions
 - B. Retrieve, apply and use AED as soon as possible
11. Early planned transition to advanced life support
AED, automated external defibrillator; CPR, cardiopulmonary resuscitation; PCMA, precompetition medical assessment; SCA, sudden cardiac arrest.

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 SCA^{14–15} 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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Every football pitch in the world should adopt FIFA emergency medical care standard

This will curb risk of sudden cardiac death among players of world's most popular sport, says FIFA

[The FIFA medical emergency bag and FIFA 11 steps to prevent sudden cardiac death: setting a global standard and promoting consistent football emergency care Online First doi 10.1136/bjsports-2013-092767]

Every football pitch around the globe should adopt a universal standard of emergency medical care, along the lines set out by FIFA, to curb the potential for serious injuries and deaths in the world's most popular sport, urges an international panel of experts in the ***British Journal of Sports Medicine***.

The call comes as FIFA moves to step up efforts to flag up the importance of dealing quickly and expertly with on-pitch medical emergencies, which although not common, are nevertheless a regular occurrence, particularly sudden cardiac arrest, which remains the leading cause of sudden death during play.

In recent years, there have been several high profile cases of sudden cardiac arrest, the most recent of which was Fabrice Muamba, who survived thanks to the prompt care given by a team physician who was part of the sideline medical team.

In a bid to boost the quality of the emergency field-side response, and help medical teams provide a universal standard of potentially life-saving assistance, FIFA's Medical Assessment and Research Center has developed an emergency medical bag (FMEB), with the aid of an international panel of experts, made up of specialists in neurology, cardiology, orthopaedic surgery, sports medicine and emergency medicine.

The FMEB contains a comprehensive inventory of essential but generic equipment, accessories, and medicines - from dressings, syringes, and a stethoscope to a defibrillator and spinal board, which can be used anywhere in the world, at amateur and professional levels, in training and competition.

The FMEB is designed to be used in response to a range of on-pitch medical emergencies, from anaphylactic shock and fractures, to spinal injuries and sudden cardiac arrest, for up to 60 minutes, if needs be.

And following a decision at the 2012 FIFA Congress, the FMEB has been sent to all 209 member associations of FIFA in June of this year.

In view of the varied knowledge, skills, training and composition of healthcare professionals on duty during training and competition, FIFA additionally recommends that key field-side professionals should go on FIFA football emergency medicine training courses, backed up with advanced life support/pre-hospital basic care qualifications.

As part of its prevention programme, the FIFA Medical Assessment and Research Center has also developed the FIFA 11-Steps to prevent Sudden Cardiac Deaths (and other life threatening situations).

The 11-Steps protocol focuses on:

- prevention through screening to pick up athletes with pre-existing conditions that make them more susceptible to major injury or sudden death;
- planning through adequate training and an approved emergency medical plan;
- pre-game preparation to include the FMEB, an on-duty medical team, and an adequately staffed and equipped ambulance;
- putting the emergency medical plan into practice the moment a player collapses on the pitch.

“Both the FMEB and FIFA 11-Steps [...] are part of a broader preventive philosophy promoting player safety and football as a health enhancing leisure activity,” say the authors. “Education of the medical and paramedical staff, coaches, physiotherapists, referees and fitness trainers is an essential adjunct to this process,” they add.

“The FMEB is the proposed medical equipment standards to be provided at every football field and to be used whenever medical emergencies arise,” they conclude.